Lending Club Case Study

Optimizing Lending Decisions: Insights from Loan Default Analysis

Objectives

- Determine the characteristics and patterns of borrowers likely to default, labeled as "charged-off.“
- Analyze the factors that strongly correlate with loan defaults, such as salary, loan term, and home ownership status.
- Utilize insights to refine approval criteria, reduce credit loss, and improve overall portfolio quality.
- Assess variables that can justify higher interest rates for risky borrowers to balance business objectives and risk mitigation.
- Equip the company with actionable insights for better customer segmentation and tailored lending strategies.

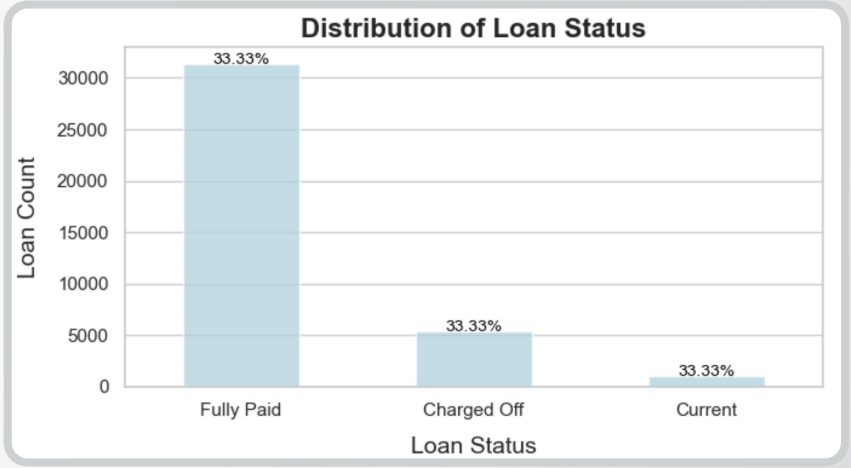
Approach

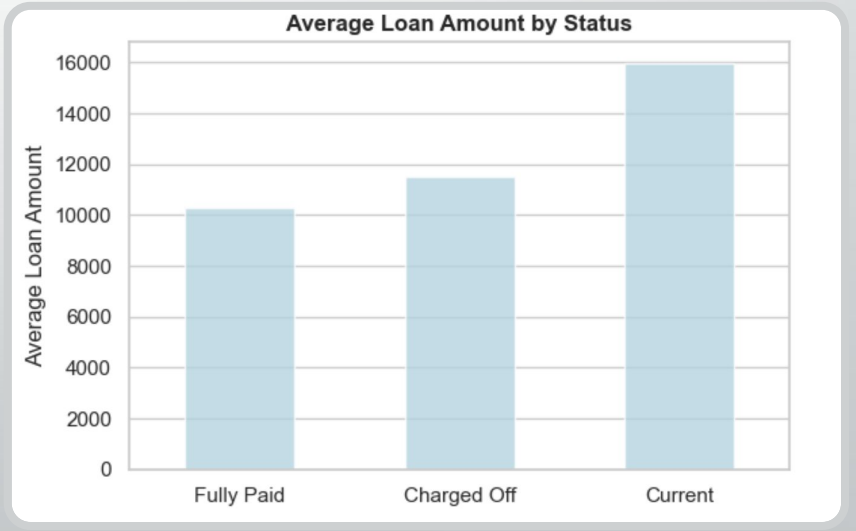
- Data Cleaning
- Univariate Analysis
- Segmented Analysis
- Bivariate Analysis
- Consolidated Summary

Overall Company Performance

About 15% of processed loans have been charged off, indicating a substantial financial risk. Also, the average loan amount of charged off loans ($11,504) is higher than of fully paid loans ($10,279) and overall average loan amount of $10,614 as well.

Insight: While the majority of loans perform well, the charged off loans number and average loan value emphasizes the need for better risk assessment strategies to minimize losses.





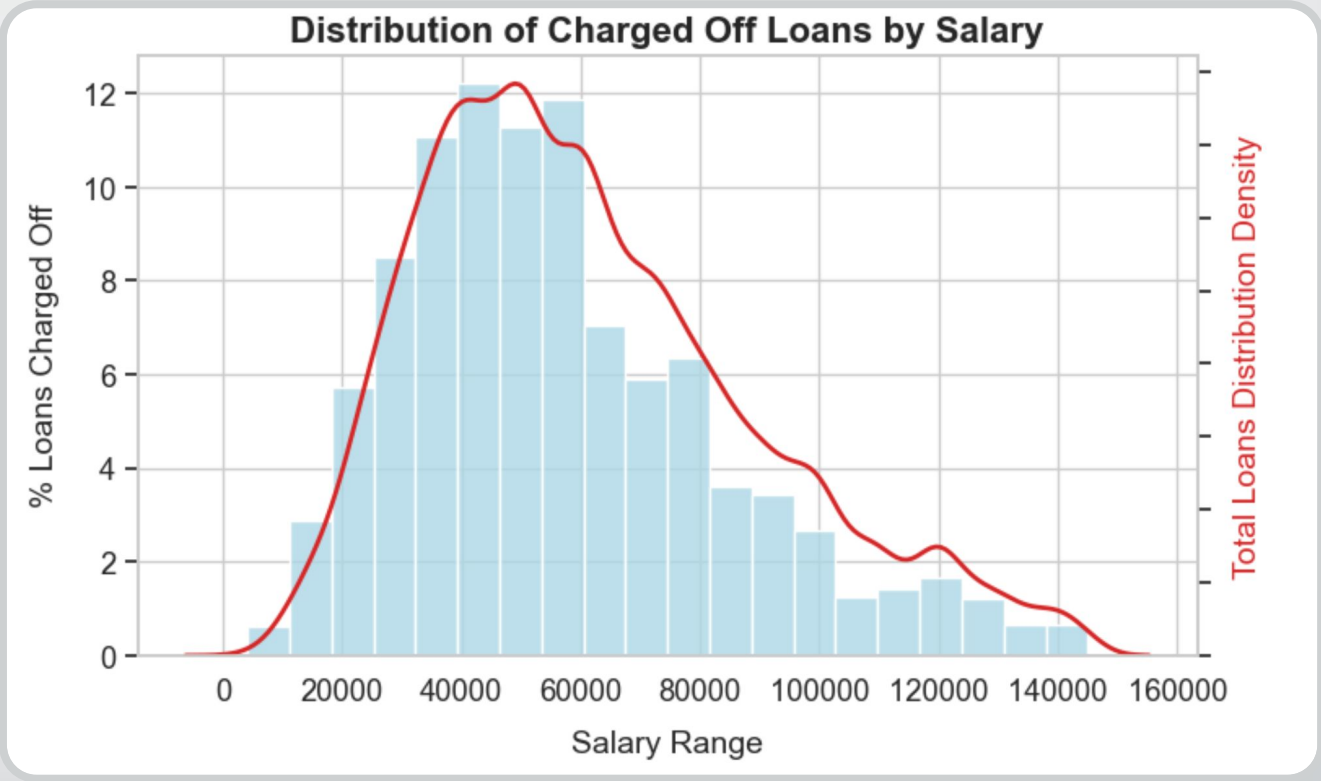
Demographic and Income-Based Observations

Borrower's Annual Income

Borrowers earning between **$30,000** and **$60,000** annually constitute the largest loan-taking group and have a significant contribution to loan defaults.

Insights:

This segment may have limited financial buffers, making them more prone to defaults. Enhanced credit checks or restricted loan limits can reduce risks.



Univariate Analysis – Continuous Ordered Variable (Annual Income)

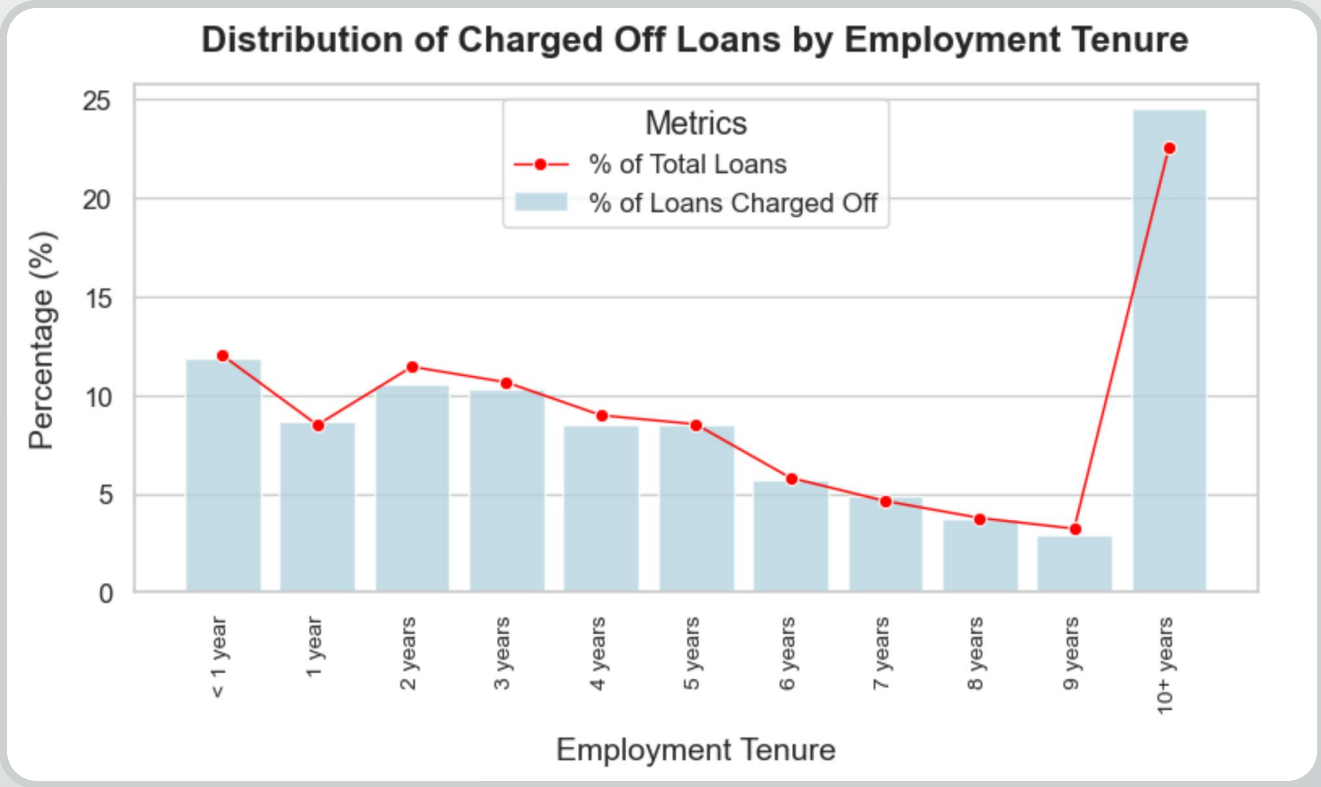
Borrower's Employment Tenure

Applicants with 5 years or less of work experience have a higher likelihood of defaulting. However, the highest loan takers and defaulters are borrowers with 10+ years of experience.

Insight:

This segment may have limited financial buffers, making them more prone to defaults. Enhanced credit checks or restricted loan limits can reduce risks.

However, its difficult to comment on the 10+years segment as its very vast segment and may have retired old age borrowers as well which are again might have limited financial buffers or are dependents



Univariate Analysis – Categorical Ordered Variable (Employment Tenure)

Loan Terms and Characteristics

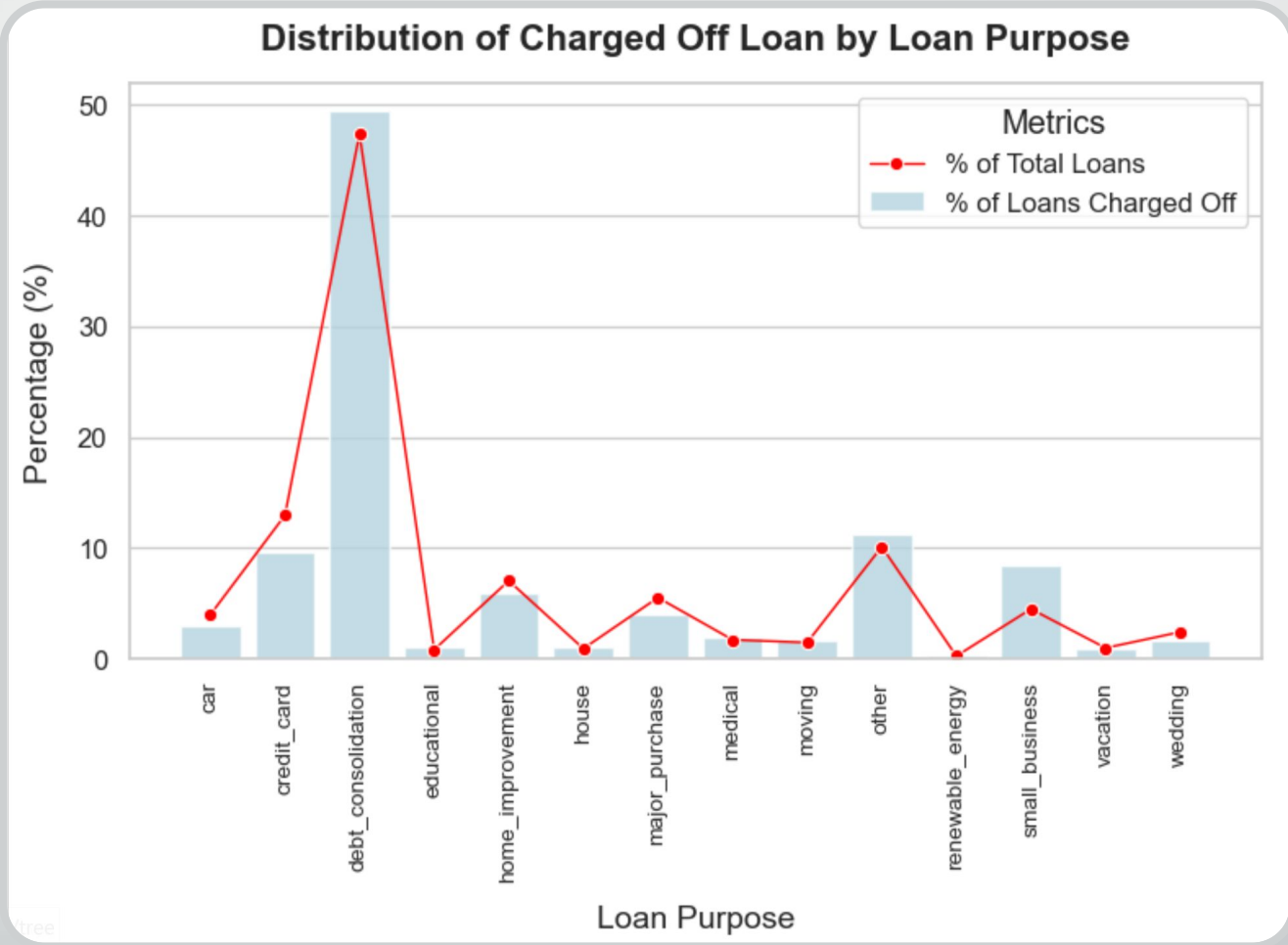
Loan Purpose

Loan purposes like **debt consolidation, small business, credit card, and other** exhibit higher default rates.

Insight:

Loans for essential purposes (e.g., **education , medical** or **house**) might be lower risk loans and could be offered on lower interest rates.

Lending to discretionary purposes like debt consolidation, credit card, or unspecified reason should involve higher interest rates or collateral requirements.



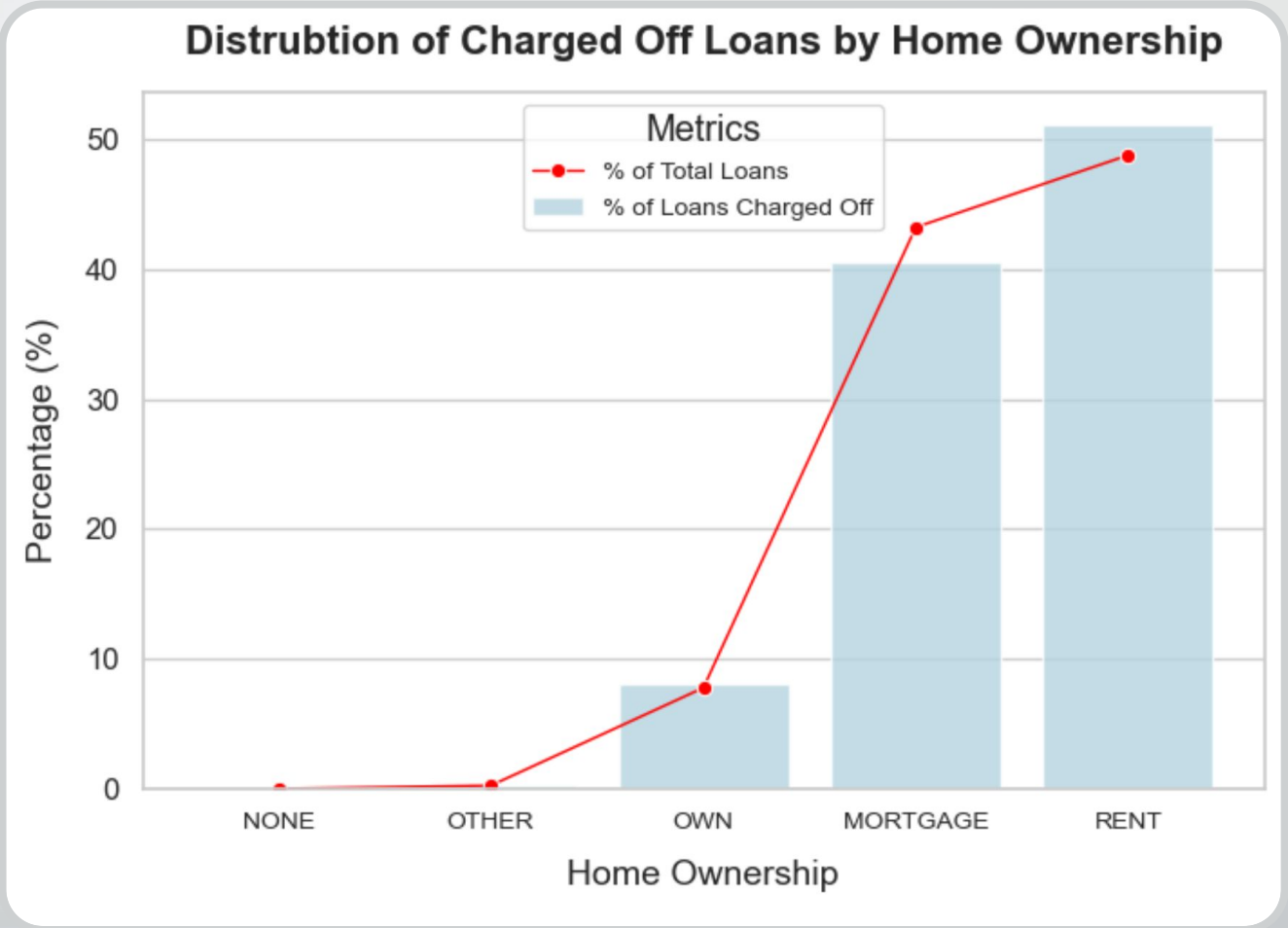
Univariate Analysis – Unordered Categorical Variable (Loan Purpose)

Home Ownership Status

Borrowers with **rented or mortgaged homes** show higher defaults than those who own homes.

Insight:

Homeownership indicates financial stability. Rented or mortgaged applicants should undergo rigorous income-to-loan ratio checks before loan approvals.



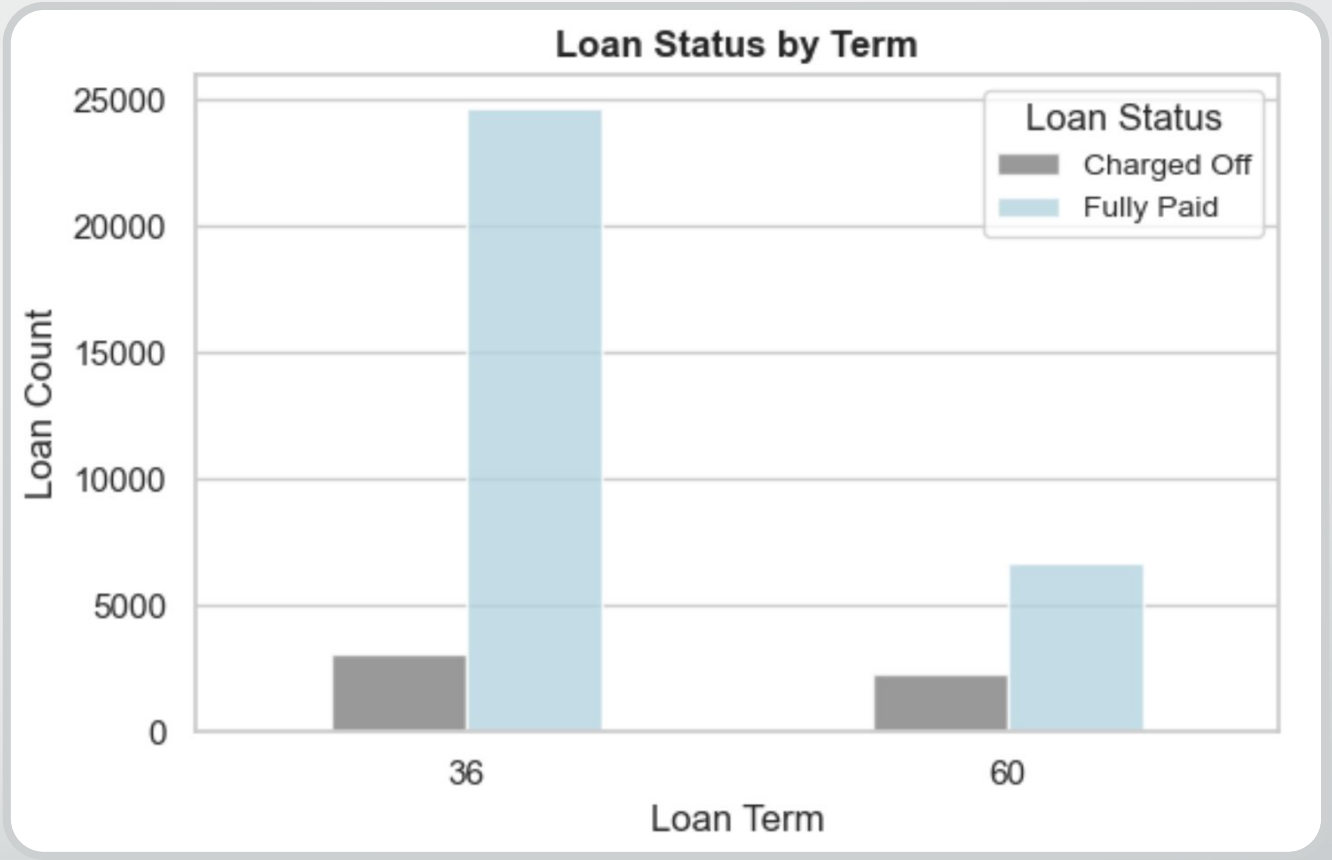
Univariate Analysis – Unordered Categorical Variable (Home Ownership Status)

Loan Term

Loans with **a 36-month** term exhibit significantly lower default rates compared to **60-month** term loans.

Insight:

Longer loan tenures increase the financial strain over time. Introducing stricter eligibility for longer terms or incentivizing shorter terms could mitigate risks.



Univariate Analysis – Categorical Ordered Variable (Loan Term)

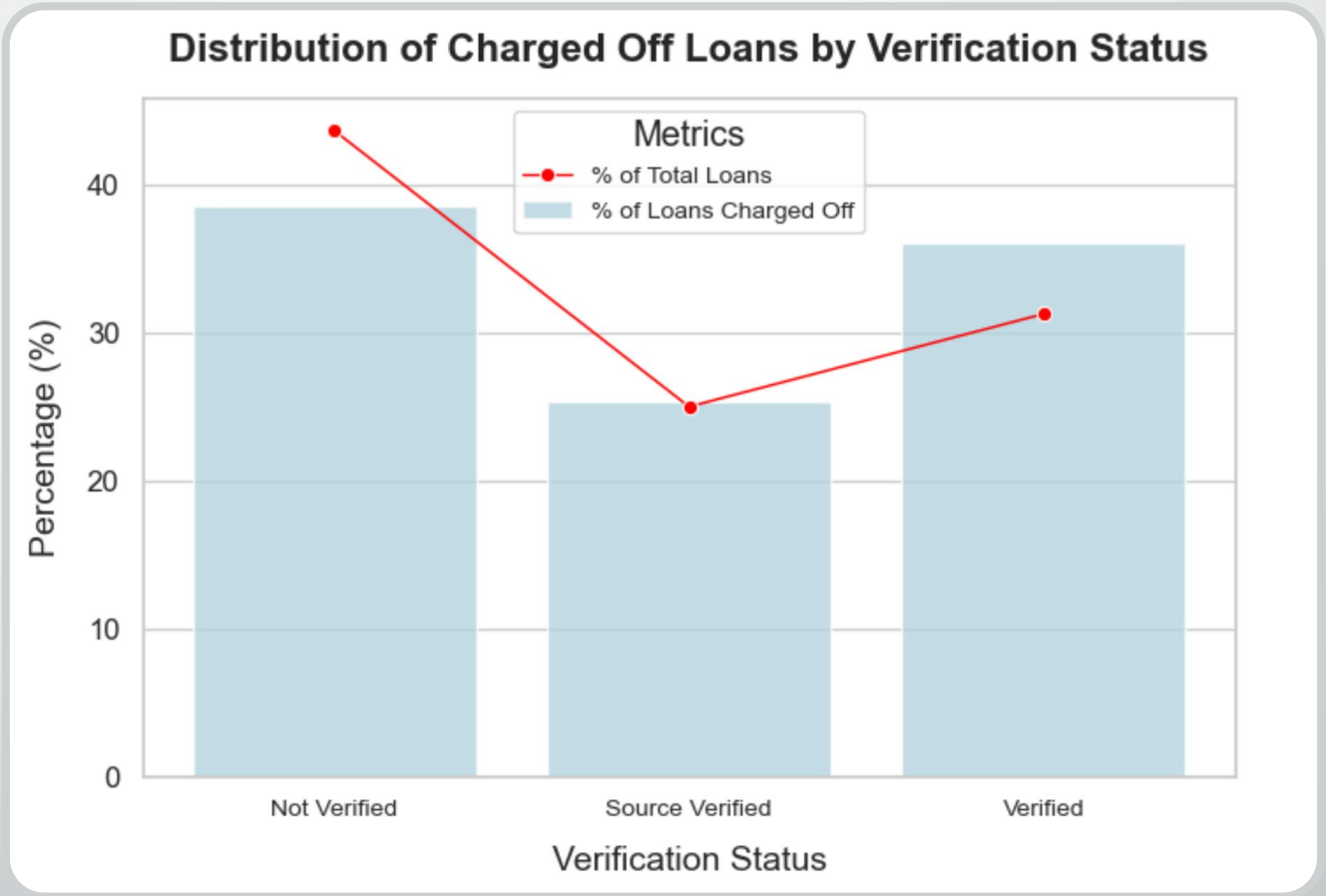
Risk Indicators

Borrower's Profile Verification Status

Unverified borrowers contributed highest number of defaults which is quite likely to happen.

Insight:

Company should strongly review its verification and loan approval process to strictly deny the loans that are unverified.



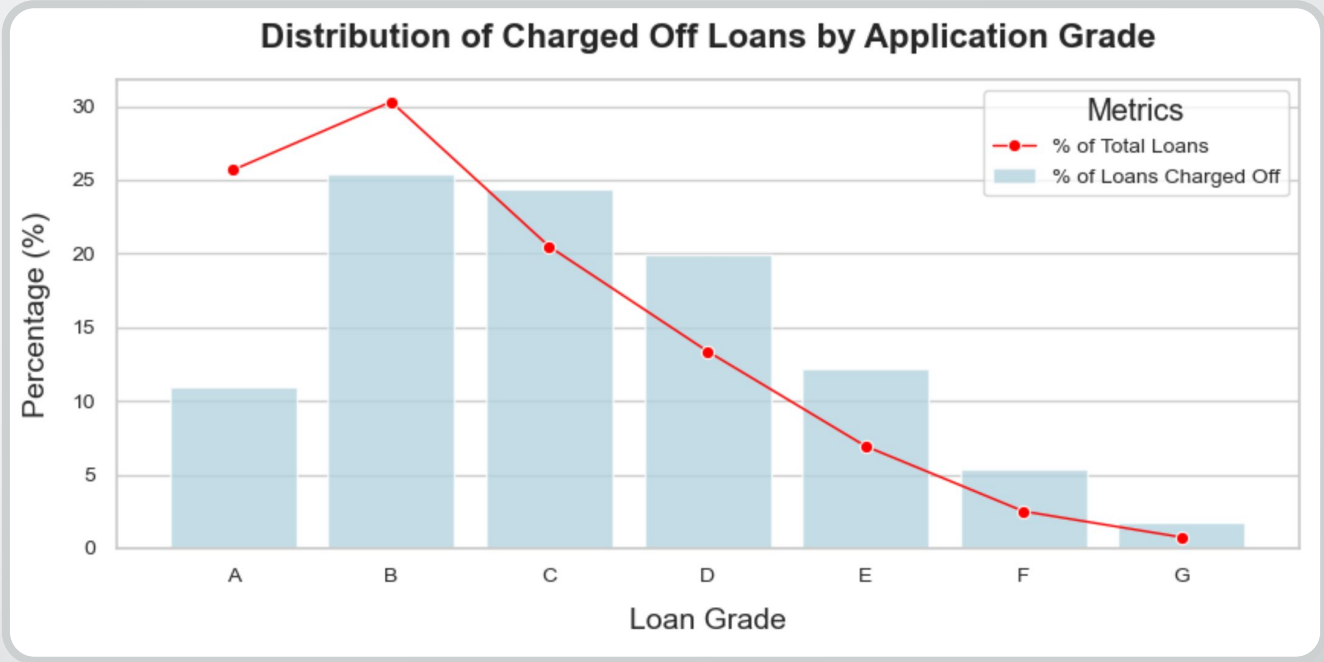
Univariate Analysis – Unordered Categorical Variable (Verification Status)

Loan Grading Mechanism

Grades **A, B, and C** show higher defaults despite being lower-risk grades.

Insight:

Existing grading criteria might need recalibration to align with actual risk levels.



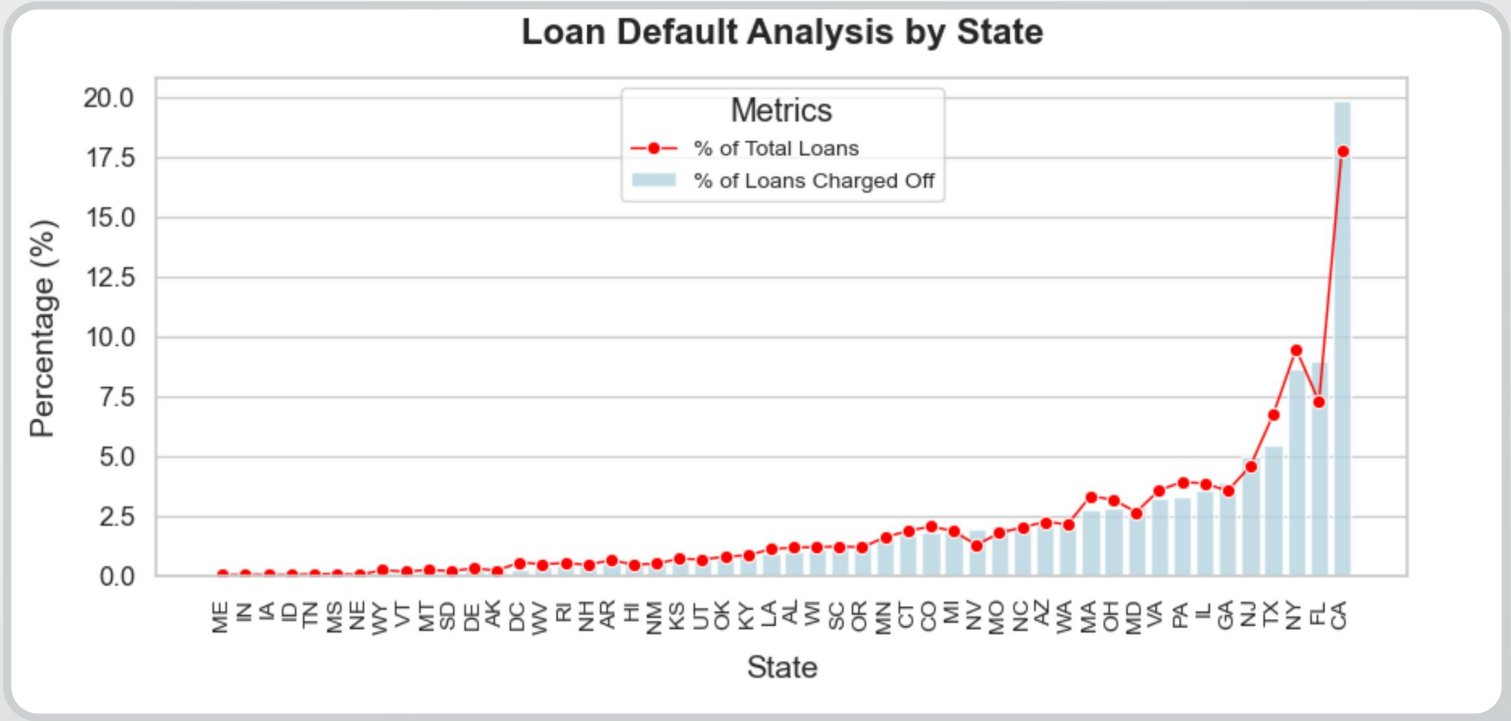
Univariate Analysis – Categorical Ordered Variable (Loan Grade)

Geographical Distribution

States like **California, Florida, New York,** and **Texas** have the highest default rates.

Insight:

Loans in these states might require localized risk policies, possibly factoring in regional economic conditions.



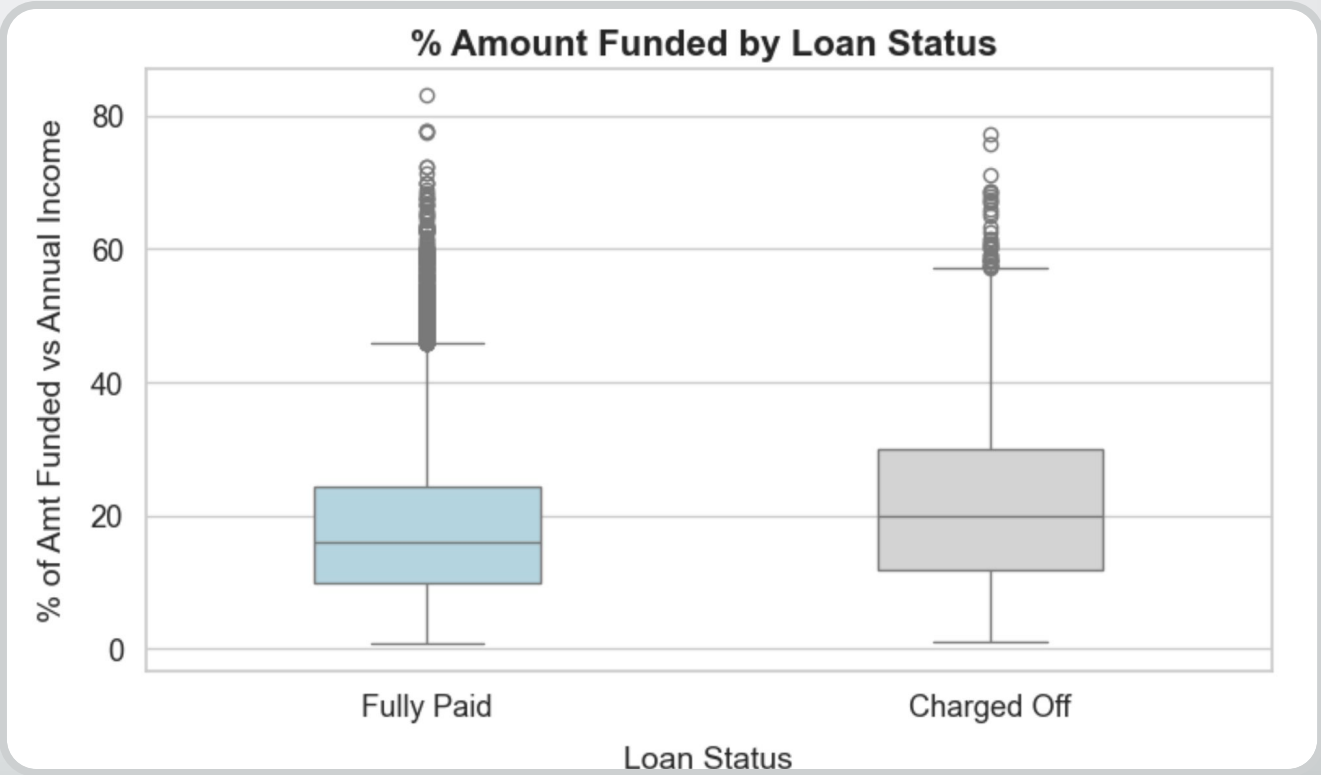
Correlation Analysis

Funded Amount vs. Annual Salary

Most of the successful loans have % Amt Funded (to Annual Salary) lying in range of **10 – 24%** with upper boundary of **45%** Whereas most of the defaulted loans lying in range of **12-30%** with upper boundary of **57%**

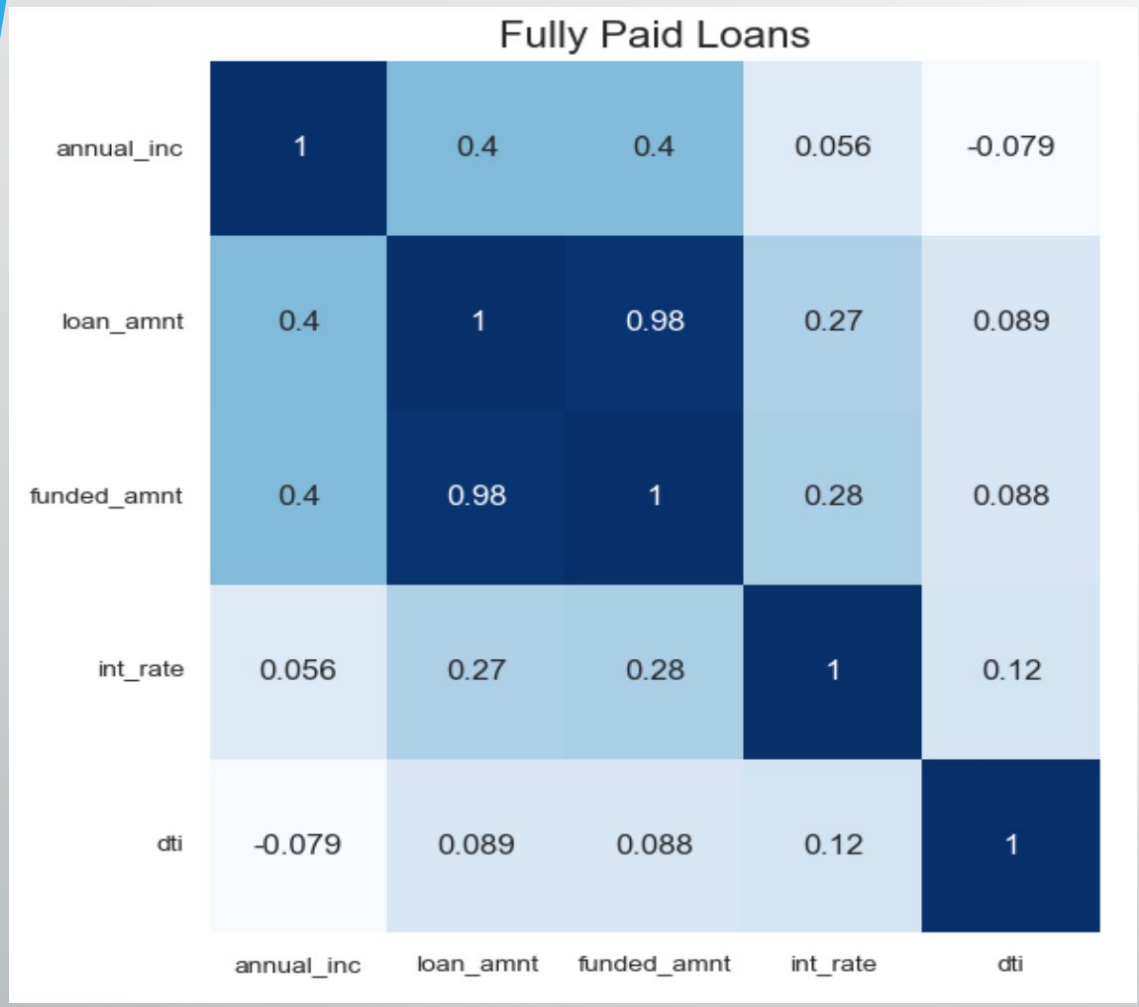
Insight:

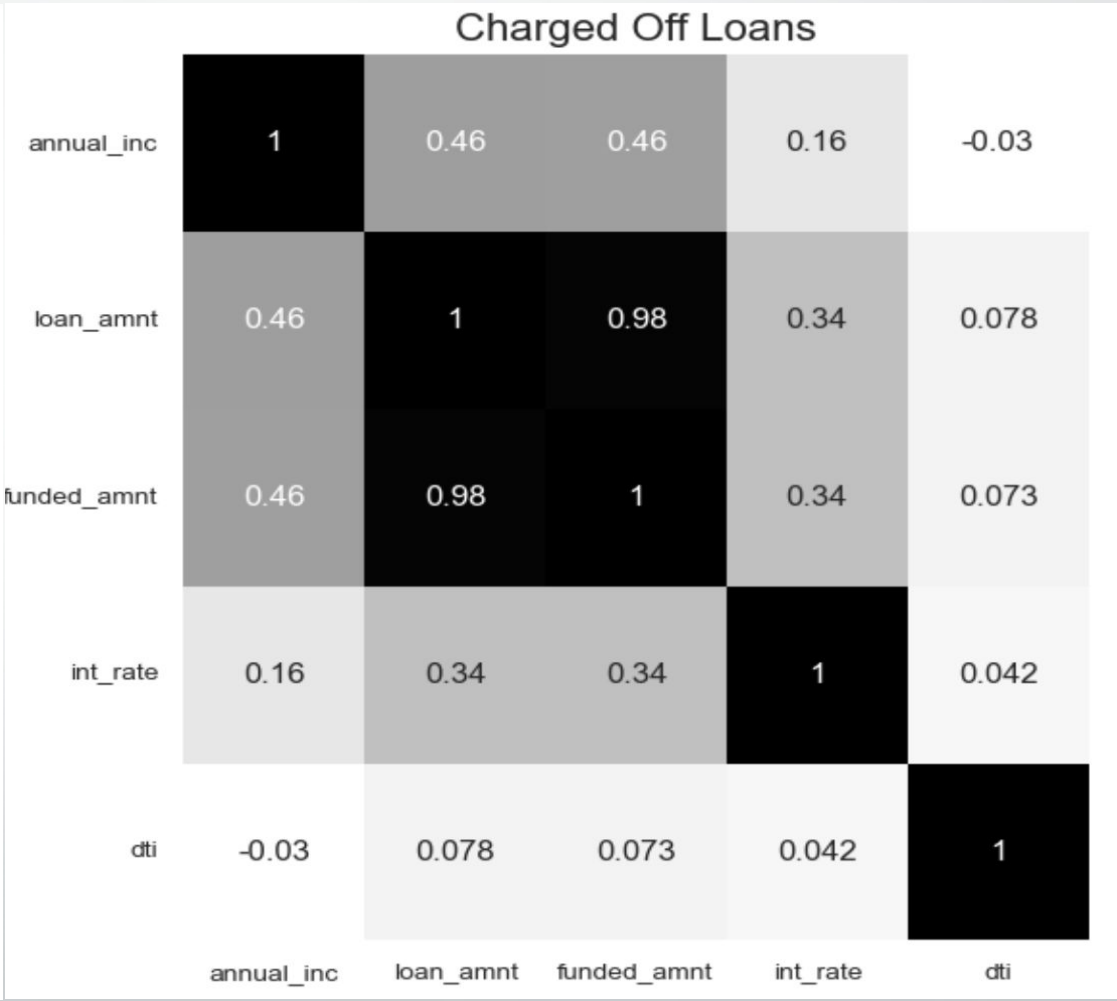
Setting an average funding cap as a percentage of income between **20-30%** and not going beyond **40%** can effectively reduce default risks.



Derived metrics - % of Amount Funded on Annual Salary

Correlation matrix





Correlation Matrix (Contd..)

Key Findings:

- Correlation between annual income and funded amount is 0.4 in case of fully paid loans whereas its higher i.e. 0.46 in case of charged off loans.
- Correlation between Interest rates and annual income is 0.056 in case of fully paid loans whereas its higher i.e. 0.16 in case of charged off loans.
- Correlation between Interest rates and Debt-to-Income Ratio is 0.12 in case of fully paid loans whereas its lower i.e 0.042 in case of charged off loans.

Insights:

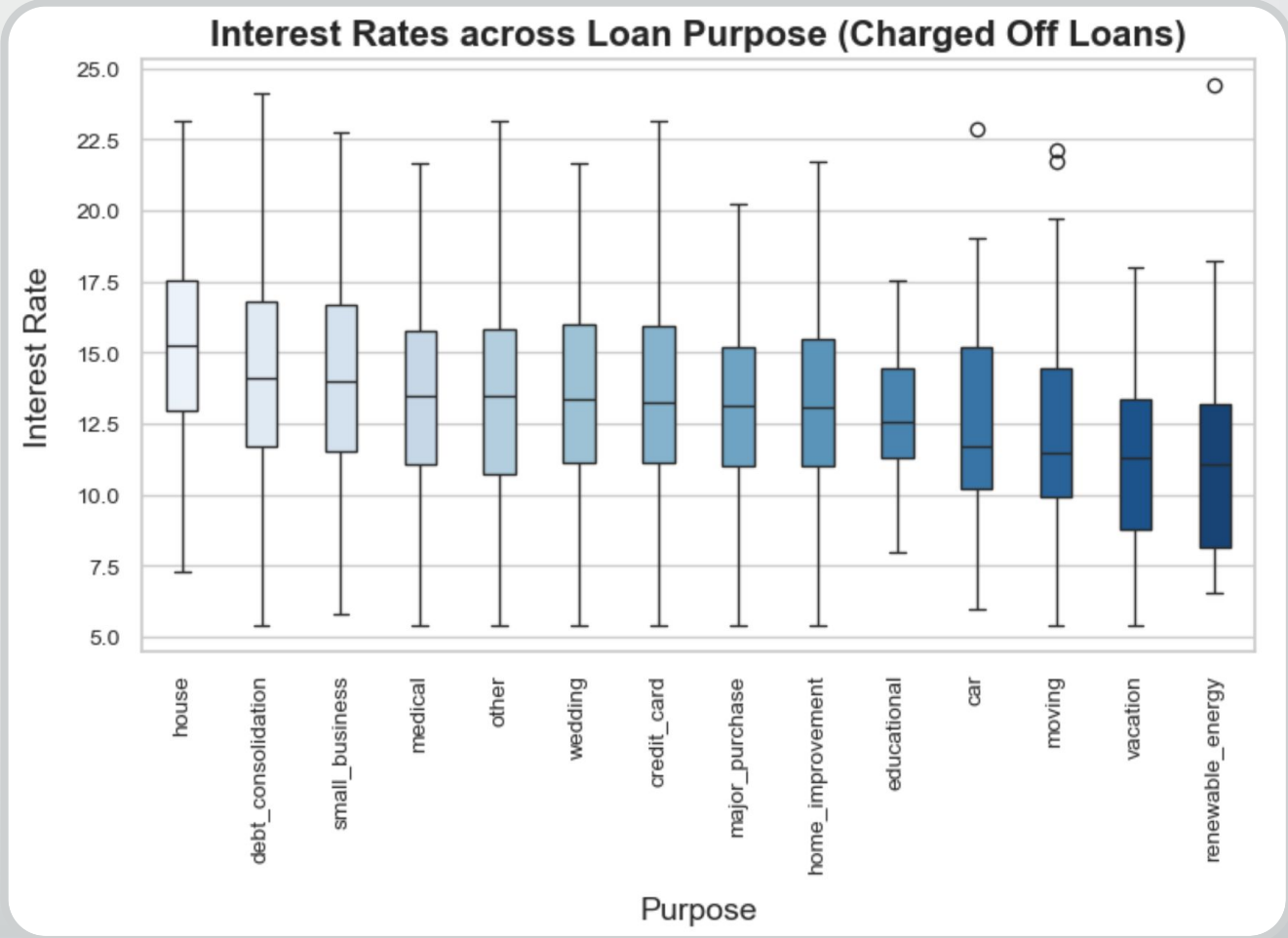
- Funded amount should be capped to 40% of the annual income to lower down the risk of defaults.
- Interest to be kept on higher side for the higher Debt-To-Income ratio borrowers to lower down the risk of defaults.

Interest Rates vs Loan Purpose

Loans for **home** and **medical** purposes are distributed at higher rates, while discretionary loans (e.g., **vacation, car**) at lower rates default more.

Insight:

Adjusting interest rates for discretionary loans to account for risk levels can improve profitability.

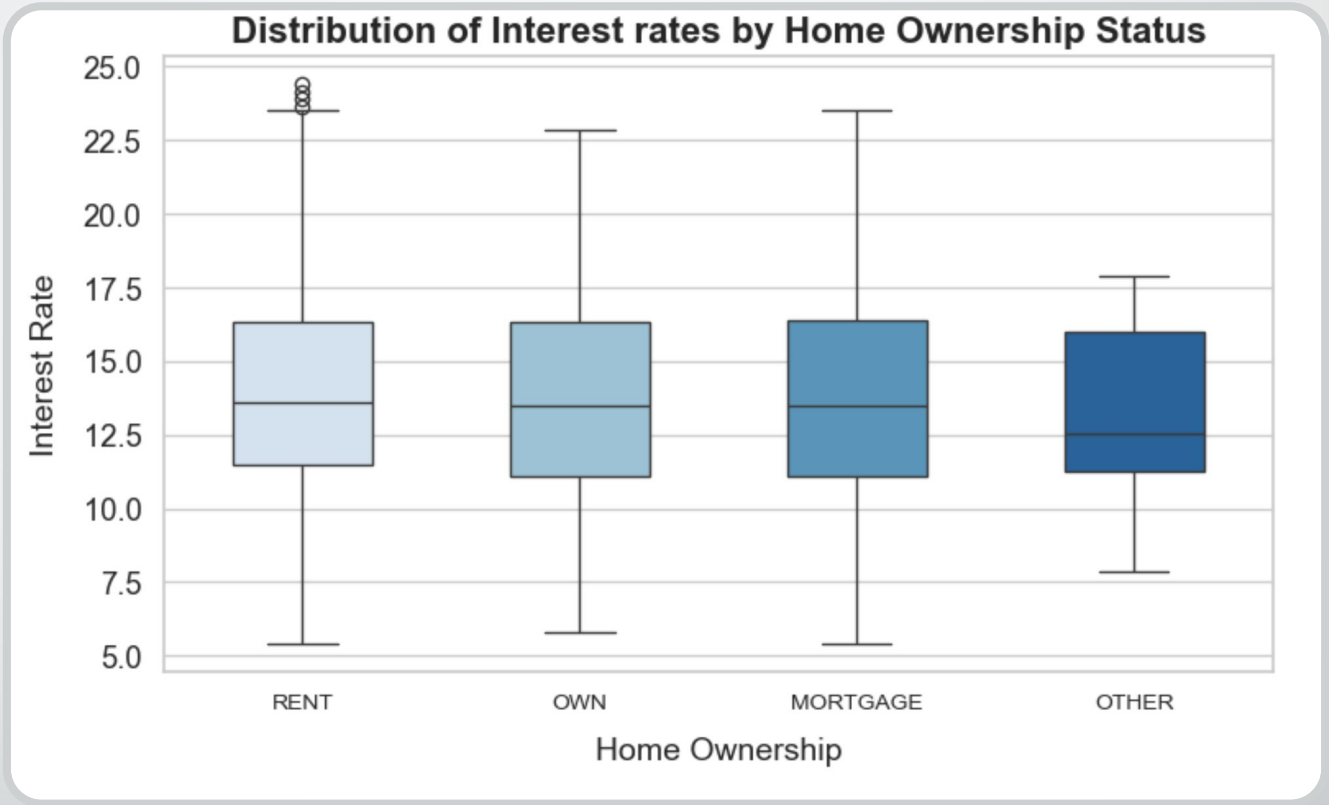


Interest Rates vs Home Ownership Status

Interest rates for **owned, rented, and mortgaged homes** show similar distribution among defaulters.

Insight:

Borrower with owning home have a better financial stability than borrower with rented or mortgage property. Hence, the interest should be made higher for the later cases.



Consolidated Findings & Recommendations

- **Risk-Based Interest Rates**: Increase interest rates for discretionary purposes and borrowers with low income or work experience.
- **Income-to-Loan Cap**: Limit loans to a maximum of 40% of the borrower's annual salary.
- **Enhanced Regional Policies**: Implement state-specific credit policies for high-risk states.
- **Targeted Grading Recalibration**: Reassess loan grades to reflect updated risk patterns.
- **Promote Shorter Loan Terms**: Encourage 36-month terms through better rates or benefits.
- **Improved Credit Checks**: For renters and less experienced applicants, introduce stricter financial screening.
- Reduce exposure to high-risk loan purposes such as debt consolidation and small business loans.