# Lending Club Case Study

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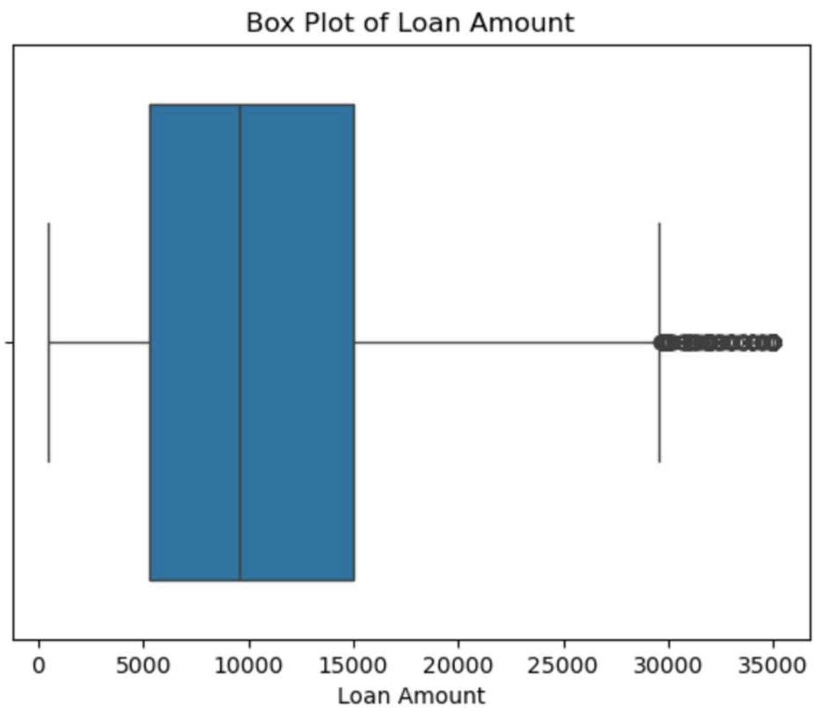
# Problem Statement

- Lending Club specializes in lending various types of loans to urban customers
- Lending Credit loss is a major concern for the company.
- Defaulters are the primary source of credit loss.
- Identifying risky loan applicants can significantly reduce credit loss.
- The goal of this case study is to identify the key factors that contribute to loan default.

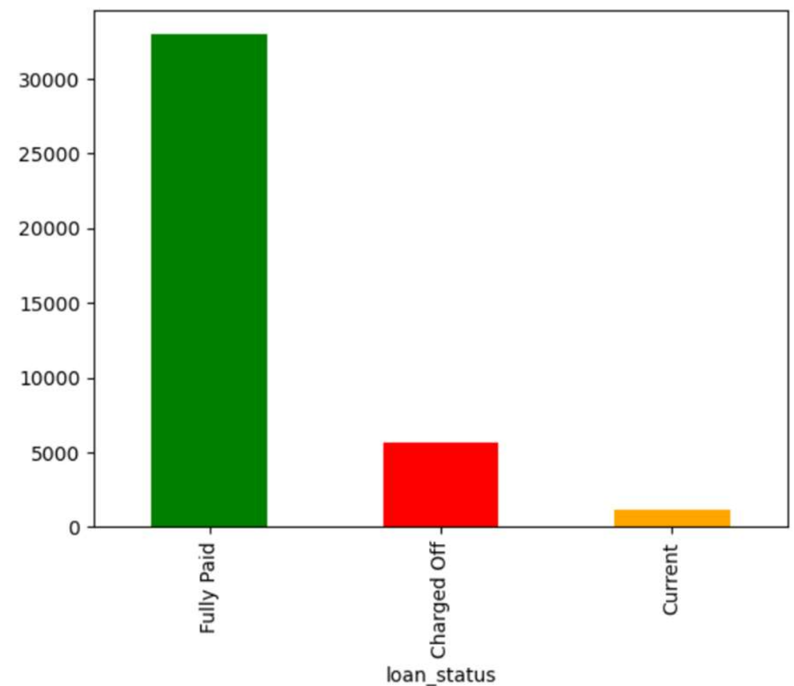
# Problem solving approach

- **Domain Understanding:** Understand the lending industry, loan types, and risk factors.
- **Data Cleansing:** Handle missing values, outliers, inconsistencies, and data normalization.
- **Univariate Analysis:** Analyze distribution, summary statistics, and visualization for loan amount, interest rate, dti , and other relevant variables.
- **Segmented Univariate Analysis:** Analyze loan performance by borrower demographics (state,annual income), loan type, and loan status.
- **Bivariate Analysis:** Explore correlations between loan amount and interest rate, purpose and default risk, and other relevant variable pairs.
- **Summary of Observations and Recommendations:** Summarize key findings, identify patterns, and provide actionable recommendations for improving loan risk assessment.

# Loan Amount & Loan Status

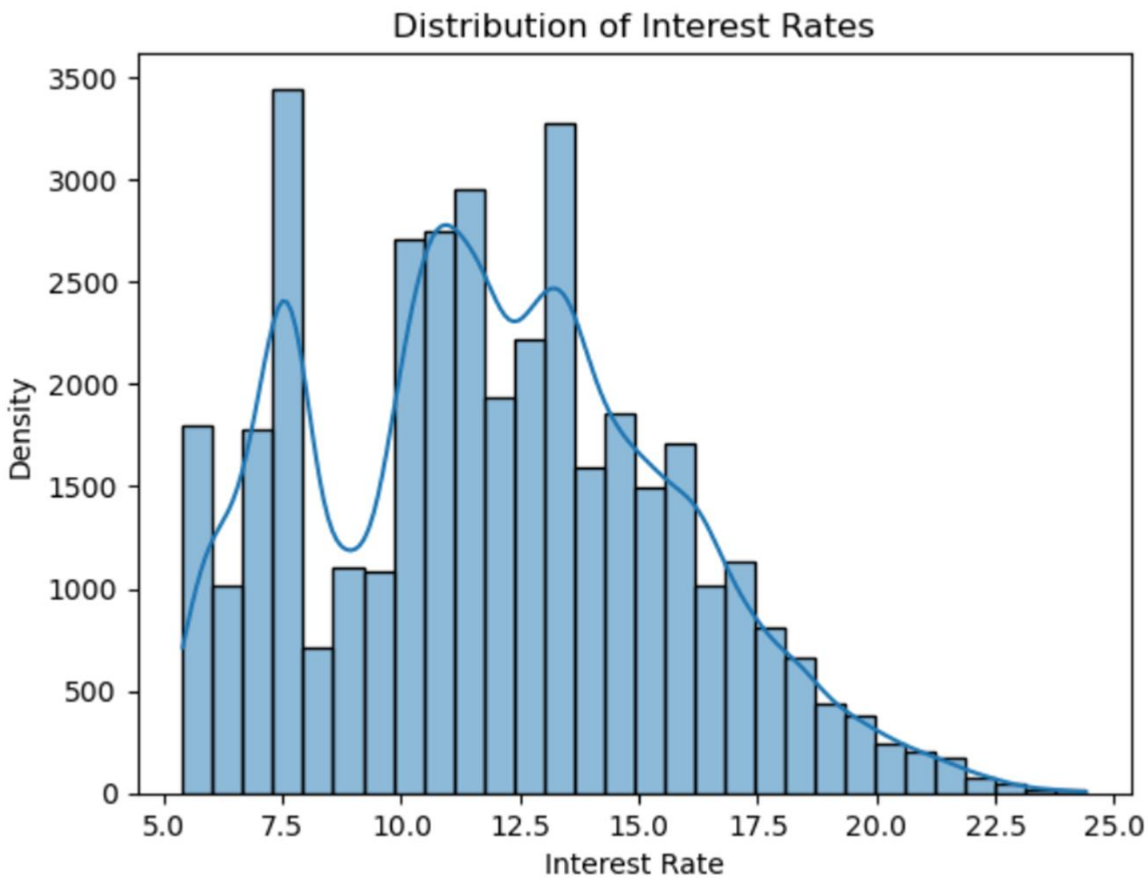



The majority of loan applications were for amounts between 5k and 14k.



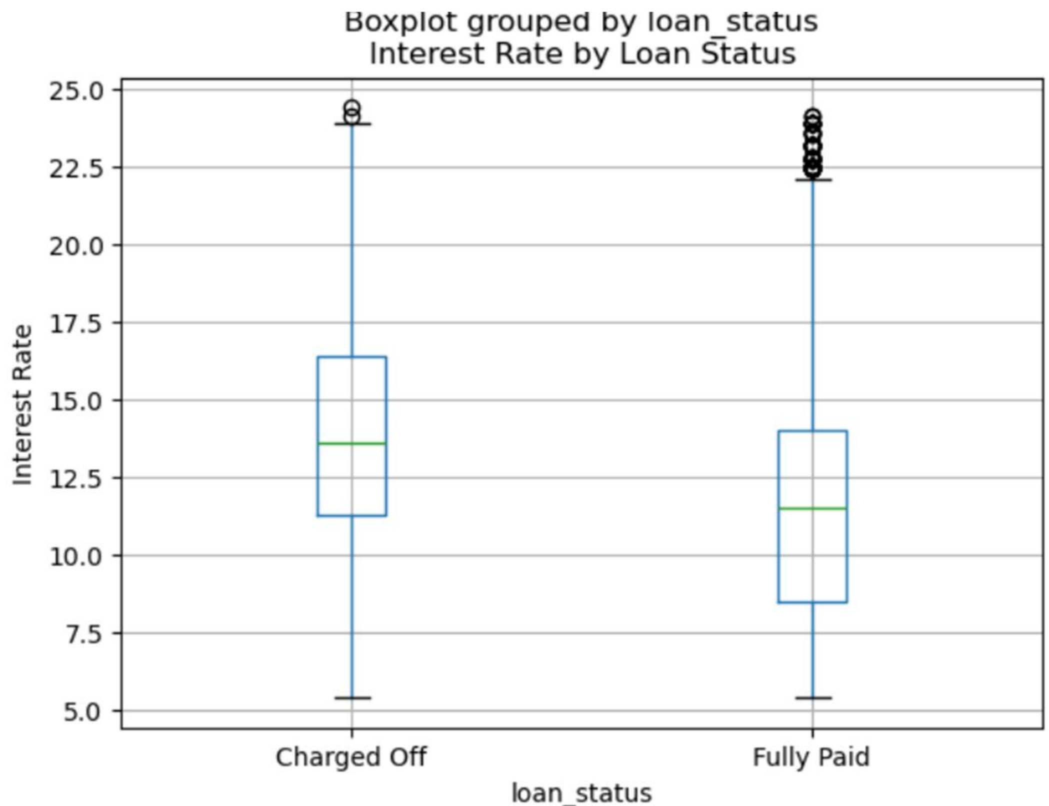

Current loan default rate is 14.16%

# Interest Rate



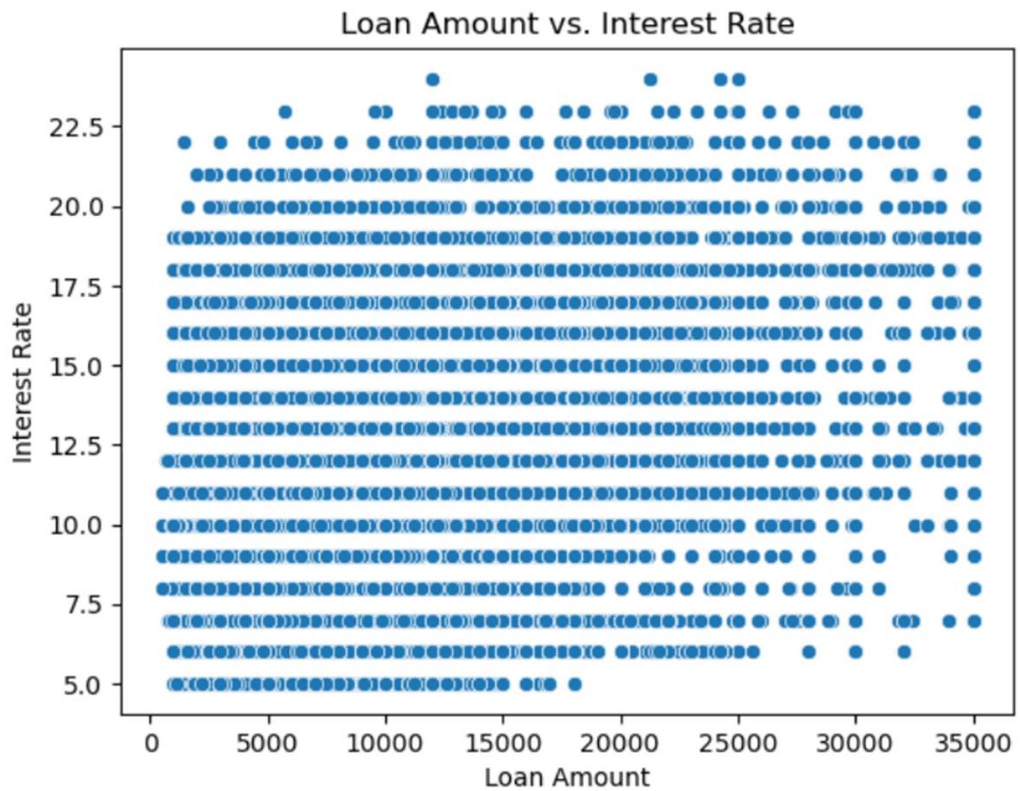

Interest rates in the dataset are moderately spread out, with a standard deviation of 3.69%. The majority of loans have interest rates between 8.9% and 14.4%. Average interest rate is 11.8%

# Interest Rate vs Loan Status




Loans with interest rates exceeding 13.8% have a higher likelihood of default compared to those with lower rates. The average interest rate for non-default loans is 11.6%.

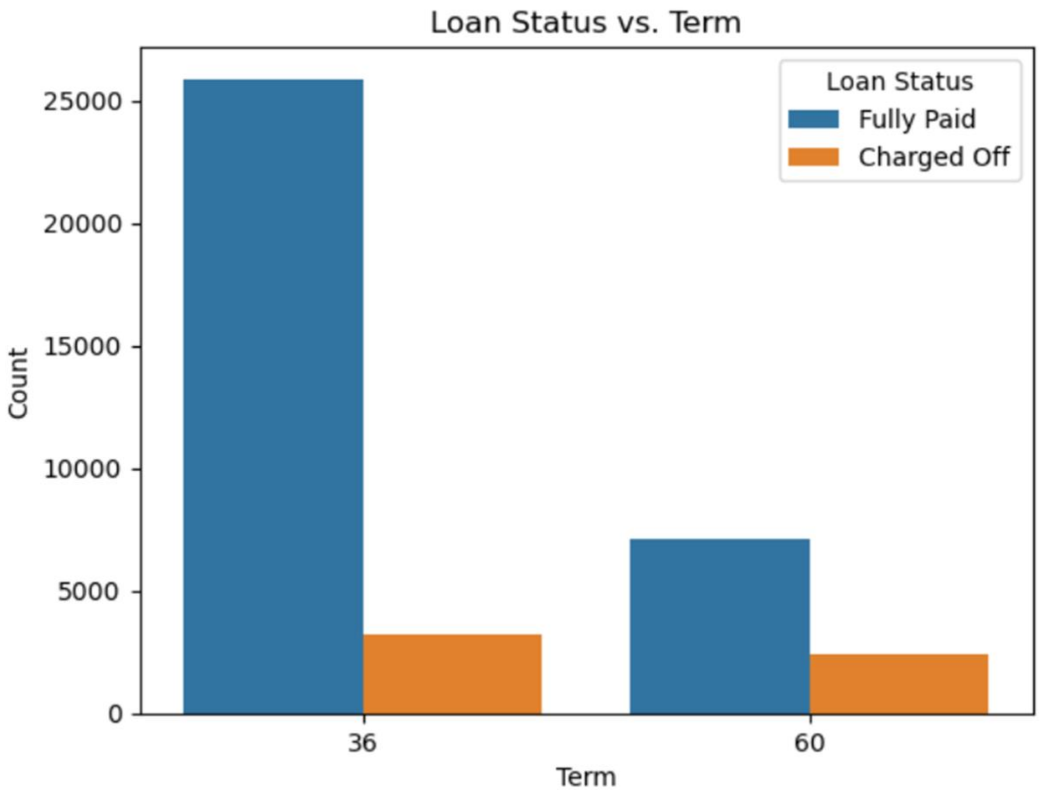
# Loan Amount vs. Interest Rate




Correlation coefficient: 0.2980857005767569

0.298 indicates a weak positive correlation between loan amount and interest rate. This means that there's a slight tendency for larger loan amounts to be associated with higher interest rates, but the relationship is not strong.

# Term vs Loan status

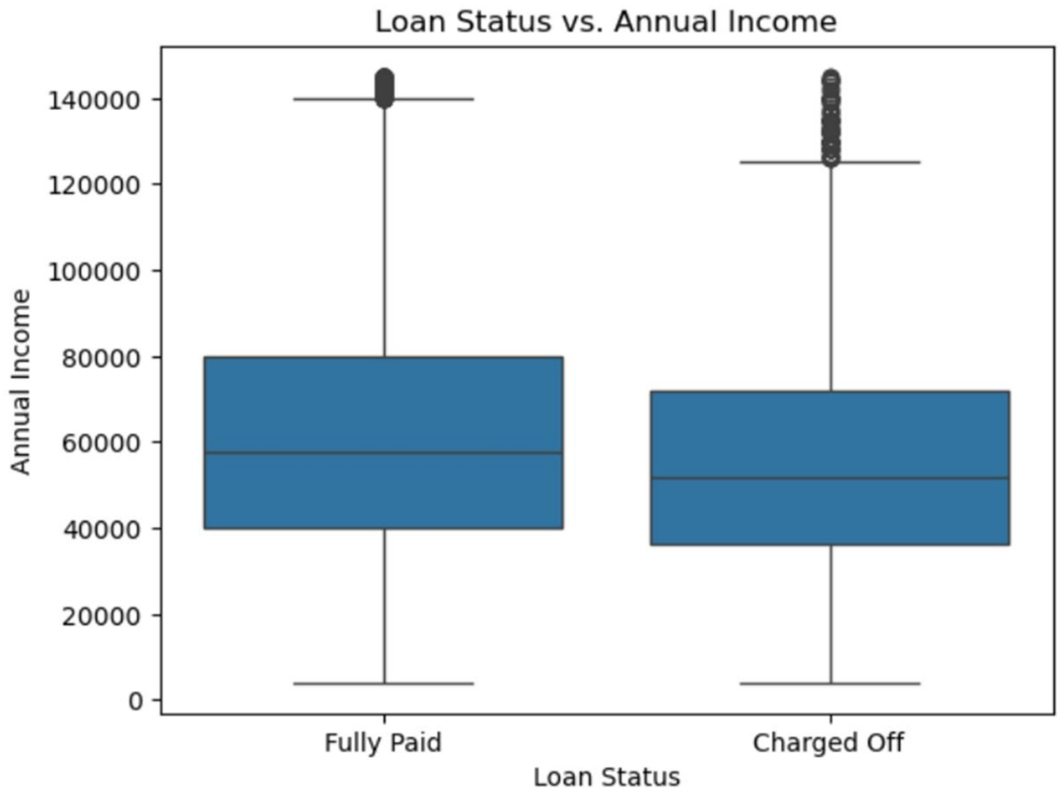



| | term | loan_status | count_x | count_y | pct |
|---|---|---|---|---|---|
| **0** | 36 months | Charged Off | 3227 | 29096 | 11.090872 |
| **1** | 36 months | Fully Paid | 25869 | 29096 | 88.909128 |
| **2** | 60 months | Charged Off | 2400 | 9481 | 25.313785 |
| **3** | 60 months | Fully Paid | 7081 | 9481 | 74.686215 |

**Higher Default Rate for Longer Terms:**

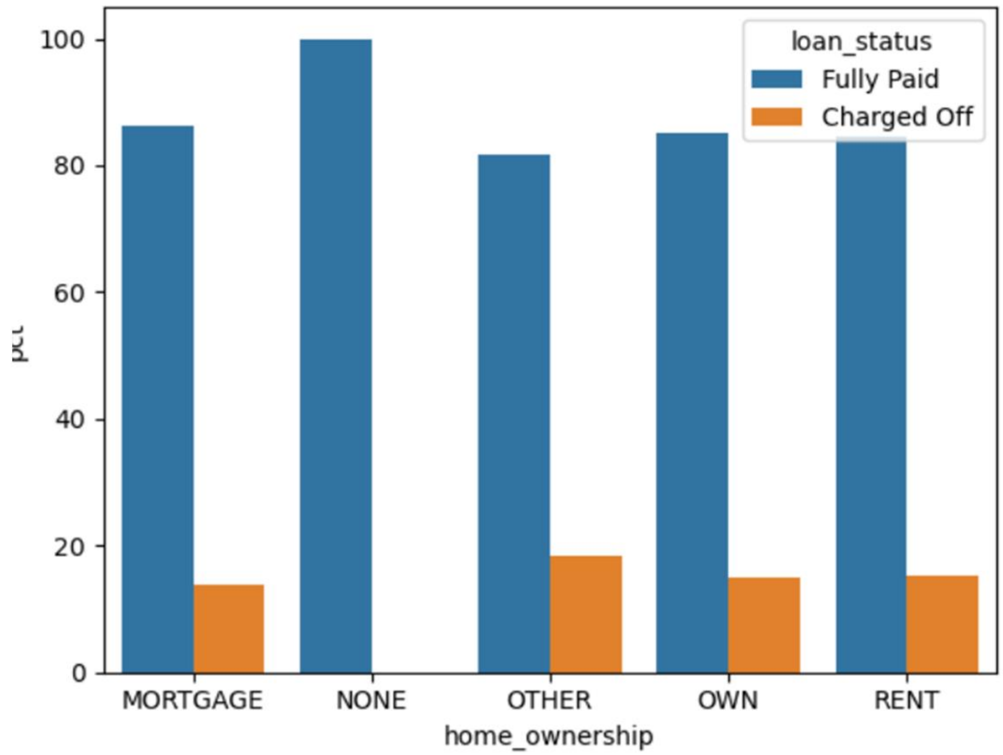
Loans with a 60-month term have a significantly higher default rate (25.31%) compared to those with a 36-month term (11.09%).
This suggests that longer-term loans are more likely to result in default

# Loan Status vs. Annual Income



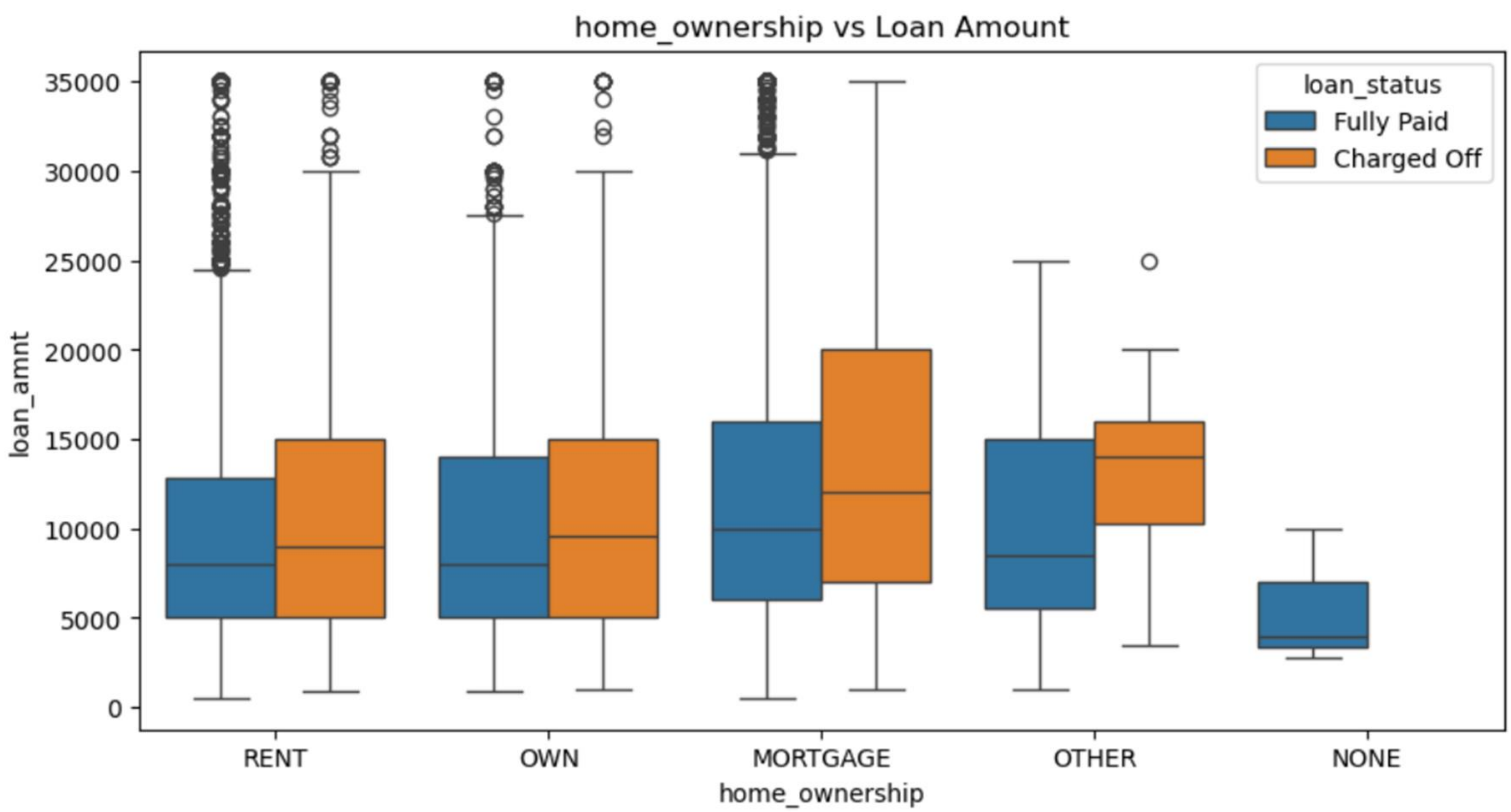

There is a slightly higher risk of default among customers with lower annual incomes compared to those with higher annual incomes.

# Loan Status vs Home Ownership



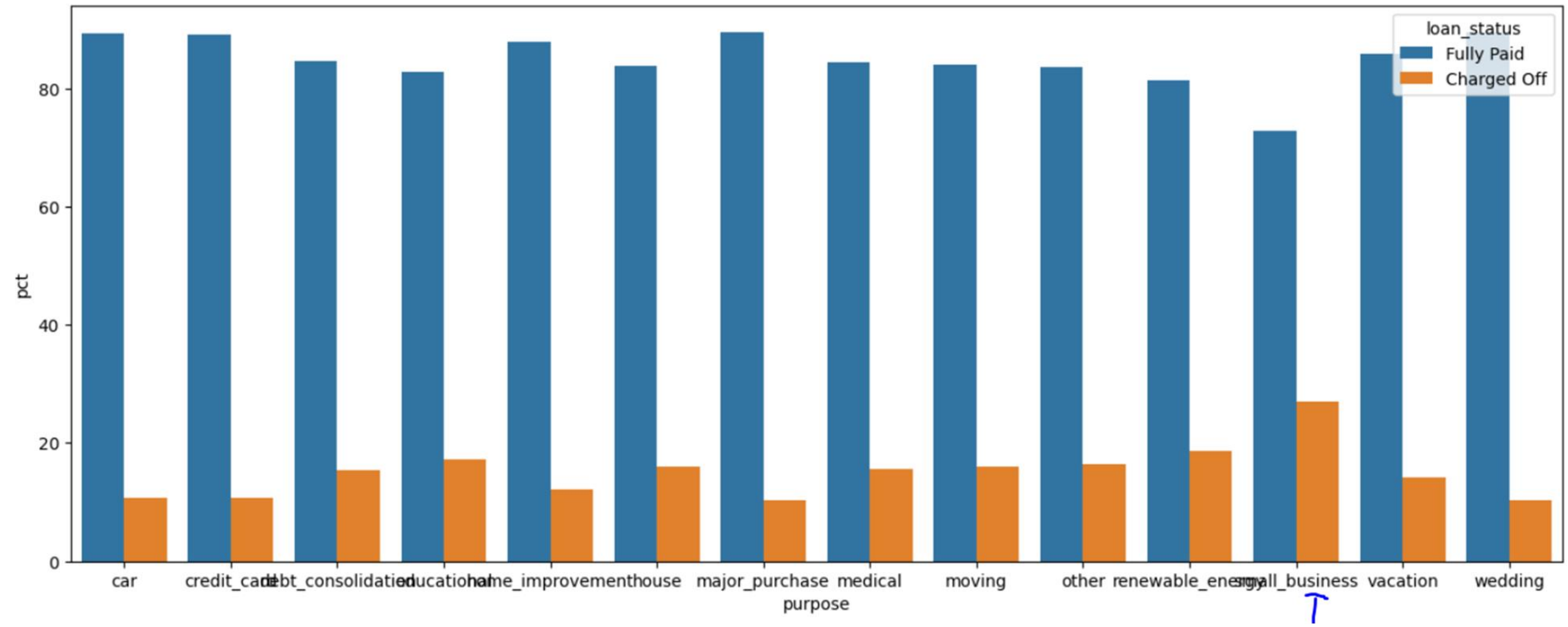

The default rate is lowest for mortgages, at 13.7%, while the highest default rate is seen in the "Other" home ownership category, reaching 18.4%.

# Home Ownership vs Loan Amount




Customers with a home ownership status of MORTGAGE who borrowed larger amounts are at a higher risk of default.

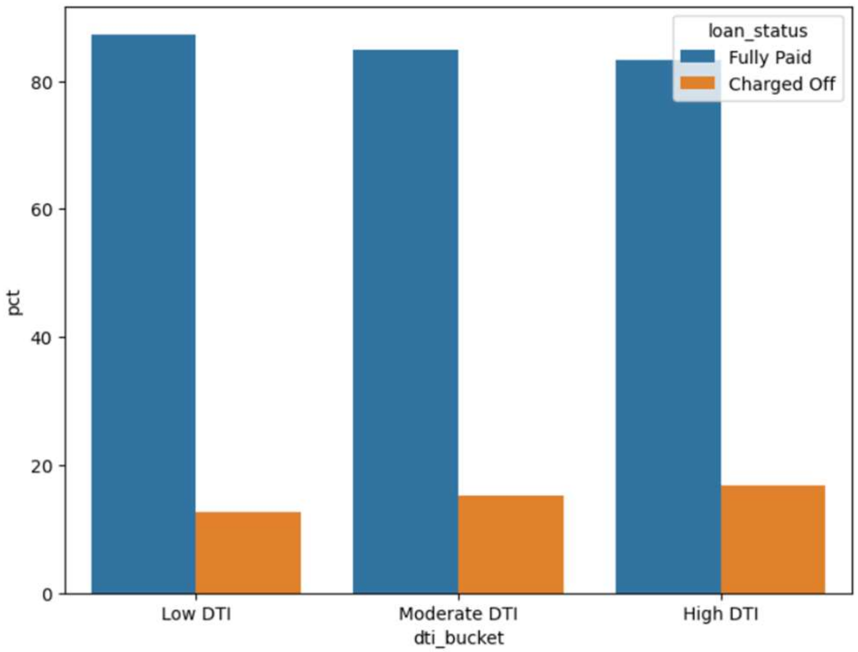
# Purpose vs Loan Status




| | purpose | loan_status | count_x | count_y | pct |
|---|---|---|---|---|---|
| 22 | small_business | Charged Off | 475 | 1754 | 27.080958 |
| 23 | small_business | Fully Paid | 1279 | 1754 | 72.919042 |

**High default rates:** Loans for **small business**, **debt consolidation**, and **other** purposes have the highest default rates, ranging from 15% to 27%.
**Low default rates:** Loans for **credit card**, **house**, and **major_purchase** purposes generally have lower default rates, typically below 15%.

# DTI vs Loan Status

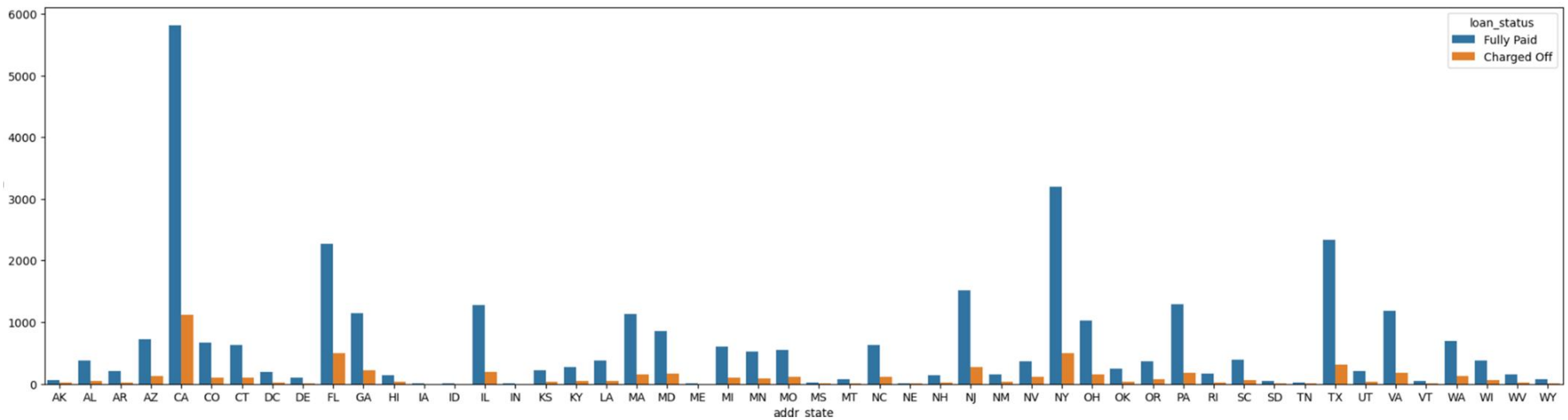



| dti_bucket | loan_status | count_x | count_y | pct |
|---|---|---|---|---|
| Low DTI | Charged Off | 1631 | 12935 | 12.609200 |
| Low DTI | Fully Paid | 11304 | 12935 | 87.390800 |
| Moderate DTI | Charged Off | 2791 | 18441 | 15.134754 |
| Moderate DTI | Fully Paid | 15650 | 18441 | 84.865246 |
| High DTI | Charged Off | 1205 | 7201 | 16.733787 |
| High DTI | Fully Paid | 5996 | 7201 | 83.266213 |

**Higher DTI is associated with a higher default rate:** Borrowers in the "High DTI" category have a significantly higher default rate (16.73%) compared to those in the "Low DTI" (12.61%) and "Moderate DTI" (15.13%) categories.

**Lower DTI is associated with a lower default rate:** Borrowers in the "Low DTI" category have the lowest default rate, suggesting that they are less likely to default on their loans.

# Borrower's State vs Loan Status




Customers from CA, NY, TX, and FL are the largest borrowers of loans, but these regions also have the highest volume of defaults.

# Conclusion

- Loans for **small business**, **debt consolidation**, and **other** purposes have the highest default rates, ranging from 15% to 27%.
- Borrowers in the "High DTI" category have a significantly higher default rate (16.73%) compared to those in the "Low DTI" (12.61%) and "Moderate DTI" (15.13%) categories.
- Customers from **CA, NY, TX**, and **FL** are the largest borrowers of loans, but these regions also have the highest volume of defaults.
- A strong positive correlation exists between loan amount and the number of installments, suggesting that larger loans are typically repaid over longer periods.
- Loans with **interest rates** exceeding **16%** have a significantly higher risk of default compared to loans with lower interest rates.
- Loans with a **60-month term** have a significantly **higher default** rate (25.31%) compared to those with a 36-month term (11.09%). Prefer shorter tenure loan over longer tenure loan.
- Individuals with a history of public derogatory records are more likely to file for bankruptcy. To mitigate risk, Lending Club should implement stricter criteria to ensure that borrowers do not have any public derogatory records