Bank Loan Risk Analysis Report

Abstract

This project analyzes **38,623 bank loan applications worth $436 million** to uncover loan risk patterns, evaluate portfolio performance, and provide actionable recommendations for risk management. Using **Power BI dashboards** combined with Python and SQL analysis, the study highlights borrower trends, identifies high-risk loan categories, and suggests data-driven strategies to minimize defaults while maximizing loan approvals.

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1. Introduction

Banks face significant challenges in managing loan portfolios, especially in identifying borrowers with a higher likelihood of default. Effective loan risk analysis not only reduces financial losses but also improves decision-making in loan approvals.
This project aims to:

- Track funded vs. risky loans.

- Measure loan performance across borrower segments.

- Identify risk drivers such as loan tenure, borrower demographics, and housing status.

- Provide recommendations for reducing default rates.

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2. Dataset Description

- **Source:** Bank Loan Application Records

- **Size:** 38,623 loan applications

- **Total Loaned Amount:** $436 million

- **Features:** Applicant demographics, employment, loan purpose, loan amount, tenure, property ownership, and loan status (good/risky).

The dataset provided a comprehensive view of borrower profiles, repayment behavior, and loan outcomes.

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3. Methodology

1. **Data Cleaning & Preprocessing**

   o   Removed duplicates and handled missing values.

o   Standardized categorical fields (loan purpose, ownership type).

2. **Exploratory Data Analysis (EDA)**

   o   Segmented data based on tenure, purpose, and demographics.

   o   Calculated risk ratios and repayment trends.

3. **Dashboard Development (Power BI)**

   o   Built **interactive dashboards**: Summary, Overview, and Details.

   o   Included KPIs and trend visualizations.

4. **Insights Extraction**

   o   Identified key borrower risk factors.

   o   Compared good vs. risky loans.

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4. Key Metrics / KPIs

- **Total Funded:** $436M

- **Good Loans:** 86.2% ($370M)

- **Risky Loans:** 13.8% ($65.5M)

- **Best Performing Tenure:** 36-month loans (73%)

- **Risk Segment:** Renters showed higher default risk

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5. Dashboards Overview

1. **Summary Dashboard**

   o   High-level KPIs (funded amount, good vs risky loans).

2. **Overview Dashboard**

   o   Loan tenure analysis, demographics, repayment trends.

3. **Details Dashboard**

   o   Loan purposes, borrower segments, ownership impact.

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6. Key Insights

- **Loan Tenure:** 36-month loans performed best, with lower default rates compared to longer tenures.

- **Borrower Housing Status:** Renters were more likely to default compared to homeowners.

- **Loan Purpose:** Certain purposes (like personal loans and small business loans) showed higher risks than others.

- **Portfolio Strength:** Overall loan approval rate was strong, but ~14% of loans carried risk.

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7. Conclusion

The loan portfolio demonstrates **healthy performance (86% good loans)**, but defaults remain concentrated in specific borrower segments. By focusing on **tenure optimization, stricter screening of renters, and careful monitoring of high-risk loan purposes**, banks can improve loan recovery and minimize defaults.

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8. Recommendations

- Prioritize **36-month loan structures** for improved repayment reliability.

- Implement **stricter risk assessment** for renters before approval.

- Monitor high-risk loan purposes and adjust approval strategies accordingly.

- Use **real-time dashboards** for continuous monitoring of loan performance.

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9. Future Scope

- Integrate **machine learning models** to predict default probability.

- Include **macroeconomic factors** (employment rates, inflation) to improve risk assessment.

- Expand analysis to cross-bank datasets for more robust insights.