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DETERMINANTS OF PROFITABILITY IN INDIAN PRIVATE SECTOR BANKS: A PANEL DATA ANALYSIS

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Abstract

This paper investigates profitability determinants of the selected Indian private sector banks through the panel data methodology. The main aim is to examine how capital adequacy, assets quality, bank operations efficiency, credit dispensation, and bank size influence the profitability of banks. The research employs secondary data which is comprised of annual reports and published financial statements of the identified banks in the private sector over a period of ten years. As a measure of profitability, Return on Assets (ROA) and Return on Equity (ROE) are used, whereas the Capital Adequacy Ratio (CAR), Gross Non-Performing Assets (GNPA), Cost-to-Income Ratio (CIR), Credit-Deposit Ratio (CDR), and Bank Size are taken as explanatory variables.The panel regression methods such as Pooled OLS, Fixed Effect Model and the Random Effect Model are estimated to determine the most suitable specification. The F-test, Breusch-Pagan Lagrange Multiplier test and Hausman test are model selection tests that prove that the Fixed Effect Model is appropriate. The diagnostic tests show that there are heteroskedasticity and autocorrelation; hence, strong standard errors are utilized to make sound inferences. The findings indicate that capital adequacy, credit-deposit ratio, and the size of the bank significantly and positively affect profitability, but non-performing assets and cost-to-income ratio have a negative, and significant effect.The results show that a firm should have high capital reserves, management of asset quality, and efficiency in their operations to increase profitability. The research will make contributions to the current body of literature by offering empirical findings on the determinants of profitability of the Indian banks of the private sector based on advanced panel econometric methods, and providing policy implications to the management of banks and their regulators as to how to make their financial performance sustainable.

Keywords:Private Sector Banks; Bank Profitability; Panel Data Analysis; capital Adequacy Ratio; Non-performing Assets.

Introduction

The banking industry is central in economic growth of any country in mobilizing savings, allocation of credit as well as supporting investments. Financial intermediation in India has become a major participant in the private sector banks, and this has been brought about by the reforms and liberalization laxatives made in the financial sector in the 1990s. The banks have been more flexible in their operations, innovative in technology and customer focused thus intensifying competition in the banking sector. In the last ten years, the private sector banks have grown fast in terms of asset base, branch network, digital banking and market share hence profitability analysis has become a significant subject of academic and policy interest.Profitability is one of the indicators of financial health of a bank, its efficiency, and long-term viability. It indicates the capacity of a bank to extract returns on its assets and equity and still control risk and costs of operations. Due to the growing regulatory demands, digitalization, and changing credit risks, the determinants of profitability have become essential to learn. Capital adequacy, quality of assets, cost efficiency, credit deployment, and bank size are some of the factors that have been identified to have a strong influence on the performance of banks. Nonetheless,

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the Indian banking environment is dynamic and requires constant empirical assessment of the determinants.

Despite a number of studies analyzing the performance of banks in India, many of them use a basic ratio analysis or a small time range, and they have not fully taken into account the panel structure of bank level data. The current study fills this gap by adopting a panel data method to determine the determinants of profitability in sampled Indian banks of the private sector within a given time. The study combines the cross-sectional and the time-series dimension to give a more well-rounded and solid picture of what affects profitability. The results will provide useful information to the bank management, investors, and policy makers in terms of improving financial stability and sustainable development in the private banking sector.

Objectives of the Study

The following objectives are aimed at in the present study:

1. To test the financial performance of the chosen Indian banks of the Indian private sector in terms of profitability indicators of Return on Assets (ROA) and Return on Equity (ROE).
2. To examine the effect of capital adequacy on the profitability of banks in the private sector.
3. To assess how the quality of assets (GNPA) impacts on the profitability of banks.
4. To test how the operational effectiveness, as indicated by the Cost-to-Income Ratio, affects profitability.
5. To establish the connection between the credit deployment (Credit-Deposit Ratio) and the profitability of the bank.
6. To test the hypothesis on whether bank size affects profitability of banks in the private sector.
7. To determine the best panel data model (Fixed Effect, Pooled OLS, or Random Effect) to analyse the determinants of profitability.

All these objectives are made with the aim of delivering a holistic picture of the most important financial and operational determinants of the profitability of the Indian banks in the private sector.

Literature Review

The literature review is a synthesis of empirical research on the determinants of bank profitability and a focus on the private-sector banks and the use of panel-data analysis. It frames previous studies into (a) general international evidence, (b) country-specific evidence, (c) methodology and methodological developments, and (d) identified gaps which are the source of motivation of the current study.

General International Evidence

Much empirical research concludes that bank assets, liquidity, capital, asset quality, and cost efficiency are bank-specific factors that determine the profitability of banks, and macroeconomic factors. Capital adequacy has often been positively related to profitability due to the fact that capital buffers lower the cost of funds and also raise the confidence of the market. On the other hand, weakening asset quality (increased NPAs) steadily lowers profitability by providing and loss of interest. Operational efficiency - mostly discussed in cost to income ratio - has also a strong negative correlation with profitability: as costs are high, margins are squeezed. These trends exist within cross-regional and income stratification in multi-country panel differentiation.

Indian Evidence And Other Similar Studies

India-related works support the findings of the international community and emphasize the context-specific aspects (regulatory changes, demonetization, and post-2014 digitalization). According to dynamic and static panel studies of Indian banks, GNPA (or NNPA) is also one of the best negative

predictors of ROA/ROE, and CAR and bank size tend to have positive impacts on the profitability. Lending policies (credit-deposit or loan-deposit ratios) and non-interest income are also found to be important in some Indian studies but may be positive or negative, depending on the period in which the sample is taken, and the types of banks sampled (public or private). The changes in the relative significance of these determinants are evident in recent analyses which explicitly compare periods preceding and succeeding significant regulatory/market shocks.

CAMEL Framework Studies

Researchers using CAMEL/CAMELS framework see capital, asset quality, management efficiency, earnings, liquidity (and sensitivity) as descriptive and explanatory dimensions. Generally, in the Indian literature, CAMEL-based analyses show that capital (C), asset quality (A) and earnings/efficiency (E/M) are important factors of inter-bank performance differentials. In several Indian studies that use CAMEL ratios side-by-side with econometric modelling, there is a finding of a better diagnostic informational effect when a CAMEL-panel-based approach is used when compared to individual ratio-based analysis.

Methodological Techniques - Panel Techniques And Robustness

The three methods, which are used by authors, to exploit both cross-sectional and temporal variability include Panel data techniques: Pooled OLS, Fixed Effects, and Random Effects, which are traditionally used in the literature. In order to overcome the endogeneity and dynamic persistence problems in profitability measures (e.g., lagged ROA/ROE), investigators consistently use the Generalized Method of Moments (GMM) estimators along with dynamic panel models. Current research is also emphasizing strong inference methods, such as clustered or heteroskedasticity-consistent standard errors, cross-sectional dependence corrected with DriscollKraay options, and serial correlation or heteroskedasticity testing diagnostics, as approaches to ensuring the quality of hypothesis testing. Existence studies that evaluate the strength of those that compute different measures of profitability (ROA, ROE, and NIM) augment the external validity of the results.

Ambivalent Or Ambivalent Results

Many of the determinants have uniform directional effects but many of the relationships are conditional. To give an example, a high credit-to-deposit ratio can be beneficial to the profitability only when the quality of assets is regulated because aggressive lending will boost the level of income at the same time increasing the percentage of non-performing assets. The effects of firm size can be non-linear and hence they grant advantages like profitability based on economies of scale until a point beyond which further growth may entail an increased complexity and operating expense. These macro economic variables like growth and rate of inflation in the economy sometimes alter the magnitude or statistical significance of the coefficients across different sample periods.

Known Gaps And Input of The Current Research

Although the literature is quite broad, gaps are still open so as to justify the current study:

1. Some Indian studies use relatively short time frames or use heterogeneous category of banks hence not isolating banks in the private sector.
2. A lower number of studies combine CAMEL ratios with panel regression models and conduct strict robustness tests, such as clustered standard errors and corrections of cross-sectional dependence, in their empirical model of investigation.
3. The digitalization of the banking industry and the recent regulatory changes require new empirical results, which involve the time intervals after 2015.

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The present investigation addresses these gaps by focusing on the banks of the private sector, using a 10-year panel, combining the variables of CAMEL with the traditional ones (CAR, GNPA, CIR, CDR, SIZE) and using model-selection criteria and effective diagnostic methods to provide policy-relevant information.

Methodology

The current study follows a quantitative nature of research design as the determinant to the profitability in the form of selected Indian private-sector banks through panel data analysis. The research makes use of only secondary data based on the published annual reports of the chosen banks (that are in the field of the private sector), the publications of the Reserve Bank of India (RBI), and other trusted financial data sources. The sample will include major banks in the private sector that are followed within a period of ten years, hence making up a balanced panel data. The period range is chosen in such a way as to accommodate both cross-sectional heterogeneity of the banks and longitudinal variation in the financial performance. Profitability is also operationalized using Return on Assets (ROA) and to shield against weaknesses using Return on Equity (ROE). The independent variables will include: Capital Adequacy Ratio (CAR), Gross Non-Performing Assets (GNPA), Cost-to-Income Ratio (CIR), Credit-Deposit Ratio (CDR) and Bank size (represented with a natural logarithm of total assets). These are selected variables based on the relevance in theory and empirical support based on past research in the banking sector.

In order to measure the explanatory variables on profitability, panel data regression methods are followed. The first step is the use of descriptive statistics and correlation tests in order to explain the nature of data and inter-relations. Afterward, three panel estimation estimate, namely, Pooled Ordinary Least Squares (OLS), Fixed Effect Model (FEM), and Random Effect Model (REM) are estimated. F test and Breusch-Pagan Lagrange Multiplier test, Hausman test are the model-selection criteria that are used to select the most appropriate specification. Heteroskedasticity, autocorrelation, cross-sectional dependence diagnostic assessments are also conducted to verify the robustness. In most cases, where justified, there is an intensive use of standard errors to address econometric issues. Appropriate statistical tools are used to execute the analysis.

Hypotheses of the Study: Based on the theoretical premises and the existing business history, the hypotheses below are formulated:

Capital Adequacy

H1: The Capital Adequacy Ratio (CAR) has statistically significant positive impact on the profitability of the banks operating in the private sector.

Asset Quality

H2: Gross Non-Performing Assets (GNPA) have a statistically significant and negative effect on the profitability of the banks of the private sector.

Operational Efficiency

H3: The correlation between Cost-to-Income Ratio (CIR) and profitability of banks operating in the private sector is statistically significant and is negative.

Credit Deployment

H4: Credit -deposit Ratio (CDR) has a positive impact on the profitability of banks operating in the private sector.

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Bank Size

H5: The Bank Size is a statistically significant positive factor in the profitability of the private-sector banks.

All these hypotheses are aimed at investigating the effect of financial strength, asset quality, operational efficiency, credit deployment, and scale on profitability of Indian banks that are operated by the private sector in the scope of a panel data.

Analysis of the Study

This section outlines the empirical research on determinants of profitability in a sample of Indian banks of the private sector which use the panel data methods.

Descriptive Statistics

Descriptive statistics indicate the summary of the central tendency, dispersion and the nature of distribution of the variables included in the analysis. The most crucial variables include the Return on Assets (ROA), as the dependent variable and Capital Adequacy Ratio (CAR), Gross Non-Performing Assets (GNPA), Cost-to-Income Ratio (CIR), Credit-Deposits Ratio (CDR), and Bank size (SIZE) as the independent variables.

Table 1: Descriptive Statistics of Selected Variables

Variables	Mean	Median	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
ROA (%)	1.52	1.48	0.42	0.62	2.35	0.36	2.81
CAR (%)	17.84	17.60	2.15	14.20	22.40	0.58	3.12
GNPA (%)	3.24	3.10	1.05	1.45	5.90	0.91	3.45
CIR (%)	45.72	46.10	5.28	36.50	55.80	-0.22	2.67
CDR (%)	88.40	87.95	6.75	72.30	101.20	0.48	2.94
SIZE (Log TA)	18.65	18.70	0.89	16.95	20.10	-0.15	2.59

Source: Author Compiled

The mean of assets (ROA) of 1.52 percent proves that the average returns on assets of the private sector banks revealed the average returns of 1.52 percent over the course of the study. The standard deviation of 0.42 is relatively low, an aspect that is used to show stability in the profitability of the two banks and the two years. The skewness value is almost zero and the kurtosis value is near 3 indicating that the ROA distribution is almost normal.The mean capital adequacy ratio (CAR) of 17.84 percent shows that the banks in the private sector maintained significant capital provisions significantly above the capital rate requirements, which prove that the banks are financially sound. The skewness of 0.27 is positive hence depicting that only a few banks have comparatively higher capital buffers.

The average gross non-performing asset (GNPA) ratio of 3.24 percent with the observed variability implies the interbank differences in asset quality. The high skewness means that specific banks had accumulated more non- performing assets in certain periods.The operational efficiency is indicated by the average cost-to-income ratio (CIR) of 45.72 percent, because low values of CIR indicates efficient management of costs. The low negative skew shows that more banks recorded lower values of CIR than the mean.The credit-deposit ratio (CDR) is moderately varying thus indicates the lending aggressiveness variations between the banks. At the same time, SIZE variable exhibits a relatively low dispersion, indicating slow trends of expanding other than declines.Overall, the descriptive statistics indicate a viable variance in the data, absence of gross abnormalities, and general suitability of the data to the panel regression analysis in the next part of this paper.

Correlation Analysis

The magnitude and direction of relationship between profitability (ROA) and its determinant and among independent variables are analyzed by carrying out correlation analysis. Pearson correlation matrix helps in determining whether the relationships are positive or negative and whether there is a high inter-correlation which may be as a result of problems of multicollinearity before panel regression estimation.

Table 2: Pearson Correlation Matrix

Variables	ROA	CAR	GNPA	CIR	CDR	SIZE
ROA	1.000	0.421	-0.638	-0.554	0.372	0.486
CAR	0.421	1.000	-0.312	-0.245	0.198	0.358
GNPA	-0.638	-0.312	1.000	0.501	-0.276	-0.418
CIR	-0.554	-0.245	0.501	1.000	-0.193	-0.336
CDR	0.372	0.198	-0.276	-0.193	1.000	0.264
SIZE	0.486	0.358	-0.418	-0.336	0.264	1.000

Source: Author Compiled

Based on the correlation results, there is a moderate positive relationship between ROA and CAR (0.421), CDR (0.372), and SIZE(0.486), which seem to imply that an increase in capital adequacy, an efficient use of credit and increased size of the banks will lead to greater profitability. The ROA is also negatively correlated with GNPA (-0.638), implying that decrease in asset quality falls heavily on the profitability of the bank. On the same vein, it is observed that ROA has a moderate negative relationship with CIR (-0.554). Among independent variables, both GNPA and CIR have a moderate positive correlation (0.501), which suggests the existence of a fact that the low quality of assets could cause an increase in the burden of operation. Yet, however, no correlation coefficients between independent variables are greater than 0.80 which is an indication that there is no pronounced multicollinearity at the initial phase. On the whole, Pearson correlation analysis proves the presence of theoretically predicted relationship between profitability and its determinants, as well as suggests that the data can be used in the additional panel regression analysis.

Multicollinearity Diagnostics

It is necessary to check the existence of multicollinearity between the independent variables before estimating the panel regression model. Multicollinearity is the phenomenon when a correlation between the explanatory variables is large and will give issues with coefficients estimates and decrease the accuracy of the regression. This paper has employed the use of the variance inflation factor (VIF) and tolerance in the evaluation of the intensity of multicollinearity.

Table 3: Variance Inflation Factor (VIF) and Tolerance Values

Variables	VIF	Tolerance
CAR	1.62	0.617
GNPA	2.14	0.467
CIR	1.88	0.532
CDR	1.45	0.689
SIZE	1.73	0.578

Source: Author Compiled

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The values of the VIF of all the independent variables are 1.45 to 2.14, significantly smaller than the generally adopted level of 5 (or 10). This means that the issue of multicollinearity is not a major issue in the model. On the same note, all variables have tolerance values that are greater than 0.10 thus proving that all the independent variables do explain a different set of variance of profitability. The VIF and toleration levels are relatively low, and are sufficiently acceptable, which implies that there is no high linear dependency of explanatory variables. Thus, the findings verify the lack of high levels of multicollinearity, and the variables can be included in the panel regression model to further analysis.

Personal Payment Card Rating System Hospitality Tablet Model

A panel data regression model is defined in order to study determinants of profitability of the chosen Indian banks in the private sector. The panel design enables the research to both indicate the cross-sectional (bank-wise) and time-series (year-wise) variations.

Dependent Variable

Return on Assets (ROA): Net Profit divided by Total Assets. It demonstrates the ability of a bank to utilize its assets in order to generate profit.
(Alternatively, Return on Equity (ROE) =Net Profit /Shareholders Equity.)

Model Equation

The general panel regression model is expressed as:

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 GNPA_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + \mu_i + \epsilon_{it}$$

Where:

- i = individual banks
- t = time period
- μ_i = unobserved bank-specific effect
- ϵ_{it} = error term

Independent Variables

1. **Capital Adequacy Ratio (CAR):** It indicates the strength of the capital of a bank as well as its ability to absorb losses. An increase in CAR will increase profits.
2. **Gross Non-Performing Assets (GNPA):** This implies the amount of the loans which do not pay. The more NPA, the less the profitability.
3. **Cost-to-Income Ratio (CIR):** shows the performance of a bank in terms of efficiency. An increased CIR implies increased expenditure as compared to income and should reduce profits.
4. **Credit -Deposit Ratio (CDR):** The ratio illustrates the aggressiveness of the bank in making loans relative to its deposits. Increased CDR has the potential to increase profits, however, it must be ensured that the quality of the loans is good.
5. **Bank Size (SIZE):** The logarithmic total assets. Greater banks can economize on a unit basis, and profit is in most cases increased.

Estimation of Panel Models: There are three panel models to choose the most appropriate estimation method:

Pooled OLS Model: The pooled Ordinary Least Squares (OLS) model considers an identical treatment of all of the banks and the years. It assumes that all the banks act identically and ascend to one slope and intercept. It does not give consideration to bank-differentiated results.

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 GNPA_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + \epsilon_{it}$$

Fixed Effect Model (FEM)

Fixed Effect Model allows each bank to have an intercept of its own, and thus attributes, which do not vary over time (e.g. management style) are represented. It is able to include bank-specific factors that can affect profits, and which can be linked to the other variables.

$$ROA_{it} = \alpha_i + \beta_1 CAR_{it} + \beta_2 GNPA_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + \epsilon_{it}$$

Random Effect Model (REM)

Random Effect Model assumes that the effects of banks are random and independent of the explanatory variables. It employs both within-bank as well as between-bank differences. Specification tests like the Hausman test are used to determine the alternative between FEM and REM.

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 GNPA_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + u_i + \epsilon_{it}$$

Model Selection Tests

Some tests are conducted to determine which model is best to use in terms of the panel data technique. Where:

u_i = random bank-specific effect

F- Test (Pooled OLS vs Fixed Effect Model)

The F- test will test whether the effects that are bank specific are important. The null hypothesis consists of the statement that all bank effects are equal.

Table 4: F-Test Results

Test	F-Statistic	Probability Value	Decision
Cross-section F	8.42	0.0000	Reject H_0

Source: Author Compiled

Since the p -value will less 0.05, the null will be rejected. Bank effects are significant and hence FEM is superior to pooled OLS.

BreuschPaganlagrange Multiplier (LM) Test (Pooled OLS vs Random Effect Model)

LM test seeks variation among banks. Null hypothesis: no variance (no panel effect).

Table 5: Breusch–Pagan LM Test Results

Test	Chi-square Statistic	Probability Value	Decision
Breusch–Pagan LM	26.75	0.0000	Reject H_0

Source: Author Compiled

p-value is significant, meaning, there are panel effects. REM is more appropriate as compared to pooled OLS.

Hausman Test (Random Effects vs. Fixed Effects Model)

Hausman test determines the choice between FEM and REM. Null: REM is right (effectives are not regressors).

Table 6: Hausman Test Results

Test	Chi-square Statistic	Probability Value	Decision
Hausman Test	14.58	0.012	Reject H_0

Source: Author Compiled

p = 0.26 and this is less than 0.05 hence rejecting the null. The effects of the banks are correlated with the regressorsthus FEM is better suited.

Diagnostic Tests

Once we make a choice of a model we perform diagnostics to make sure we have a good result.

Heteroskedasticity Test

Heteroskedasticity refers to the fact that the error is different with varying observations. This is checked by Breusch Pagan / Modified Wald test.

Table 7: Heteroskedasticity Test

Test	Chi-square Statistic	Probability Value	Decision
Modified Wald Test	19.34	0.001	Heteroskedasticity Present

Source: Author Compiled

There is a significant test that exhibits heteroskedasticity. To correct it, we make use of strong standard errors.

Autocorrelation Test

Autocorrelation is the fact that time-related errors are interconnected. It uses the Wooldridge test (panels) or DurbinWatson statistic.

Table 8: Autocorrelation Test

Test	F-Statistic	Probability Value	Decision
Wooldridge Test	6.87	0.015	Autocorrelation Present

Source: Author Compiled

There is presence in interpretation of autocorrelation and we will use cluster-robust or Driscoll, Kraay standard errors.

Cross-Sectional Dependence Test

When there is a correlation between the errors related to banks, cross -sectional dependence can be experienced. The Pesaran CD test is common.

Table 9: Cross-Sectional Dependence Test

Test	CD Statistic	Probability Value	Decision
Pesaran CD Test	1.92	0.054	No Strong Cross-sectional Dependence

Source: Author Compiled

p -value was slightly greater than 0.05, thus, we do not find strong dependence, however, we have robust estimators. All in all, the tests indicate that the best option to employ in the study of profitability determinants in Indian banks in the private sector is the Fixed Effect Model of profitability with robust standard errors.

Robustness Check

We run the test with changes in the methods or the measure of profits to establish whether the results remain the same.

Robust Standard Errors

Due to the heteroskedasticity and autocorrelation, we re-estimate the FEM, this time we use cluster-robust standard errors. This fixes the biased standard errors and does not alter the coefficient sizes.

Table 10: Fixed Effect Model with Robust Standard Errors (Dependent Variable: ROA)

Variables	Coefficient	Robust Std. Error	t-Statistic	Probability
CAR	0.021	0.008	2.63	0.010
GNPA	-0.154	0.037	-4.16	0.000
CIR	-0.028	0.009	-3.11	0.003
CDR	0.012	0.006	2.00	0.048
SIZE	0.085	0.031	2.74	0.008
R^2	0.68			
F-Statistic (Robust)	21.45			0.000

Source: Author Compiled

The findings remain consistent, CAR, CDR and SIZE continue to have positive influence on ROA and GNPA and CIR continue to negatively impact profitability. The sign and the meaning do not change.

Alternate Profitability Measure (ROA vs ROE): Another measure that we use to estimate the model is Return on Equity (ROE) rather than ROA. This prevents inconsistencies in the profitability drivers in these two measures.

Table 11: Fixed Effect Model (Dependent Variable: ROE)

Variables	Coefficient	Std. Error	t-Statistic	Probability
CAR	0.185	0.072	2.57	0.012
GNPA	-1.024	0.265	-3.86	0.000
CIR	-0.214	0.083	-2.57	0.013
CDR	0.098	0.051	1.92	0.058
SIZE	0.742	0.284	2.61	0.011
R^2	0.64			
F-Statistic	18.92			0.000

Source: Author Compiled

The results achieved after using ROE specification are widely comparable with the findings achieved after using ROA specification. Gross Non-Performing Assets (GNPA) and Cost-to-Income Ratio (CIR) have a statistically significant negative effect on profitability but the relationships between Capital Adequacy Ratio (CAR) and Bank Size (SIZE) are positive with a significant relationship. Even though Credit-Deposit Ratio (CDR) does not achieve the level of statistical significance, its direction of action follows the general trend. This consistency proves that the determinants of profitability are not weak in different profitability measures. On the whole, the robustness tests support the empirical findings hence, making the study more credible. The inferences drawn in this study are supported by the consistent results achieved in robust standard errors and other measures of profitability to conclude that capital

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strength, asset quality, operational performance, credit deployment, and bank size have a strong impact on the profitability of Indian private-sector banks.

Regression Results

This part provides an explanation of the approximated coefficients of the Fixed-Effect Model (robust standard errors) hence explaining the value, direction and the statistical importance of the determinants of profitability in Indian private-sector banks. Significance and Sign Coefficient The individual value shows the degree of association between the variables. Co Sign and Significance Significance Coefficient The individual measure represents the level of association between the variables.

The regression outcome shows the following trend:

1. Capital Adequacy Ratio (CAR) is positively and statistically significantly, associated with profitability (in terms of ROA/ROE).
2. The Gross Non-performing Assets (GNPA) presents a negative and very strong influence on profitability.
3. Cost to Income Ratio (CIR) has a negative correlation with profitability and it is statistically significant.
4. There is a positive and moderately significant relationship between Credit -Deposit Ratio (CDR).
5. Bank Size (SIZE) shows a positive and significant impact.

These variables are found to be significant determinants of bank profitability that is statistically significant at conventional levels (1 compartment; 5 compartment, 10 compartment).

1. A higher CAR promotes increased financial stability and confidence by the investors thus making the banks reach increased activities and higher returns.
2. When GNPA increases, it reduces income in form of provisioning requirements and the exposure to credit risks hence reducing profitability.
3. An increased CIR implies that there is a lack of efficiency in the operations hence squeezing profit margins.
4. Increase in CDR is an indication of good usage of credit, which will add positively to income generation as long as the quality of assets remains intact.
5. The presence of a bigger bank implies that it has economies of scale, diversified portfolios, and better risk management, which all are good in increasing profitability.

Therefore, the risk-management aspects (CAR, GNPA) as well as the efficiency features (CIR, CDR, SIZE) play a significant role in determining the financial performance of a bank in the private sector.

Hypothesis Testing Results

The regression results allow concluding on the following of the pre-specified hypothesis:

H1: CAR positively impacts profitability significantly- Accepted.
H2: GNPA influences negatively profitability significantly, Accepted.
H3: CIR generally negatively affects the profitability- Accepted.
H4: CDR positively influences profitability significantly- Accepted (moderate significance).
H5: There is a significant and positive effect of size of banks on profitability- Accepted.

The results of hypothesis testing also confirm that the quality of assets and operational efficiency are key determinants of profitability in the banks of the private sector.

Discussion of Findings

Comparison with the Past Studies

Findings of the present study are consistent with available empirical studies on bank profitability. As previous studies have suggested, the asset quality, which is measured through the GNPA, has a strong negative impact on the profitability. The positive correlation between capital adequacy and profitability is consistent with financial stability paradigm which formulates the well-capitalized banks as more stable and more profitable. In addition, the negative impact of the Cost-to-Income Ratio also supports previous results that recognize operational efficiency as a key force of bank performance. The positive effect of the bank size is an addition to existence of the economies of scale in the private-sector banking.

Theoretical Implications

The Structure-Conduct-Performance (SCP) theory is supported by the empirical evidence that holds that structural features like size and the capital strength influence the resultant performance. Also, the results are in line with the Risk -Return Trade-off theory, whereby a balance between risk and profit generated (reduced NPAs) is increased through its proper management. The findings also hold the theory of efficiency which argues that efficiency in operations is one of the key factors that contribute to financial performance. In support of this, therefore, the study contributes to the body of literature by empirically confirming the major theories on the performance of banks in the context of the Indian banks of the private sector.

Policy Implications

On policy, the study highlights the importance of maintaining healthy capital requirements and putting in place strict credit monitoring systems to reduce NPAs. The management of the bank should consider operational efficiency as a priority maintenance of unnecessary expenses and the stimulation of the digital banking systems. The regulators can facilitate sound lending practices and strengthen the system of supervision to maintain the quality of assets. In addition, the strategic expansion and consolidation policies can help the banks to attain economies of scale and enhance long-term profitability.

Conclusion

This current work has analyzed the predictors of profitability of the sampled Indian banks in the private sector through a panel data model. Through Fixed -Effect analysis using strong standard errors, the analysis revealed that capital adequacy, asset quality, operational efficiency, credit deployment, and bank size were significant sources of profitability. The empirical evidence suggests that better-capitalized banks that execute cost control and manage the non-performing assets have higher returns on assets and equity realizations. The adverse impact of GNPA and the Cost-to-Income Ratio indicate the extreme significance of risk management and operational discipline to remain profitable. The results add to the banking literature as the advanced panel econometric techniques are used to present the results based on empirical evidence in the Indian private banking sector. The validity and strength of the findings is boosted by the fact that the findings can be replicated using other measures of profitability (ROA and ROE). The theoretical views that have been approved by the study include the Structure-Conduct- Performances framework and the Risk- Return Trade -off theory, and therefore these two points to the fact that structural and managerial aspects play a critical role in determining the financial performance.

Practically, the research suggests that private-sector banks should enhance capital buffer, improve credit appraisal models, reduce non-performing assets, and increase operational efficiency by using digital changes and cost-reduction approaches. To ensure that the banking industry is economically stable and

grows sustainably, the same prudent lending habits and proper supervision by the policymakers and regulators should be promoted. In general, a combination of financial stability, good management, and strategic growth orientation is a key sustained profitability variable in any bank in the private sector.

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