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A Study on Credit Risk Assessment Strategies at Punjab National Bank (PNB)

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Abstract: ***This paper examines the credit risk assessment strategies employed by Punjab National Bank (PNB), India's second-largest public sector bank, over the period FY2019–FY2025. The study traces PNB's recovery from the landmark ₹14,000 crore fraud of 2018 through a comprehensive redesign of its credit risk infrastructure. Drawing on PNB's annual reports, Pillar 3 disclosures, and RBI publications, the paper empirically analyses key credit quality indicators including Gross NPA, Net NPA, Provision Coverage Ratio (PCR), Capital to Risk-Weighted Assets Ratio (CRAR), and Credit Cost. Principal findings indicate a dramatic improvement in asset quality — Gross NPA fell from 15.50% in FY2019 to 3.95% in FY2025 — alongside a restoration of capital adequacy (CRAR: 9.73% to 17.01%) and a return to sustained profitability (Net Profit: ₹16,630 Cr in FY2025). The paper also evaluates PNB's technological interventions, including its Early Warning System (EWS), machine learning-based MSME credit scoring, and Account Aggregator integration. Strategic recommendations are offered across six domains: IRB transition, ML production deployment, advanced stress testing, credit culture reform, legacy NPA resolution, and ESG credit risk integration.***

Index Terms: Credit Risk, Non-Performing Assets (NPA), Punjab National Bank, Basel III, Early Warning System, Internal Credit Rating, Provision Coverage Ratio, Capital Adequacy.

I. INTRODUCTION

Few things in modern economics are as taken-for-granted as a functioning banking system — until it stops functioning. At that point, as crises from East Asia in 1997 to the United States in 2008 demonstrated, the damage spreads rapidly and unevenly, hitting ordinary savers, small businesses, and public finances all at once. The proximate cause in most banking crises is some version of the same thing: too many bad loans, recognised too late, with too little capital set aside to absorb the losses — that is, credit risk mismanagement.

For India's state-owned banks, this is not an abstract concern. Public sector banks collectively hold roughly 60% of the country's total banking assets and serve hundreds of millions of customers. Punjab National Bank (PNB) sits at the centre of this story. Founded in 1894 — one of the genuinely old institutions of the Indian financial system — PNB is today India's second-largest public sector bank by business volume. It manages a loan book exceeding ₹9 lakh crore, serves around 180 million customers through over 10,000 branches, and is deeply embedded in agricultural credit, MSME lending, and priority sector financing.

In February 2018, PNB disclosed that employees at its Brady House branch in Mumbai had issued fraudulent Letters of Undertaking totalling close to ₹14,000 crore, without proper collateral or authorisation — the largest banking fraud India had ever seen. The systemic failures it exposed went far beyond one rogue branch: the bank's Core Banking System and its SWIFT messaging network had never been properly integrated. This study traces — with empirical grounding — how PNB rebuilt its credit risk management infrastructure from FY2019 to FY2025, whether the improvements are real and durable, and what challenges remain.

Punjab National Bank was established on 19 May 1894 in Lahore (then British India). The 1969 nationalisation transformed it into a developmental bank with explicit obligations to priority sectors, rural lending, and financial inclusion. The April 2020 merger with Oriental Bank of Commerce (OBC) and United Bank of India (UBI) created India's second-largest PSB with a combined balance sheet of approximately ₹18 lakh crore, over 11,000 branches, and approximately 1,03,000 employees. By FY2025, PNB achieved a remarkable turnaround — Gross NPA below 4%, CRAR above 17%, and five consecutive years of net profitability.

Credit risk is, at its most basic level, the chance that someone who borrowed money will not pay it back. Modern credit risk theory distinguishes three primary components: Probability of Default (PD), Loss Given Default (LGD), and Exposure at Default (EAD). The product PD × LGD × EAD yields Expected Credit Loss (ECL), which forms the basis of both accounting provisions under Ind AS 109 and regulatory minimum capital requirements under Basel III.

II. LITERATURE REVIEW

Credit risk has been a subject of serious academic inquiry since the 1930s. Altman's [1] 1968 Z-Score model used multivariate discriminant analysis on 66 manufacturing firms, combining five financial ratios into a single bankruptcy prediction score still widely used today. Robert Merton's [2] 1974 structural model applied option pricing theory to model a firm's equity as a call option on its assets, with debt as the strike price — commercialised as the KMV model by Moody's Analytics. Ohlson [3] (1980) extended the approach through logistic regression, producing direct probability-of-default estimates, while Zmijewski [4] (1984) employed probit analysis.

Lessmann et al. [5] (2015) benchmarked 41 classification algorithms across credit scoring datasets, finding that ensemble methods like Random Forests and Gradient Boosting Machines consistently outperformed traditional logistic regression. The practical challenge of explainability has driven the development of SHAP values, which decompose individual model predictions into the contribution of each input variable. Addo, Guegan, and Hassani [6] (2018) further demonstrated that deep neural networks achieve superior default prediction accuracy for retail credit portfolios.

The 5 Cs framework — Character, Capacity, Capital, Collateral, and Conditions — remains relevant as a qualitative overlay on quantitative scoring. The Indian-specific literature reflects recurring NPA concerns in PSBs. Rajan and Dhal [7] (2003) found that rapid credit growth, high real interest rates, and borrower-level economic distress are dominant NPA drivers. Kumar and Kishore [8] (2019) demonstrated that government-owned banks consistently exhibit higher NPAs than private sector banks due to structural factors including political lending mandates.

Basel III raised minimum capital requirements, tightened definitions of high-quality capital, introduced the leverage ratio, and added liquidity coverage requirements. RBI's implementation for Indian banks requires minimum CRAR of 11.5% (including the capital conservation buffer) versus the BCBS minimum of 10.5%. RBI's IRACP norms define when a loan is classified as non-performing (repayment overdue more than 90 days) and minimum provisioning rates at each NPA level. The Insolvency and Bankruptcy Code (IBC, 2016) reformed the resolution ecosystem, giving creditors genuine leverage in negotiations with defaulting promoters for the first time.

III. OBJECTIVES AND RESEARCH METHODOLOGY

This study is organised around six primary objectives:

1) To examine PNB's credit risk assessment framework, policies, and internal rating models across retail, MSME, corporate, and agricultural lending segments.
2) To empirically analyse PNB's key credit quality indicators — Gross NPA, Net NPA, CRAR, PCR, Credit Cost, and NIM — over FY2019 to FY2025.
3) To evaluate PNB's compliance with Basel II/III regulatory frameworks and RBI prudential norms.
4) To assess the role of technology — particularly EWS, AI/ML tools, and Account Aggregator integration — in improving credit risk surveillance.
5) To examine real-world case studies from PNB's lending history.
6) To develop practical, evidence-grounded recommendations for strengthening PNB's credit risk management capabilities.

This study adopts a descriptive-analytical research design based entirely on secondary data. It is not designed to test a formal hypothesis but to provide a comprehensive, evidence-based analysis. Primary data sources include: PNB Annual Reports (FY2019–FY2025) including Pillar 3 disclosures; RBI Master Circulars on IRACP, Financial Stability Reports, and Basel III implementation guidelines; IBBI quarterly newsletters; Basel Committee publications; academic journals; and NSE/BSE disclosures and SEBI filings.

The study applies trend analysis, ratio analysis, comparative benchmarking against private sector peers (HDFC Bank), case study analysis of five landmark lending events, and data visualisation. The study covers six financial years — FY2018-19 through FY2024-25 — capturing the full arc of PNB's post-fraud reform journey: the depths of the crisis (FY2019), the merger transition (FY2020), the COVID-19 year (FY2021), and the subsequent recovery through FY2025.

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IV. DATA ANALYSIS AND INTERPRETATION

TABLE I. PNB KEY FINANCIAL INDICATORS FY2019–FY2025

Metric	FY2019	FY2021	FY2023	FY2025
Gross NPA (%)	15.50%	14.12%	8.74%	3.95%
Net NPA (%)	6.56%	5.73%	2.72%	0.40%
PCR (%)	62.0%	77.8%	86.1%	90.27%
CRAR (%)	9.73%	14.32%	15.24%	17.01%
CET1 Ratio (%)	7.42%	10.22%	10.71%	12.33%
Net Profit (₹ Cr)	-9,975	+3,457	+2,507	+16,630
NIM (%)	2.48%	2.80%	3.10%	2.93%
Credit Cost (%)	5.20%	2.90%	1.70%	0.80%
ROA (%)	-1.41%	0.31%	0.19%	0.52%
ROE (%)	-21.5%	5.2%	3.1%	8.5%

Source: PNB Annual Reports FY2019–FY2025; PNB Q4FY25 Results (May 2025). FY2020 figures are merger-adjusted.

The most significant finding in the data is the sustained improvement in asset quality. Gross NPA fell from 15.50% in FY2019 to 3.95% in FY2025 — a reduction of 1,155 basis points over six years. Net NPA fell from 6.56% to 0.40%, meaning that after provisions, the unprotected residual NPA exposure stands at just 0.40% of the loan book. The decline was not linear: FY2020–21 showed only modest improvement due to merger-related legacy NPAs from OBC and UBI, and the COVID-19 moratorium pausing the NPA classification clock. The decisive decline began in FY2022 when resolution activity picked up and fresh NPA slippage from post-2018 lending vintages proved materially lower.

Capital adequacy at 17.01% in FY2025 represents one of the clearest success stories. Going from 9.73% to 17.01% required government recapitalisation injections (approximately ₹16,000 crore between FY2019 and FY2022), careful management of risk-weighted asset growth, and five years of profitability generating retained earnings. CET1 improved from 7.42% to 12.33%, reducing the bank's reliance on Additional Tier 1 instruments. Table II shows PNB's full Basel III compliance status as of FY2025.

TABLE II. PNB BASEL III COMPLIANCE STATUS — FY2025

Capital Metric	RBI Requirement	PNB FY2025	Status
CET1 Ratio	8.0% (incl. CCB)	12.33%	Compliant
Total Tier 1	9.5% (incl. CCB)	14.05%	Compliant
Total CRAR	11.5% (incl. CCB)	17.01%	Compliant
LCR	100%	~125%	Compliant
NSFR	100%	~110%	Compliant

PNB's return to profitability in FY2021 — after three consecutive loss years — marks a fundamental inflection. The primary driver was the dramatic reduction in credit cost from 5.20% in FY2019 to 0.80% in FY2025. For a loan book of over ₹10 lakh crore, a 1% difference in credit cost is roughly ₹9,000 crore in pre-tax profit. Net Profit surged to ₹16,630 crore in FY2025 — more than double the FY2024 figure — while ROE recovered from -21.5% to 8.5%.

Every loan above defined thresholds is assigned an Internal Credit Rating (ICR) grade using PNB's proprietary rating models. Table III presents the ICR grade structure showing approximate Probability of Default (PD) and pricing guidance for each risk tier.

TABLE III. ICR GRADE STRUCTURE

ICR Grade	Approx. 1-Yr PD	Classification	Pricing Guidance
PNB-1	< 0.10%	Exceptional Quality	MCLR – 0.25% to MCLR
PNB-2	0.10–0.25%	Very High Quality	MCLR to MCLR + 0.50%
PNB-3	0.25–0.75%	High Quality	MCLR + 0.50% to MCLR + 1.25%
PNB-4	0.75–1.50%	Adequate Quality	MCLR + 1.25% to MCLR + 2.00%
PNB-5	1.50–3.00%	Moderate Risk	MCLR + 2.00% to MCLR + 3.00%
PNB-6	3.00–7.00%	High Risk	MCLR + 3.00% to MCLR + 4.50%
PNB-7	7.00–15.00%	Very High Risk	Special terms; Board sanction
PNB-8	> 15.00%	Near Default	Decline or immediate recovery

PNB's EWS monitors 72 defined stress indicators across all accounts above ₹5 crore, aggregating data from internal CBS records, inspection reports, and external sources including NSE/BSE filings, MCA21 data, CIBIL litigation records, and an NLP engine processing approximately 500 news sources daily. The NPA Prediction Accuracy Rate improved from about 62% in FY2020 to over 84% in FY2024. Alert categories include Financial Warnings, Banking Behaviour, Legal/Regulatory signals, Market/External signals, and Sector/Agricultural indicators.

PNB established a Data Analytics Centre of Excellence (CoE) at Head Office in FY2021. A Gradient Boosting Machine (GBM) model for MSME default prediction, trained on 180,000 SME loan accounts with 120 input features, achieved a Gini coefficient of 62.3% in out-of-sample validation, compared to 44.1% for the existing scorecard. SHAP value decomposition provides regulatorily required explainability. PNB's integration with India's Account Aggregator (AA) framework cut average SME loan processing time from 15 days to under 30 hours for loans below ₹50 lakh, while the AA-assisted portfolio shows a 23% lower 90-day delinquency rate than the manually processed cohort.

V. CASE STUDIES

BPSL illustrates how lending decisions that seemed defensible can look very different in retrospect. Total consortium debt stood at approximately ₹47,000 crore across 34 lenders; PNB's exposure was approximately ₹3,800 crore. By FY2014, the account showed serious stress — DSCR below 1.0x, leverage exceeding 8x. Under PNB's current ICR framework, those numbers would trigger PNB-6 or PNB-7 classification and immediate SAMB referral. Consortium dynamics and optimism about a steel price recovery delayed recognition. When JSW Steel's winning resolution plan was finalised in January 2019 (upheld by the Supreme Court in January 2022), PNB recovered approximately ₹1,560 crore — roughly 41% of its exposure, with a ~59% haircut.

The 2018 fraud is worth re-examining as a credit risk failure, not just an operational one. When PNB issued Letters of Undertaking (LoUs), it was in effect guaranteeing the creditworthiness of the borrower to the overseas lender. That guarantee should have gone through credit assessment: Is this borrower creditworthy? Is the underlying trade transaction genuine? None of those questions were being asked systematically. The fraud has since forced a comprehensive redesign of how PNB treats off-balance-sheet exposures — they are now subject to the same ICR rating, sanction authority, and EWS monitoring as on-balance-sheet lending.

PNB's Agra Circle managed approximately ₹1,200 crore in working capital facilities across 200+ MSME borrowers in the footwear cluster. In Q3 FY2023, rising leather costs, weakening EU export demand, and GST compliance penalties triggered EWS Amber alerts for 42 accounts (₹310 crore). The SAMB team convened a cluster-level meeting, offered principal moratoriums, formally restructured 12 accounts, and enhanced working capital limits for eight high-performing accounts. Actual NPA formation came to ₹22 crore — about 1.8% of the cluster — against a projected ₹95 crore without intervention.

VI. FINDINGS

The following are the principal findings from the data analysis:

1) Finding 1 — Dramatic Asset Quality Improvement: Gross NPA fell 1,155 basis points from 15.50% (FY2019) to 3.95% (FY2025). Net NPA at 0.40% reflects near-complete provisioning of legacy stress.

2) Finding 2 — Capital Adequacy Restored: CRAR improved from 9.73% to 17.01%, providing a 5.51 percentage point buffer above RBI's 11.5% requirement, with CET1 at 12.33%.
3) Finding 3 — Profitability Driven by Falling Credit Costs: Credit cost fell from 5.20% to 0.80%; net profit reached ₹16,630 crore in FY2025. ROE, at 8.5%, remains below private sector peers but represents a fundamental recovery.
4) Finding 4 — Sectoral Concentration Remains Dominant Structural Risk: Infrastructure and power (28%), metals and mining (18%), and textiles (12%) account for ~58% of residual gross NPA, creating tail risk the headline ratio understates.
5) Finding 5 — Loan Book Diversification Real but Gradual: Large corporate lending fell from ~57% to ~26% of the book; retail, housing, and MSME grew correspondingly.
6) Finding 6 — Technology Improving but Gap Remains: EWS accuracy improved to 84%; GBM MSME scoring Gini improved from 44.1% to 62.3%; however, ML models remain in pilot while leading private banks have them fully deployed.
7) Finding 7 — Post-Merger Integration Broadly Successful: Unified ICR models, single EWS platform, and consistent provisioning practices are operational, though cultural integration across 1,03,000 employees is ongoing.
8) Finding 8 — 2018 Fraud Reforms Substantive: SWIFT-CBS integration, function separation, Board Risk Committee, and forensic analytics directly address the mechanisms that enabled the fraud.

VII. RECOMMENDATIONS AND SUGGESTIONS

Six strategic recommendations are offered for PNB's consideration over a three-to-five-year implementation horizon:

Transitioning to the Foundation Internal Ratings-Based (F-IRB) approach should be treated as a strategic priority. IRB adoption for the investment-grade corporate book could reduce credit RWAs by 10–15%, freeing ₹15,000–20,000 crore in capital. Estimated budget: ₹150–200 crore over three years. Target: F-IRB application to RBI by FY2026–27.

The GBM pilot for SME credit needs full production deployment within 18 months; retail scoring infrastructure should follow within 24 months. Cloud-native model serving, Account Aggregator data as real-time input, and a champion-challenger framework for continuous model monitoring are the key technical requirements. A CoE target of 50+ credit-specialist data scientists is appropriate.

Current ICAAP stress scenarios should be supplemented with sector-specific scenarios calibrated to historical stress cycles in infrastructure, metals, and textiles. Reverse stress testing and climate risk integration — physical risk for agricultural portfolios and transition risk for power and steel sector lending — should begin ahead of anticipated RBI mandatory requirements.

Portfolio quality metrics should be weighted at 30–40% of relationship manager performance appraisals. The Annual Credit Risk Certification Programme should be a genuine career prerequisite. A formal Lessons Learned process for NPA migrations and a Chief Credit Risk Officer role reporting directly to the MD & CEO would materially strengthen accountability.

Every account above ₹50 crore in NPA status should be mapped to a specific resolution pathway with explicit timelines and named accountable officers. The NARCL pipeline should be extended: another ₹10,000–15,000 crore in eligible large NPA accounts could realistically be transferred in FY2025–26. Target: Gross NPA below ₹40,000 crore by FY2026.

PNB's portfolio carries real climate exposures not currently priced or managed: physical risk in the agricultural portfolio and transition risk in power, steel, and cement sector lending. ESG scoring for large corporate borrowers, geographic physical climate risk mapping, and preferential pricing for verified green projects (MCLR spread reductions of 25–50 basis points) can begin without waiting for regulatory compulsion.

VIII. CONCLUSION

Six years is long enough to see whether a recovery is real. PNB entered FY2019 in a genuinely precarious position — the aftermath of the largest banking fraud in Indian history, NPAs at 15.50%, capital barely above the regulatory minimum, and a merger with two other distressed banks looming. By FY2025, the picture looks substantially different: Gross NPA at 3.95%, CRAR at 17.01%, and net profit of ₹16,630 crore — more than double the previous year.

The evidence suggests the institutional changes are real, even if incomplete. The SWIFT-CBS integration closed a control gap that should never have existed. The Early Warning System's NPA prediction accuracy going from 62% to 84% is a meaningful operational improvement. Post-2018 credit vintages are performing materially better than pre-2018 ones at comparable ages. These are not just numbers — they reflect a different way of managing credit.

The challenges that remain are also real: sectoral concentration in residual NPAs carries tail risk that headline ratios understate; the technology gap relative to private sector peers requires sustained investment to close; and credit risk culture across 1,03,000 employees cannot be changed by a policy document or a rating model revision alone.

What PNB's recent history demonstrates — perhaps more clearly than any other single institution — is that even after a genuine crisis, recovery is possible when reforms are substantive rather than cosmetic.

IX. ACKNOWLEDGMENT

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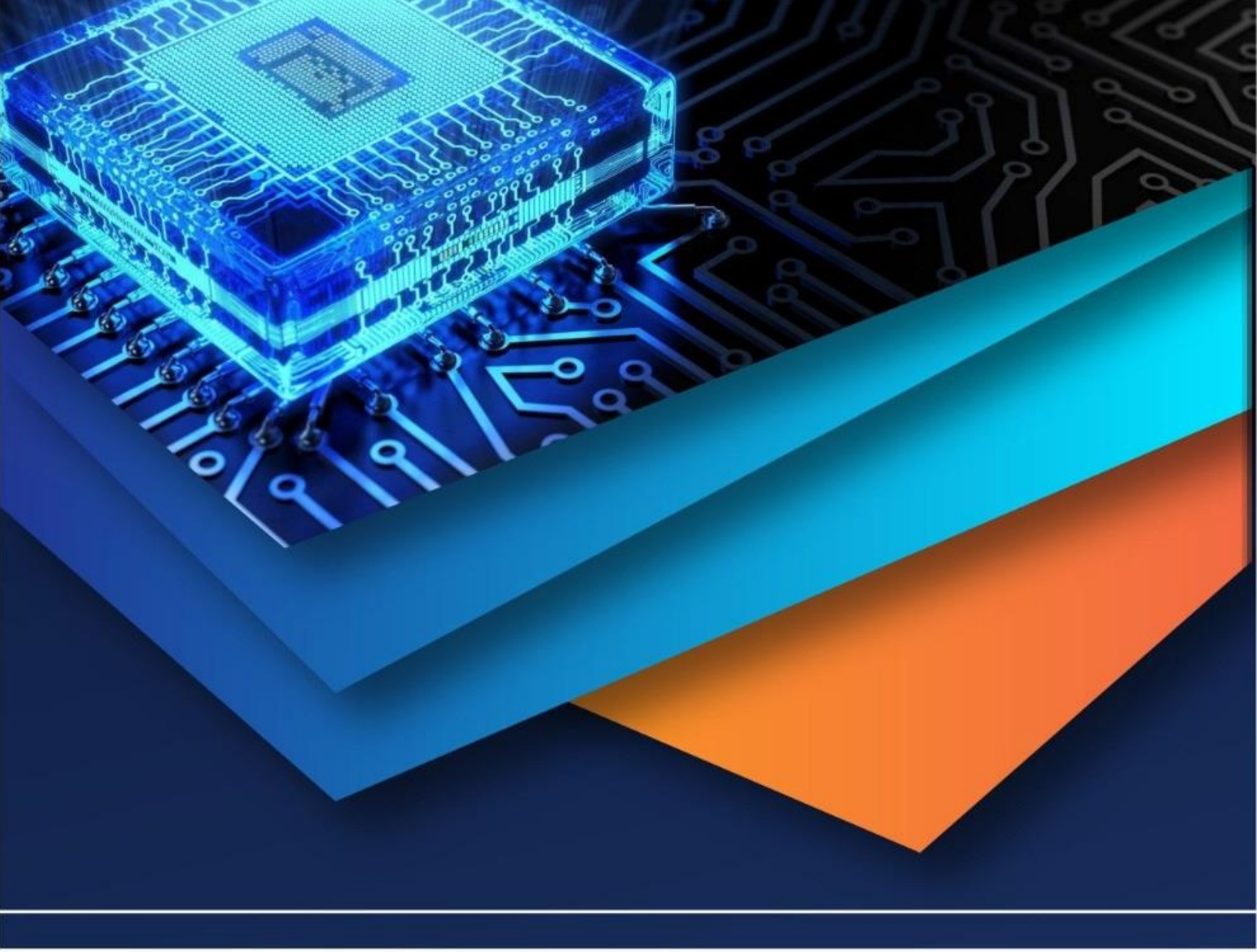
APPENDIX

Table IV. Key Financial Ratios Used In Credit Risk Assessment

Ratio	Formula	Significance
Gross NPA Ratio	Gross NPAs ÷ Gross Advances × 100	Overall asset quality
Net NPA Ratio	Net NPAs ÷ Net Advances × 100	Provisioning-adjusted quality
PCR	Total Provisions ÷ Gross NPAs × 100	Provisioning adequacy; RBI benchmark 70%
CRAR	Total Capital Funds ÷ RWAs × 100	Capital adequacy; RBI minimum 11.5%
Credit Cost	Provisions for NPAs ÷ Avg Net Advances × 100	Cost of credit losses
DSCR	Net Operating Income ÷ Total Debt Service	Debt repayment capacity; minimum 1.25x
NIM	Net Interest Income ÷ Avg Interest-Earning Assets × 100	Profitability of lending
ROA	Net Profit ÷ Average Total Assets × 100	Overall profitability; target >1%
ROE	Net Profit ÷ Average Shareholders' Equity × 100	Return on equity; 12–15% competitive



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