Lending Case Study

- Submitted by Prasanna B
                    Akshay Bhaskar

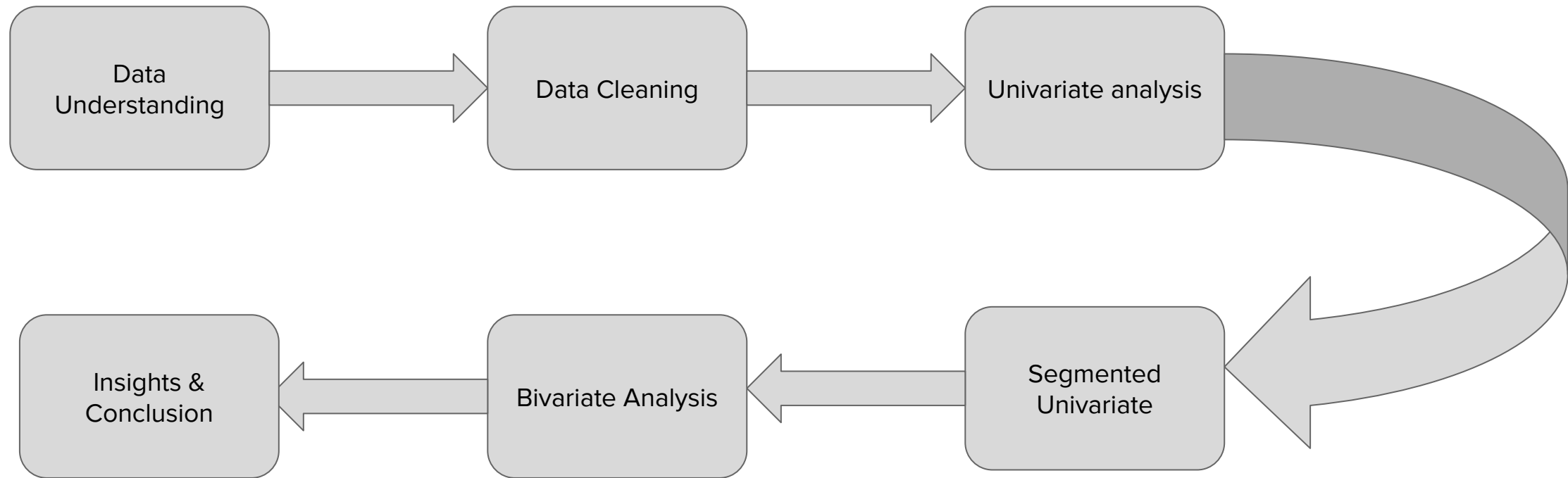# Problem statement and Objectives

Problem Statement: When a Consumer Finance Company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile. Two types of risks are associated with the bank's decision:

- If the applicant is likely to repay the loan, then not approving the loan results in a loss of business to the company
- If the applicant is not likely to repay the loan, i.e. he/she is likely to default, then approving the loan may lead to a financial loss for the company
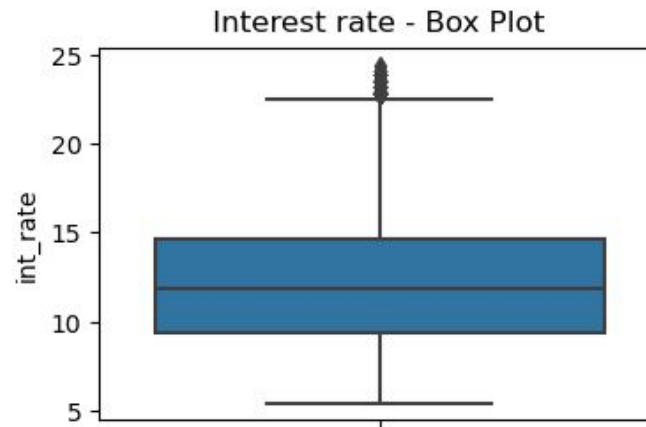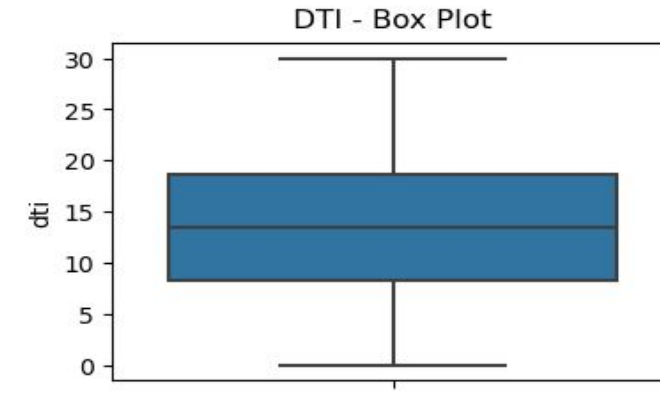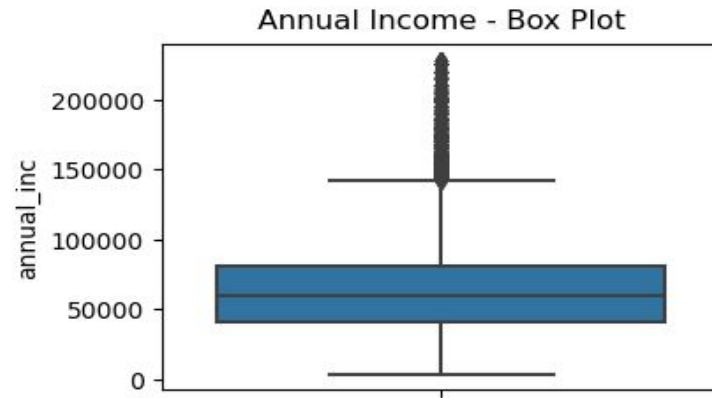
Objectives

- Understanding the driving factors (or driver variables) behind loan default

- Explain the results of univariate and bivariate analysis in business terms

- Crucial insights along with visualisations

Analysis Approach

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│     Data     │ ───▶ │     Data     │ ───▶ │  Univariate  │ ──┐
│Understanding │      │   Cleaning   │      │   analysis   │   │
└──────────────┘      └──────────────┘      └──────────────┘   │
                                                               ▼
┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│  Insights &  │ ◀─── │  Bivariate   │ ◀─── │  Segmented   │ ◀─┘
│  Conclusion  │      │   Analysis   │      │  Univariate  │
└──────────────┘      └──────────────┘      └──────────────┘
```

Important Data Overview

Annual Income - Box Plot

Interest rate - Box Plot

DTI - Box Plot

term
- 36
- 60

- Majority of borrowers have annual income between 48000 and 80000
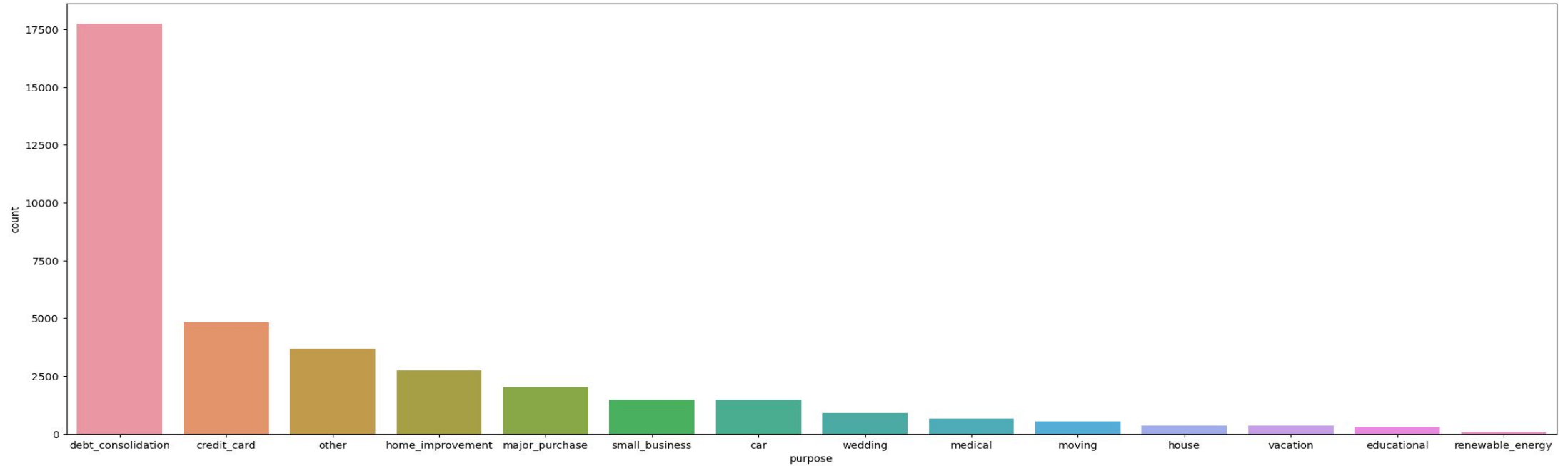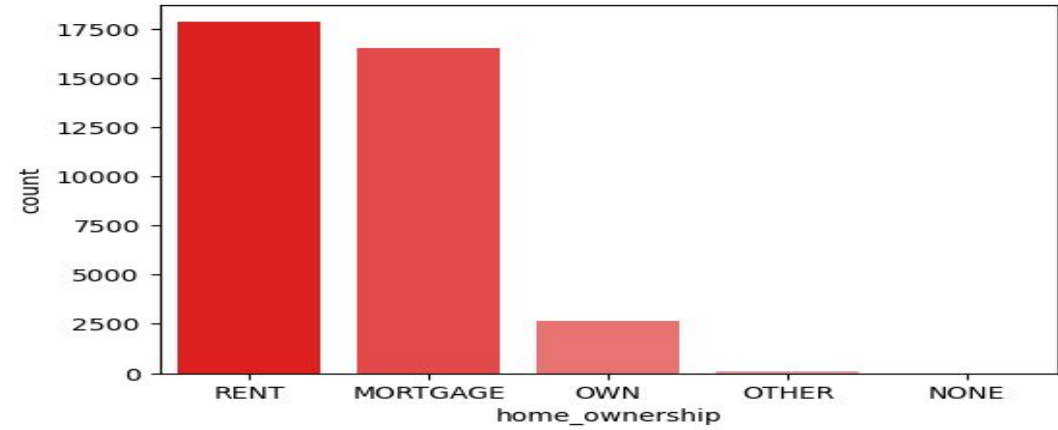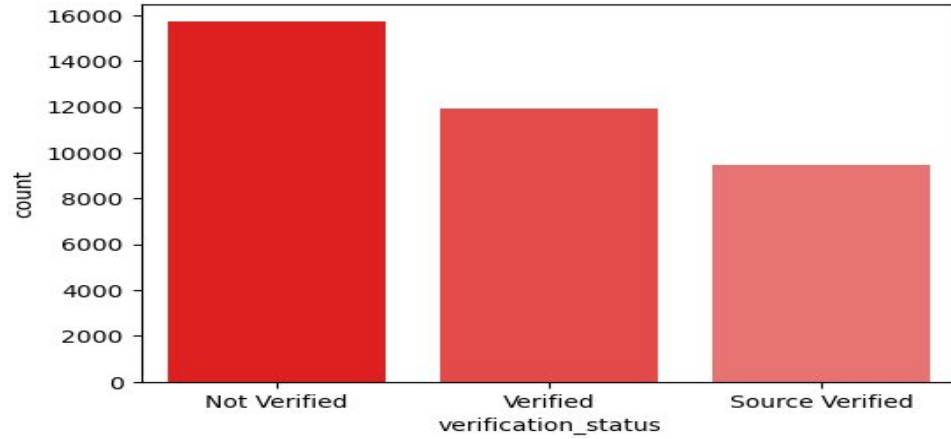- Majority of loans have interest rates between 10% and 15%
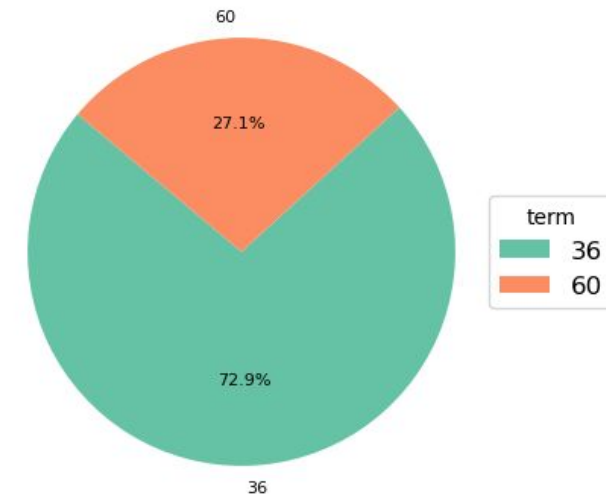
- Majority of DTI is between 10 and 20. DTI - A ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested LC loan, divided by the borrower's self-reported monthly income.
- 36 term loan is high(73%) compared to 60 month term loan

Important Data Overview
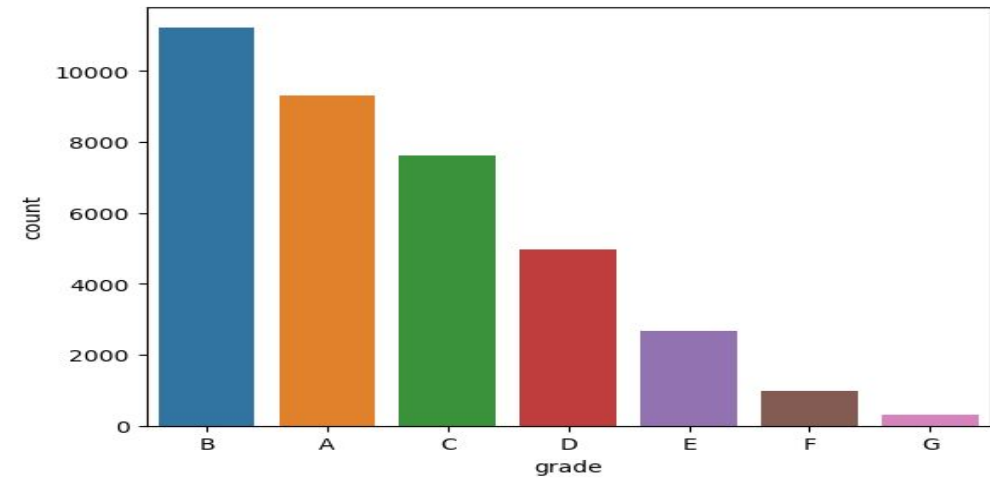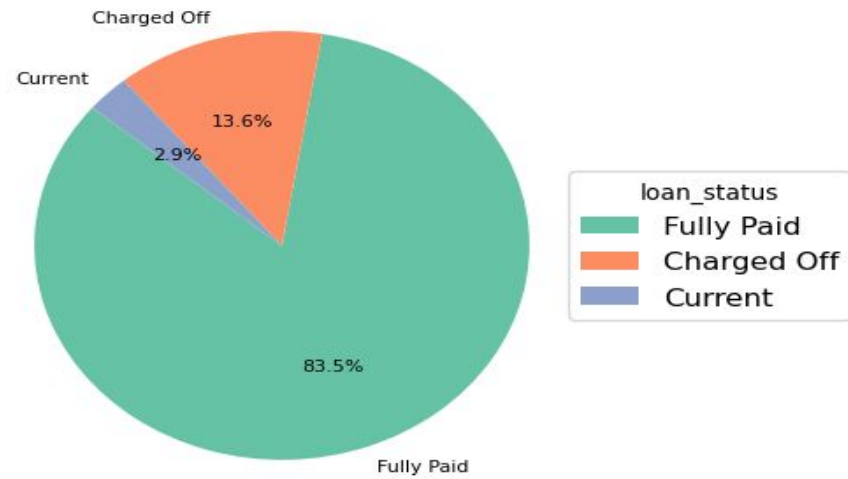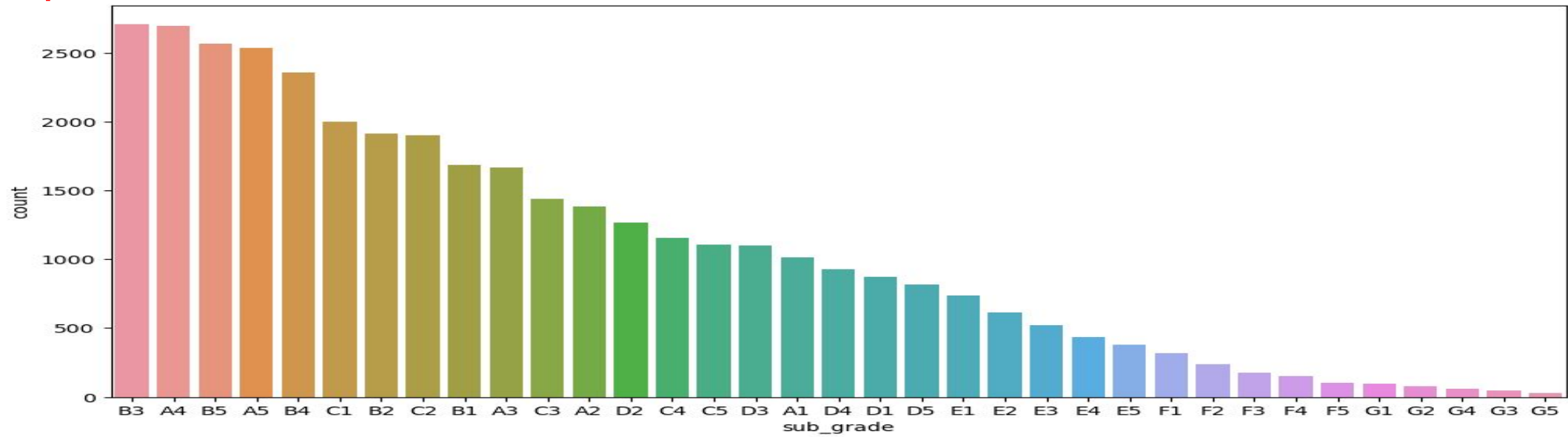
- High sub grades are given more loans
- 83% loans are fully paid and 13.5% are default loans
- High grades are give more loans, B being the top grade

Important Data Overview

- There are substantial amount of loans that are not verified
- Majority of borrowers have home ownership status as Rent or Mortgage
- Debt_consolidation is the biggest reason for taking a loan

Segmented Univariate Analysis

DTI v Default Percentage
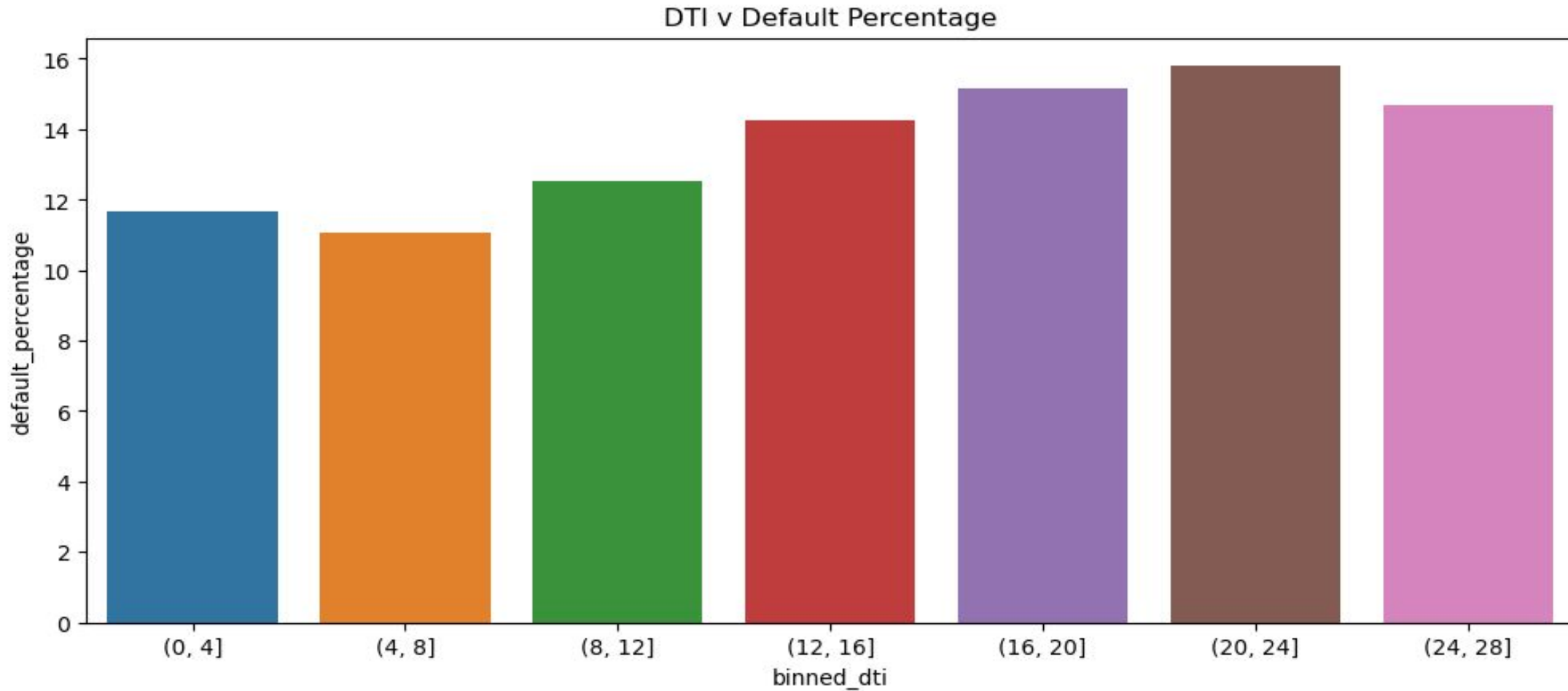
- Higher dti bins have higher default percentages.

  Note: DTI - A ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested LC loan, divided by the borrower's self-reported monthly income.
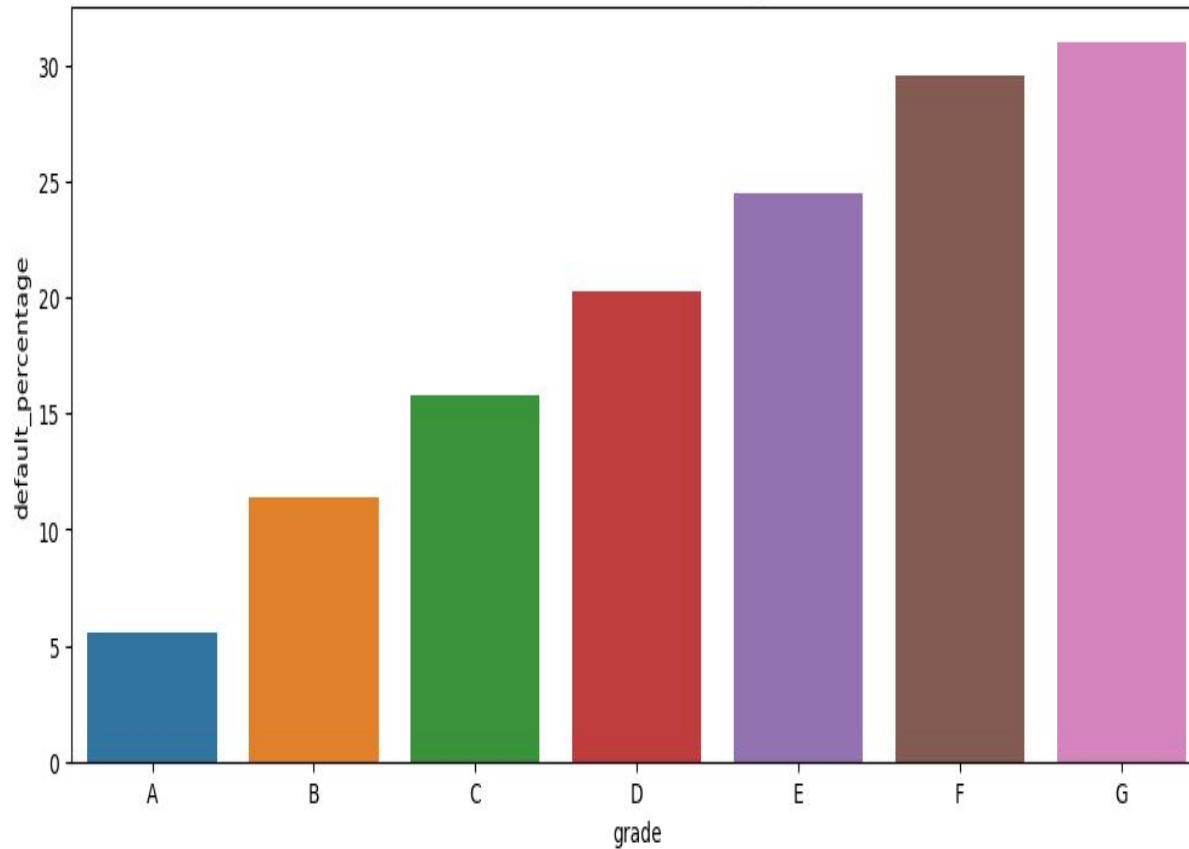
Segmented Univariate Analysis

Interest rate v Default Percentage
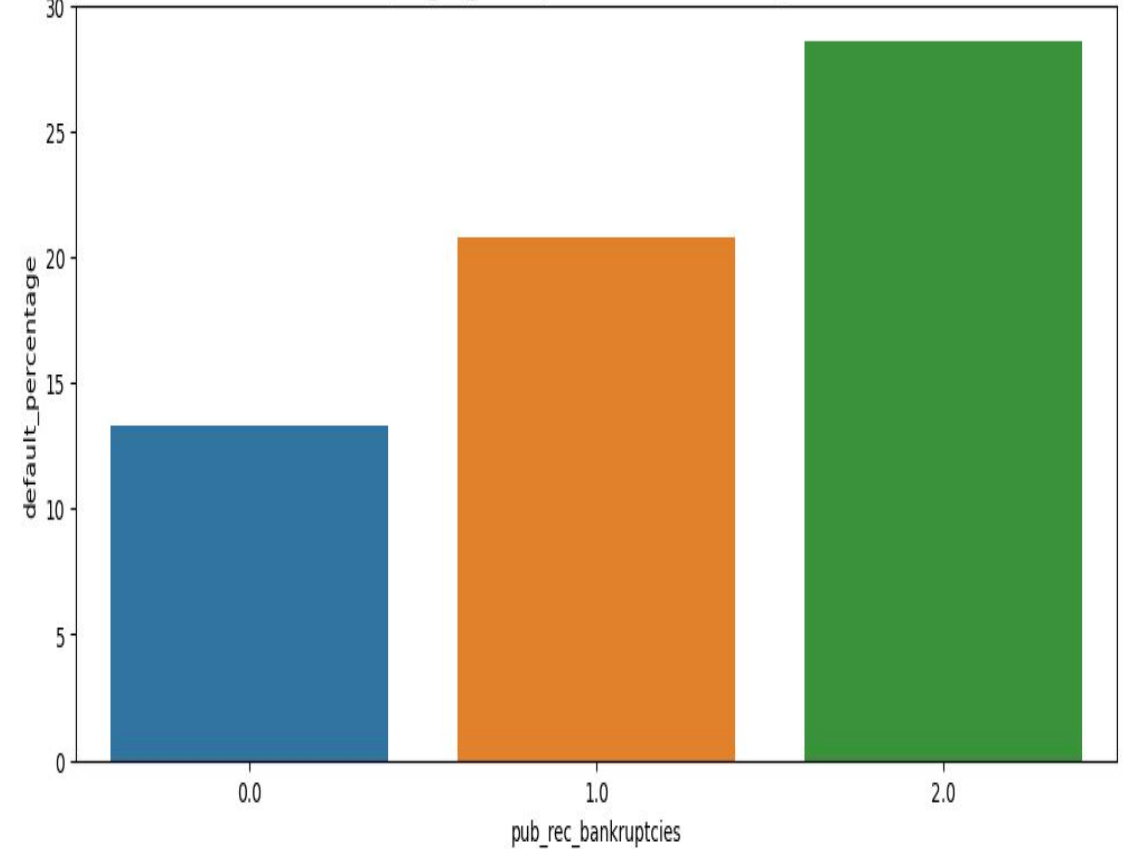
Term v Default Percentage
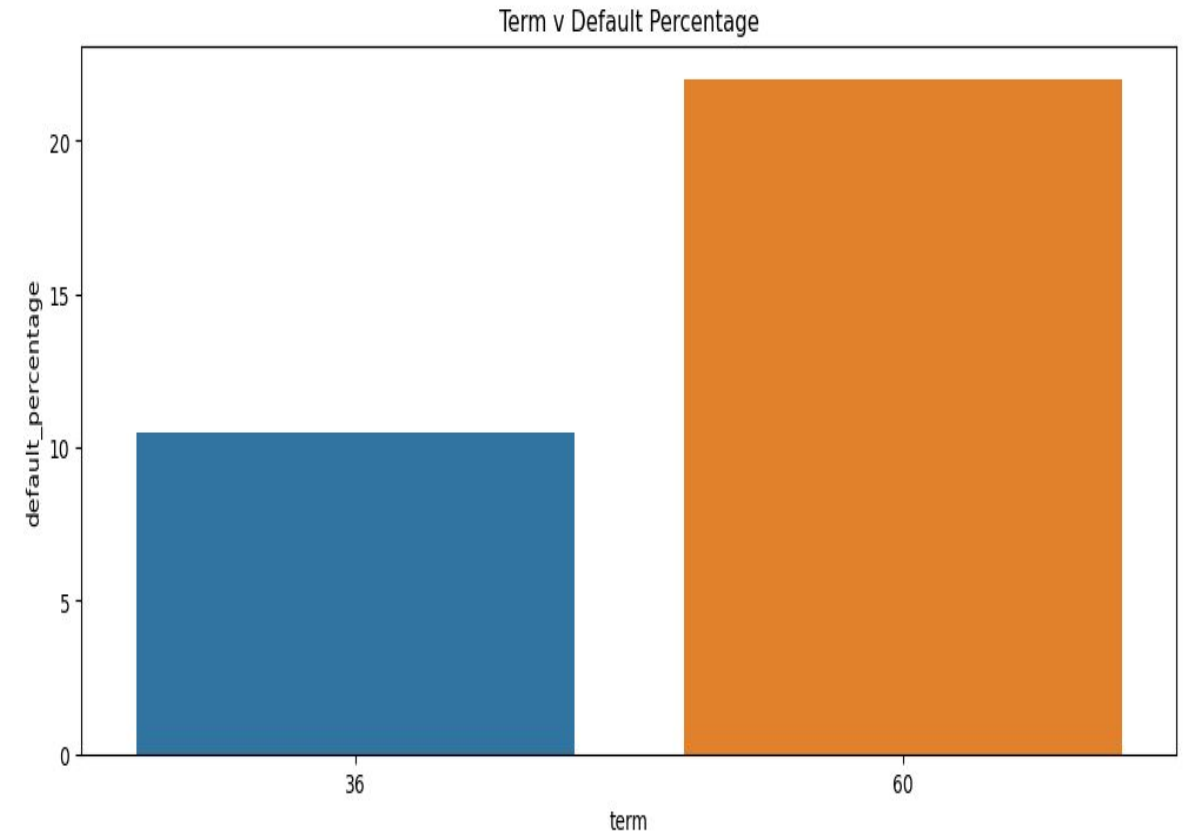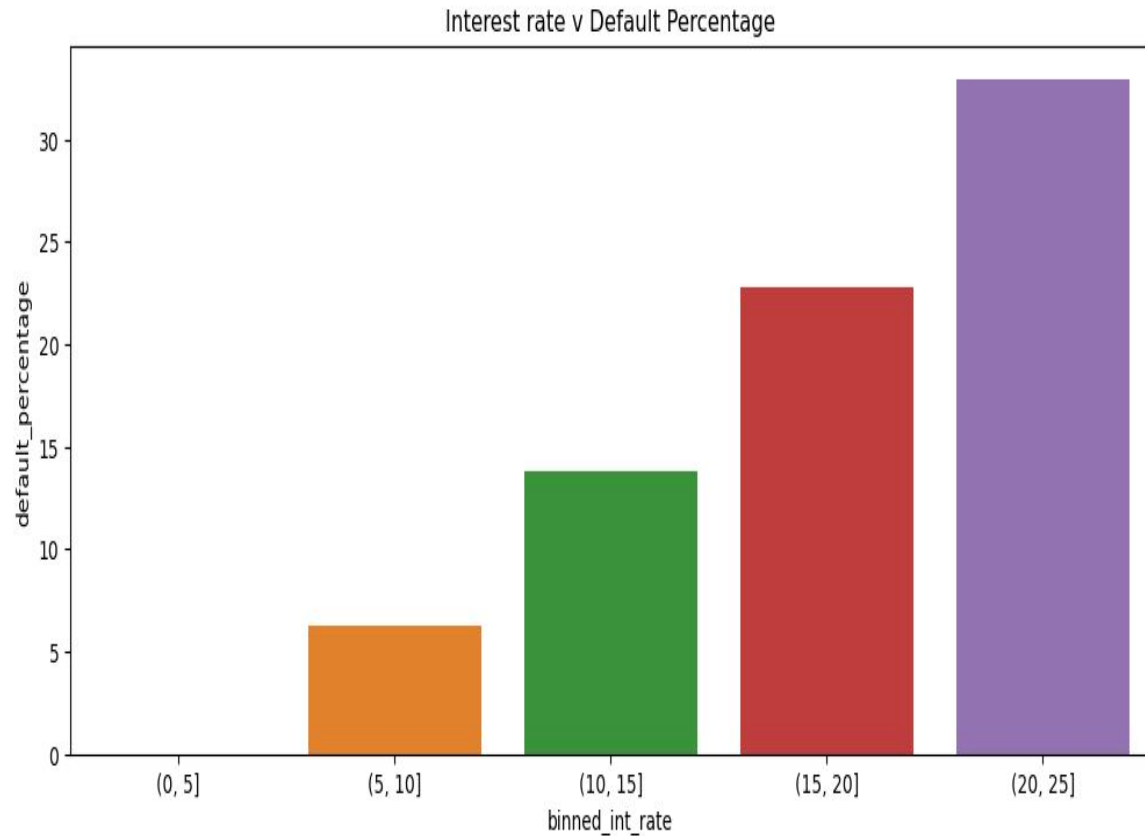
- Higher interest rates have higher default percentage
- 60 month term has high default percentage than 36 term loans
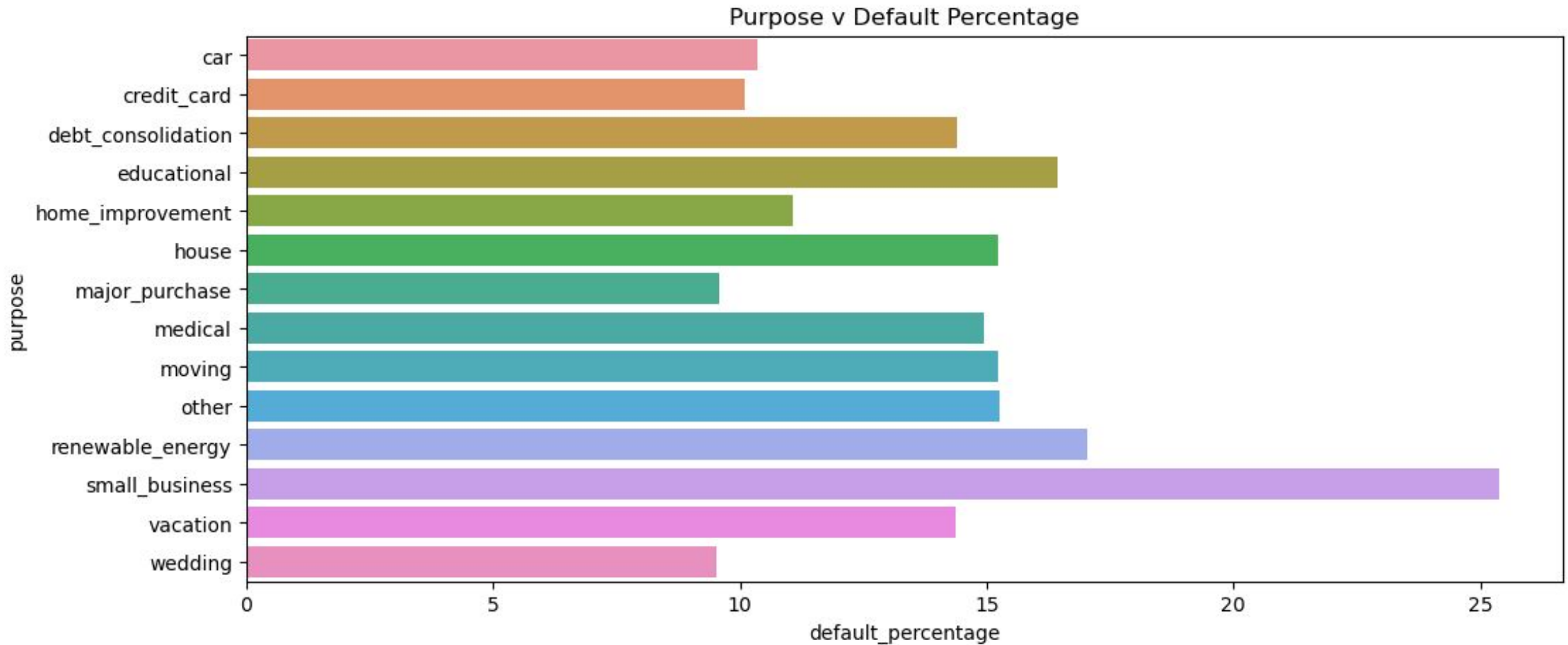
Segmented Univariate Analysis

- Default percentage increases as grade increases from A to G
- Similar pattern is observed for sub grades
- Members with public record bankruptcies have high default percentages
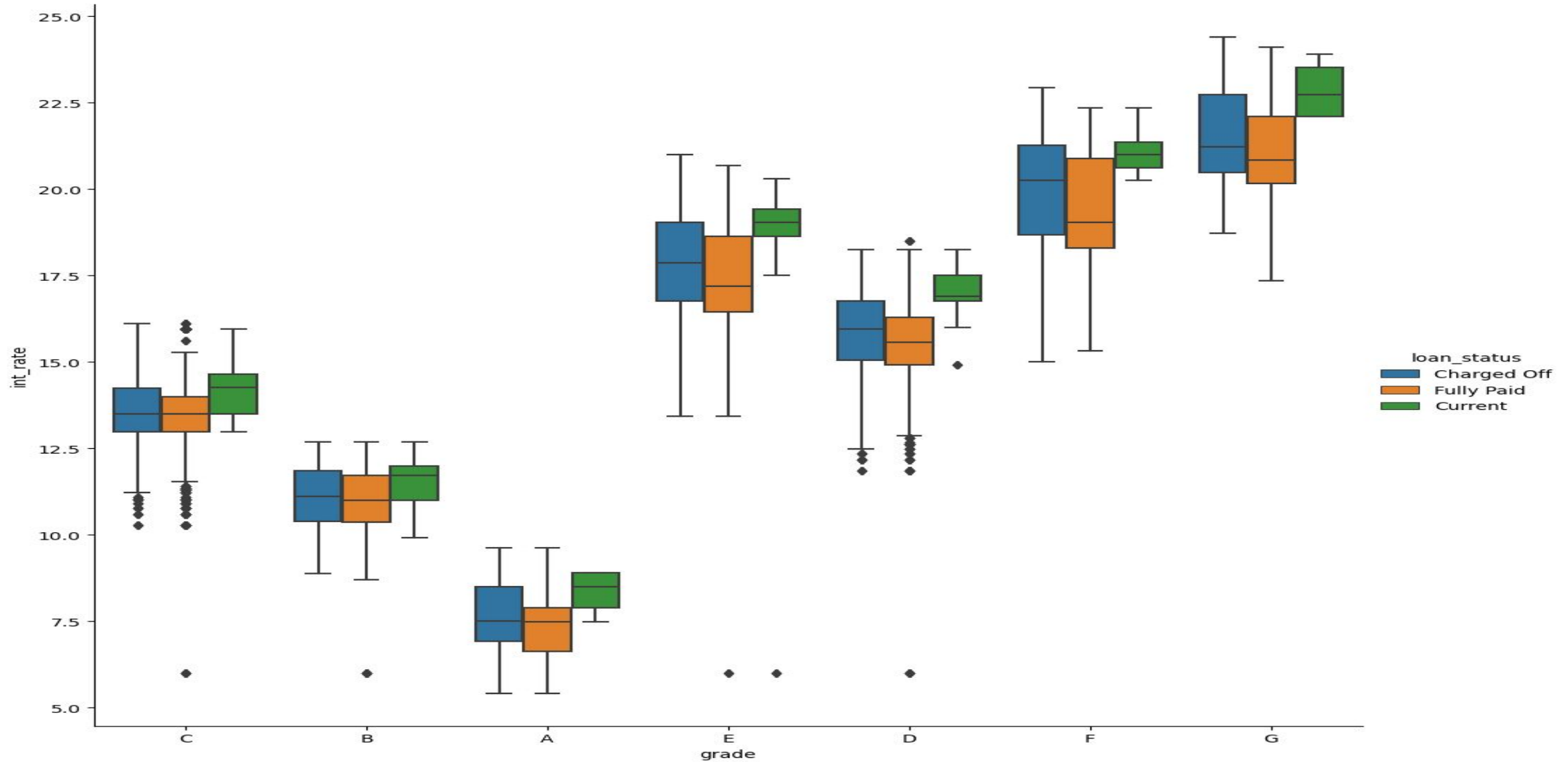
Segmented Univariate Analysis

Purpose v Default Percentage

- Small business have higher default percentage than any other purpose

Segmented Univariate Analysis

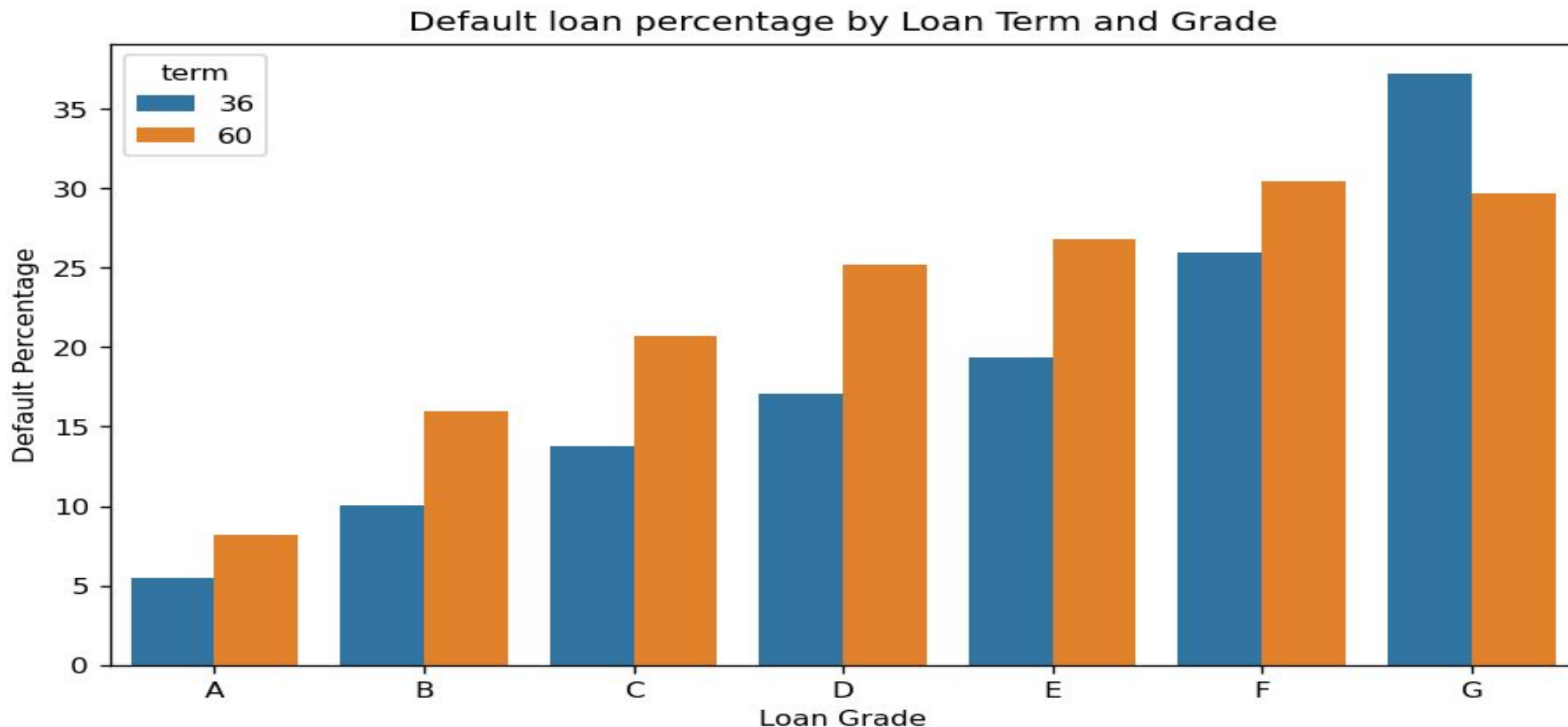Annual income binned v Default Percentage
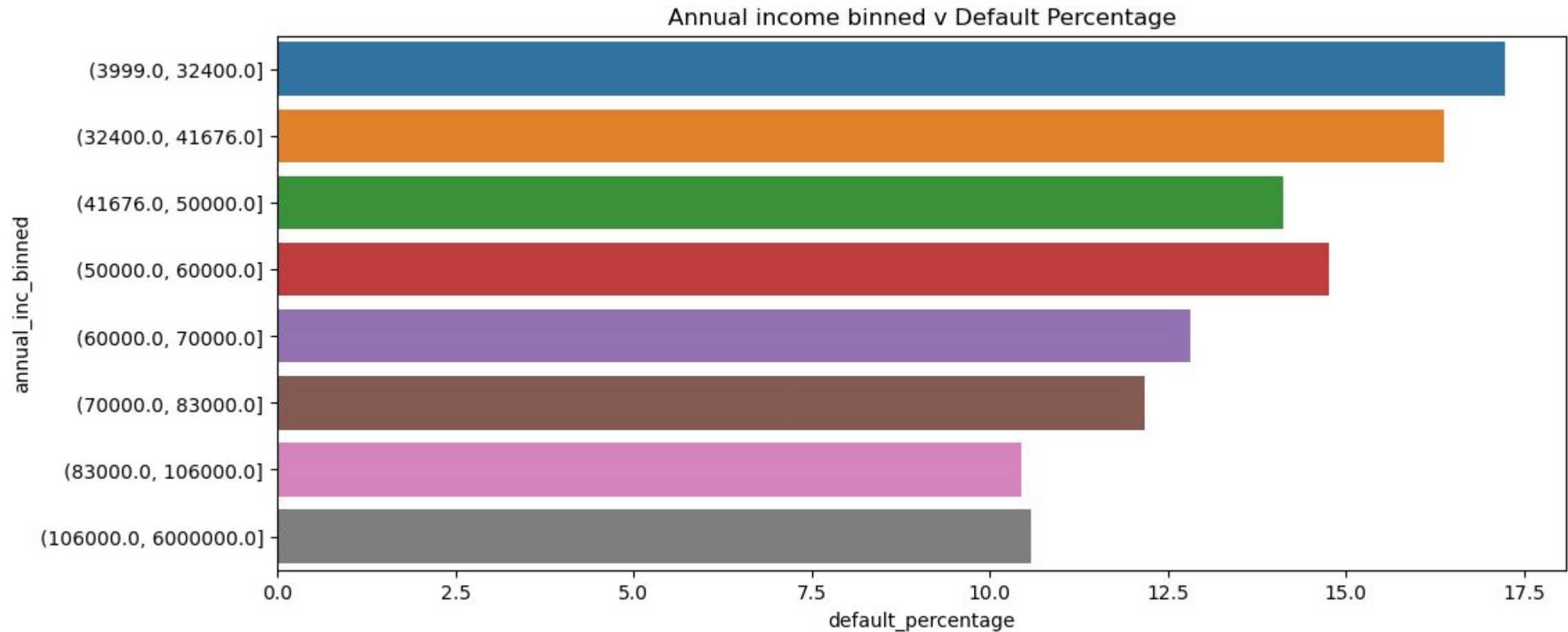
- Lower annual income bins have higher default percentages

Bivariate Analysis

- Default percentage is high with respect to lower loan grades G,F,E

Bivariate Analysis

Default loan percentage by Loan Term and Grade

- Loan default ratio of Grade A till E are irrespective of loan terms
- Grade G shows greater default percentage for 36 months term plan

Bivariate Analysis

Default loan % by Annual income and funded loan amount
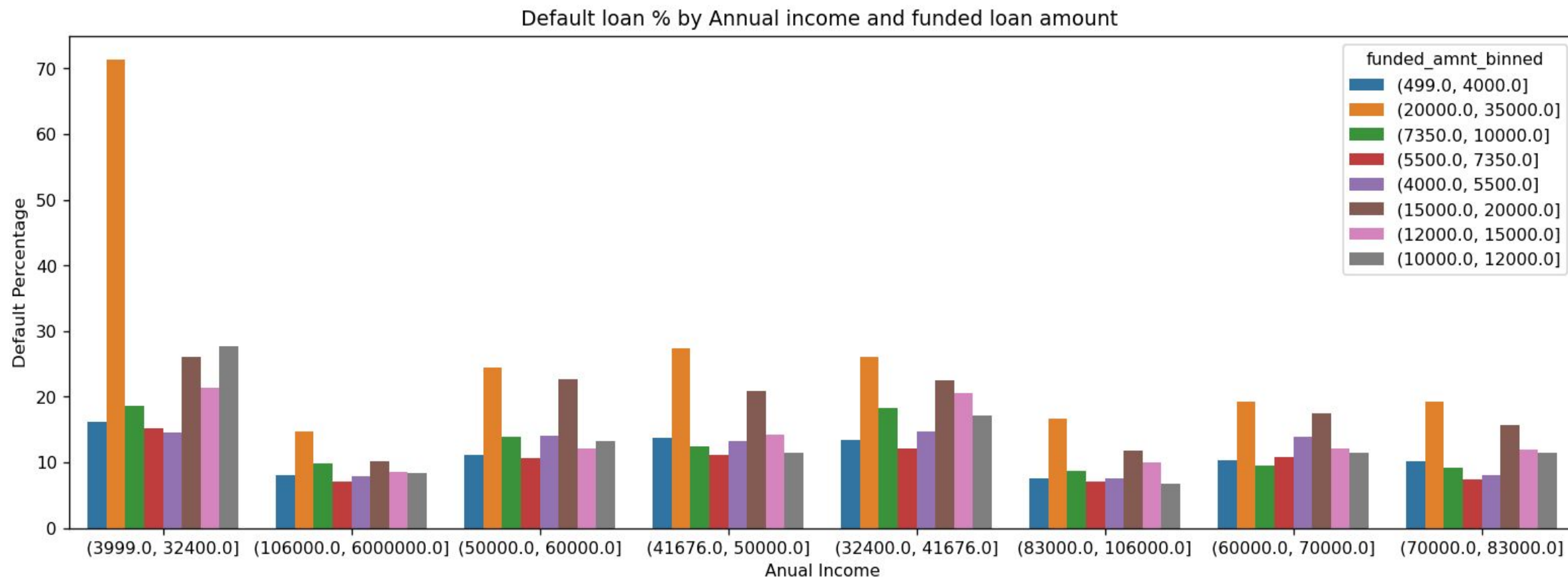
- The above shows binned annual income , binned funded amount and Default Percentage analysis
- If funded loan amount is above 20,000 USD for customer with < 30,000 USD annual income, they are most likely to default

Bivariate Analysis

Default loan % by US States and Loan purpose
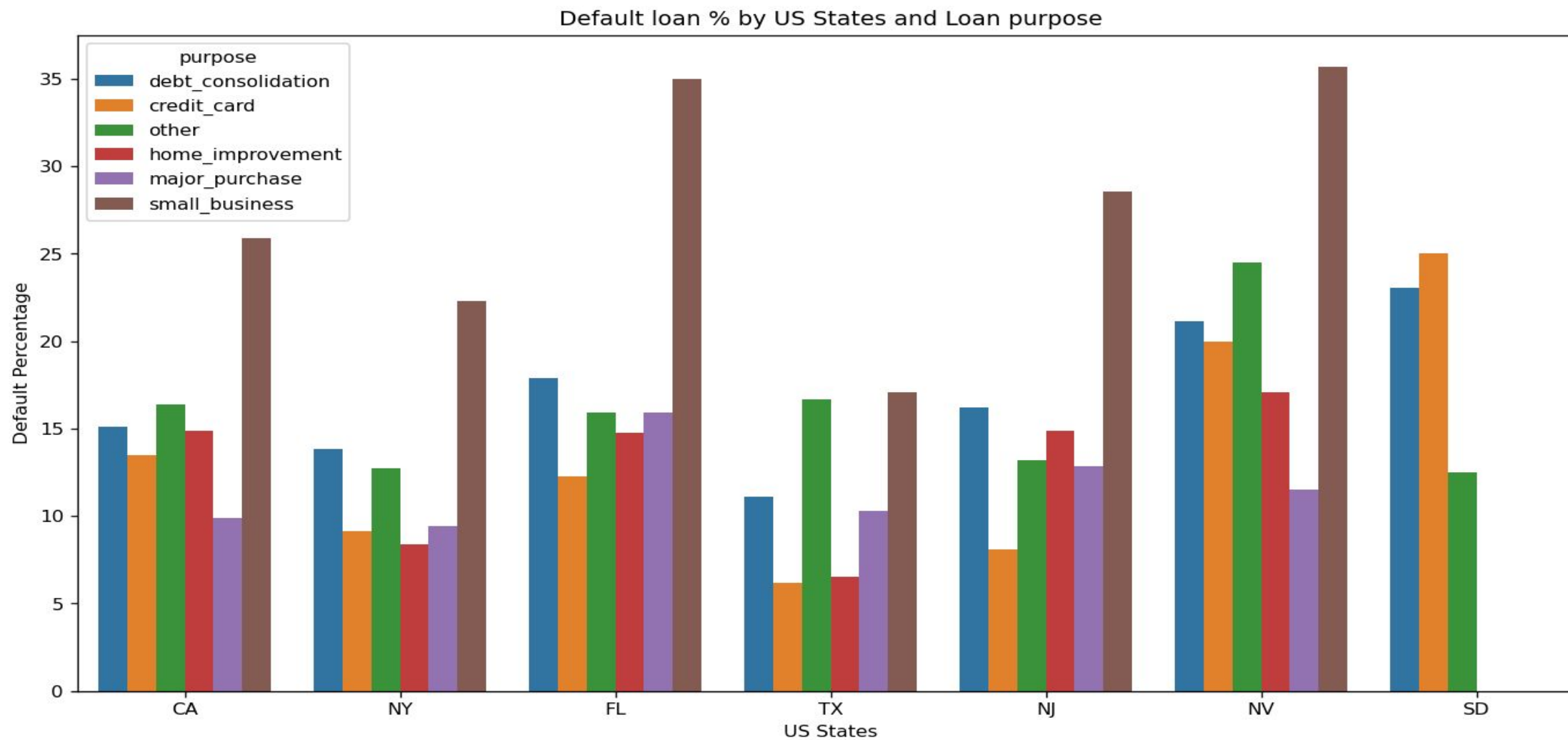
- Small business are likely to default across any region

Bivariate Analysis

Default loan % by Annual income and funded loan amount
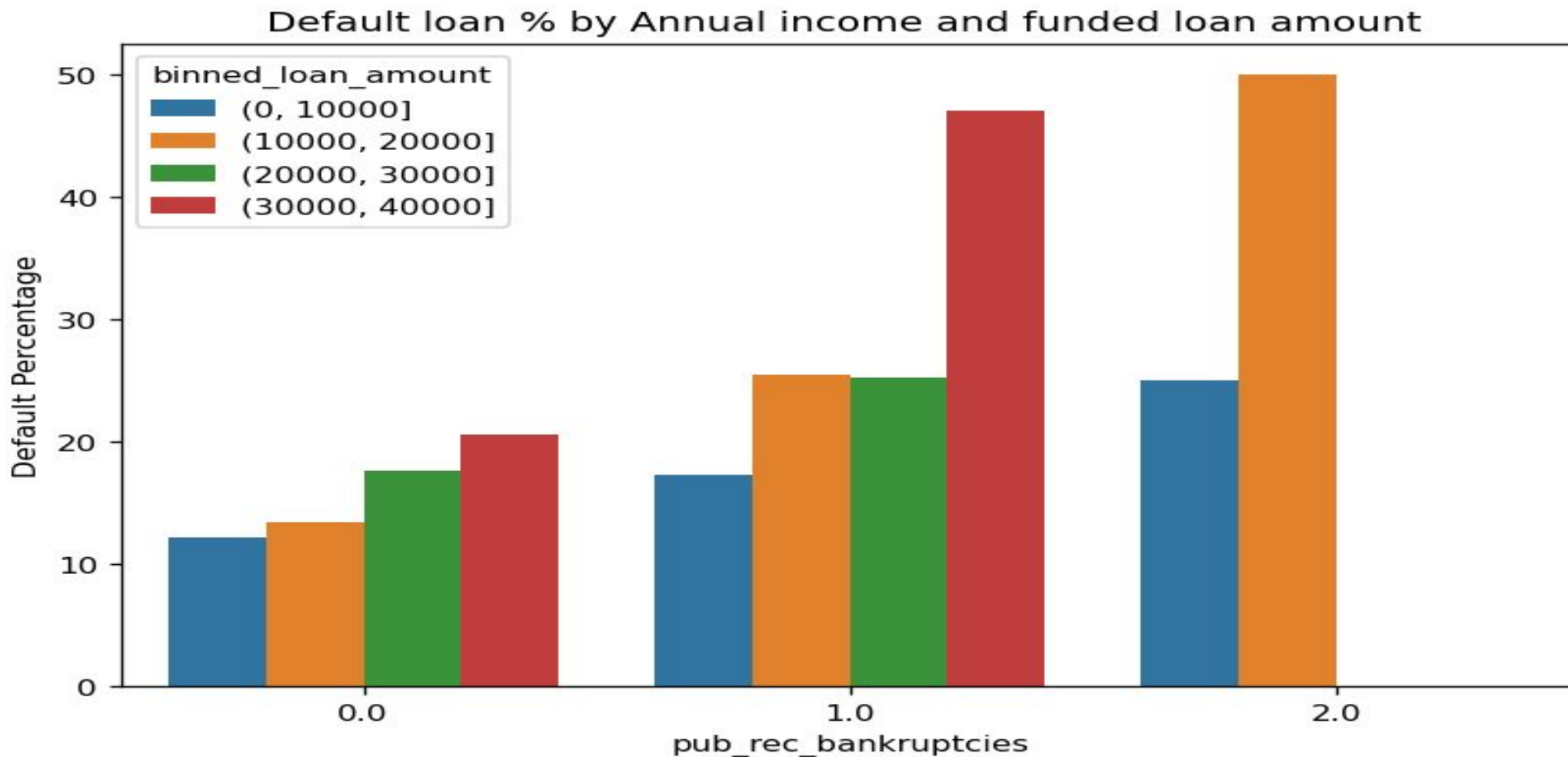
- Customers with 1 public bankruptcy record and annual income between 30000 and 40000 have very high default percentage
- Customers with 2 public bankruptcy record and annual income between 10000 and 20000 have very high default percentage

Conclusions

Based on the observation above following are major driving factors

- Grade
- Sub_grade
- Purpose
- Loan amount
- Annual income
- Public bankruptcy record

Recommendations

- Avoid Public bankruptcy record borrowers
- For each grade, loans should be give to top grades. Focus on A & B subgrades(A4, B3 etc) as they apply for most loans and less default
- Small business owners should be given loans with caution
- Avoid high amount long term loans
- Avoid giving higher loan amounts to F&G grades
- Avoid high dti ratio borrowers as they tend to default
- Avoid giving high amount loans to lower annual income(<25,000 USD)