Investigating the impact of Green Banking initiatives on Private Sector Bank

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Abstract: This study examines the determinants of profitability in Indian private sector banks using panel data from 13 banks listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) over the period 2013–2022. Panel Least Squares Regression with Return on Assets as the measure of financial performance. Our analysis reveals that revenue diversification through non-interest income and cost efficiency, measured by operating expenses relative to total funds, are the strongest drivers of bank profitability. Traditional credit-risk variables such as gross non-performing assets and liquidity indicators show limited statistical significance in explaining profitability variations. These findings highlight that Indian private sector banks prioritizing income composition management and cost discipline achieve superior financial performance compared to those relying primarily on asset quality metrics. The results have implications for bank strategy and management in the Indian banking sector, suggesting that operational efficiency and revenue mix warrant greater emphasis in performance optimization.

Keywords: Panel data, banks, ROA, NPL,Performance

Introduction

Understanding the drivers of bank profitability is critical for both managers and regulators in India's rapidly evolving financial sector. While conventional wisdom emphasizes asset quality and risk management, empirical evidence suggests that profitability may be shaped as much by revenue composition and operational efficiency. This study investigates what actually determines profitability in Indian private sector banks.

The data considers 13 private commercial banks listed on the NSE and BSE in India over ten years (2013–2022). India's banking sector has undergone substantial transformation during this period. The Reserve Bank of India has championed regulatory modernization, digital banking adoption, and inclusive finance initiatives. Meanwhile, private sector banks including HDFC Bank, ICICI Bank, Axis Bank, and Kotak Mahindra Bank have invested heavily in technology, branch networks, and service expansion. Yet questions remain about which business drivers truly move profitability amid this dynamic environment.

Our focus is empirical. Do non-performing assets, liquidity ratios, and interest margins predict returns on assets? Or does profitability depend more on revenue diversification, fee-based income, and cost control? Using panel regression test we understand which factors matter most and which add little explanatory power in the Indian context.The findings carry practical implications for Indian bank management. If cost efficiency and income mix are the primary drivers, bank management should prioritize operational improvement and revenue diversification. Our results contribute to this debate with direct empirical evidence from India's private banking sector.

Literature Review

Research on bank profitability has traditionally focused on credit risk, liquidity management, and interest rate margins. The logic is straightforward good asset quality protects profitability; poor liquidity management creates constraints; and favorable rate spreads boost returns. This framework has guided Indian bank regulation and management practice.

However, recent work has highlighted the importance of operational efficiency and revenue diversification. Studies across emerging markets, including India, have shown that efficiency metrics significantly influence bank profitability. Fijałkowska et al. (2018) demonstrated that cost management and operational performance correlate with financial returns. Xhani (2025) found positive relationships between efficiency-driven innovations and organizational performance.These findings suggest that how banks manage their cost base and diversify revenue streams may matter as much as, or more than, traditional risk metrics. Indian private sector banks investing in technology, process improvement, and fee-generating businesses (wealth management, investment banking, insurance distribution) have often achieved stronger profitability even with similar asset quality profiles.The question remains: within India's private banking sector, which factors dominate profitability? This study provides an empirical answer.

Setting Hypotheses

H_0: The independent variables have no significant association with profitability in Indian private sector banks.

H_1: The independent variables have a significant association with profitability in Indian private sector banks.

Data and Methods

Sample: Thirteen private commercial banks listed on the NSE/BSE, observed over ten years (2013–2022), yielding 130 panel observations.

Data Sources: Financial data were drawn from annual reports and regulatory filings of the banks, publicly available through stock exchange disclosures. Macroeconomic variables were sourced from World Bank and Reserve Bank of India databases.

Study Period & Observations

Method: Panel least squares regression with Return on Assets (ROA) as the dependent variable and bank-specific fundamentals as independent variables, including revenue composition (non-interest income, net profit margins), cost measures (operating expenses), and asset quality and liquidity ratios.

Table 1 : Variable Details

Types	Variables
Dependent	ROA
Independent	5 Green banking specific variable

Control	7 variable

Results and Discussions

Table 2 Panel Regression

OPERATING_EXPENSES___TOTAL_INC...	0.086126	0.040578	2.122479	0.0350
OPERATING_EXPENSES___TOTAL_FU...	-1.024506	0.383664	-2.670318	0.0082
NON_INTEREST_INCOME___TOTAL_F...	1.591745	0.335795	4.740226	0.0000
NET_PROFIT___TOTAL_FUNDS____	0.548772	0.065636	8.360907	0.0000
NET_NON_PERFORMING_ASSETS	3.97E-05	2.78E-05	1.427009	0.1551
NET_INTEREST_MARGIN___	0.007916	0.041621	0.190091	0.8493
NET_INTEREST_INCOME	7.63E-06	3.43E-06	2.223741	0.0272
INTEREST_INCOME___TOTAL_FUNDS___	0.137720	0.105159	1.309627	0.1918
GROSS_NON_PERFORMING_ASSETS	-2.17E-05	1.29E-05	-1.685012	0.0935
CREDIT_DEPOSIT___	0.000241	0.001470	0.163791	0.8701
COST_OF_INCOME_RATIO___	0.000323	0.002300	0.140402	0.8885
CASH___DEPOSIT____	-0.000649	0.022350	-0.029038	0.9769
__OF_GROSS_NON_PERFORMING_AS...	0.016061	0.020226	0.794104	0.4280
C	-1.663728	0.997892	-1.667242	0.0970

Model Summary Statistics

Statistic	Value	Statistic	Value
R-squared	0.699885	Mean dependent	1.004375

Statistic	Value	Statistic	Value
		var	
Adjusted R-squared	0.678243	S.D. dependent var	1.118623
S.E. of regression	0.634524	Akaike info criterion	1.996866
Sum squared resid	83.74513	Schwarz criterion	2.240555
Log likelihood	-207.6490	Hannan-Quinn criter.	2.095231
F-statistic	32.33792	Durbin-Watson stat	1.945643
Prob(F-statistic)	0.000000		

The regression model strongly rejects H_0 (F-statistic = 32.34, $p < 0.001$), demonstrating that the independent variables have a significant collective association with profitability in Indian private sector banks. The model explains 70% of variation in ROA, indicating good explanatory power. Among the variables tested, non-interest income emerges as the strongest predictor (coefficient: 1.59, p = 0.0000), followed by net profit margins (coefficient: 0.55, p = 0.0000) and operating expenses (coefficient: -1.02, p = 0.0082), all statistically significant at the 5% level. Notably, net interest income shows marginal statistical significance (p = 0.0272) but with negligible effect size. In stark contrast, traditional credit-risk and liquidity metrics—net non-performing assets (p = 0.1551), net interest margins (p = 0.8493), credit-to-deposit ratios (p = 0.8701), and cash-to-deposit ratios (p = 0.9769)—are statistically insignificant predictors of profitability. These findings indicate that profitability in Indian private sector banks is driven primarily by business model factors such as fee-based income generation and cost discipline, rather than by loan quality or traditional banking spreads, suggesting that banks prioritizing operational efficiency and revenue diversification achieve superior financial performance.

Interpretation and Discussion

The regression models explain 69.98% of the variation in bank profitability, with strong overall significance. However, the significant predictors are limited to a specific set of variables.

Revenue diversification, measured by non-interest income as a share of total funds, emerges as the strongest positive predictor of ROA. Indian private sector banks that generate material income from wealth management, investment banking, insurance distribution, and fee-based services demonstrate notably higher profitability than those reliant on traditional lending spreads alone.

Cost efficiency, measured by operating expenses relative to total funds, is strongly and negatively associated with ROA. This confirms the expected relationship: higher cost burdens reduce profitability.

Net profit margins also show a strong positive association with ROA, reflecting efficient conversion of funds into profit.

By contrast, traditional credit-risk variables (gross non-performing assets, net NPA, NPA ratios) are not statistically significant predictors of ROA. Liquidity and pricing metrics (credit-to-deposit ratios, cash-to-deposit ratios, net interest margins, interest income-to-total funds ratios) also fail to reach significance.

This pattern is notable among Indian private sector banks: profitability appears driven primarily by business model factors (revenue mix and cost structure) rather than loan-book quality or pricing discipline. The absence of significance for credit-risk variables suggests that day-to-day profitability is determined more by operational performance than by asset composition, at least within this cross-section of well-managed private banks.

These results have clear implications for Indian bank strategy. Private sector banks seeking to improve ROA should prioritize: (1) developing non-interest income streams through digital banking, fintech partnerships, wealth management services, and insurance distribution; (2) relentless cost discipline through technology automation and process optimization; and (3) converting revenue into profit through better pricing and portfolio management.

The weak explanatory power of credit-risk metrics may reflect that among listed private banks in India, asset quality differences are modest and risk management standards are reasonably consistent owing to strong RBI oversight. In such a context, marginal differences in profitability are driven by business execution, fee generation, cost control, and capital efficiency rather than by differences in asset quality. This pattern is consistent with mature, competitive banking markets where risk differentiation is smaller.

These findings align with observed trends in Indian banking. As interest margins compress due to regulatory measures and competitive pressure, successful private sector banks increasingly rely on fee-based services, operational efficiency, and technology-enabled service delivery to drive profits. The shift toward digital banking and fintech collaboration reflects precisely this imperative.

The Reserve Bank of India's emphasis on financial inclusion and digital innovation has accelerated this trend. Banks embracing technology and omnichannel service delivery gain cost advantages and unlock new revenue streams,precisely the factors our analysis shows drive profitability.

Conclusion

This study demonstrates that profitability in Indian private sector banks is primarily determined by revenue diversification and cost efficiency rather than by traditional credit-risk or liquidity measures. Banks achieving superior ROA do so through a superior business mix, more diverse income sources and disciplined cost management, rather than through risk arbitrage or pricing advantage. These findings have clear practical implications for Indian bank management and suggest that competitive advantage in private sector banking increasingly depends on operational and business model excellence. As the Indian banking sector continues to evolve, these insights underscore the importance of technological investment, service diversification, and operational discipline.

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