Lending Club case study Presentation and Recommendations

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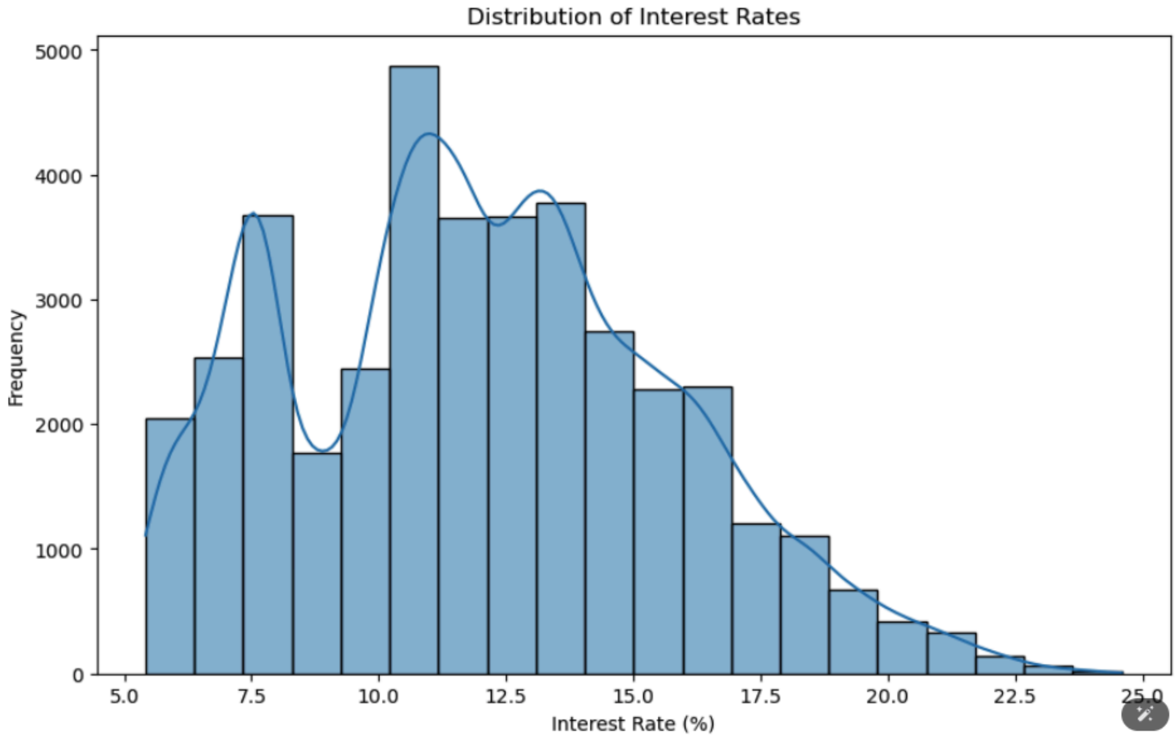
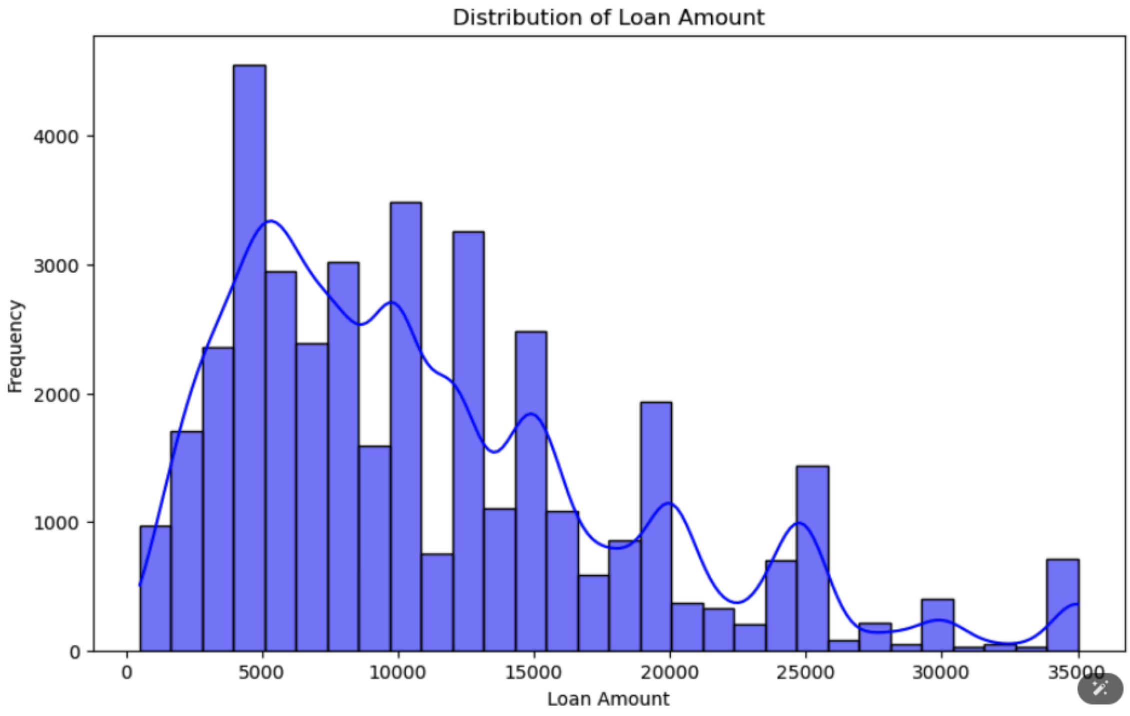
## Univariate Analysis Results in Business Terms

Univariate analysis focuses on analyzing one variable at a time, aiming to summarize its key patterns and characteristics. Here's how the results can be interpreted for business impact:

1. **Interest Rate (`int_rate`) Distribution:**




- **Insight:** Interest rates are mostly distributed between 10% and 20%, with very few loans exceeding 30%.
- **Business Interpretation:** Lending Club has set interest rates competitively, but higher interest rates may increase the risk of default. This emphasizes the importance of balancing risk-based pricing strategies.




2. **Loan Amount (`loan_amnt`):**

    - **Insight:** Most loans fall within the range of $5,000 to $15,000, with a few outliers for higher amounts.
    - **Business Interpretation:** Borrowers often request moderate loan amounts, which align with average consumer credit needs like debt consolidation or home improvement. However, larger loans might warrant stricter underwriting criteria to mitigate risk.

3. **Debt-to-Income Ratio (`dti`):**

    - **Insight:** The majority of borrowers have a DTI below 20%, but some exceed 35%.
    - **Business Interpretation:** Borrowers with high DTI ratios may face financial stress, increasing default risk. Lending Club can use this insight to refine loan approval criteria by setting DTI thresholds.

4. **Employment Length (`emp_length`):**

- **Insight:** A significant number of borrowers have 5+ years of employment history.
- **Business Interpretation:** Borrowers with stable employment are more reliable. This supports focusing on employment length as a key feature for creditworthiness evaluation.

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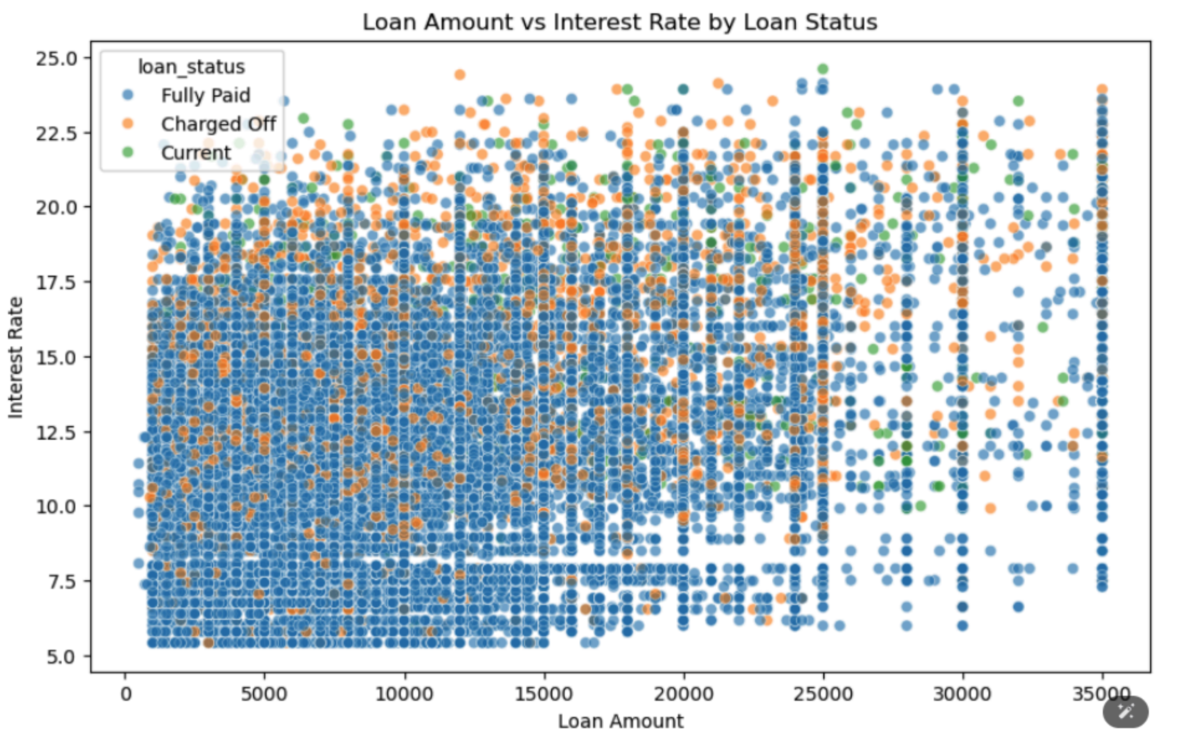
### Bivariate Analysis Results in Business Terms

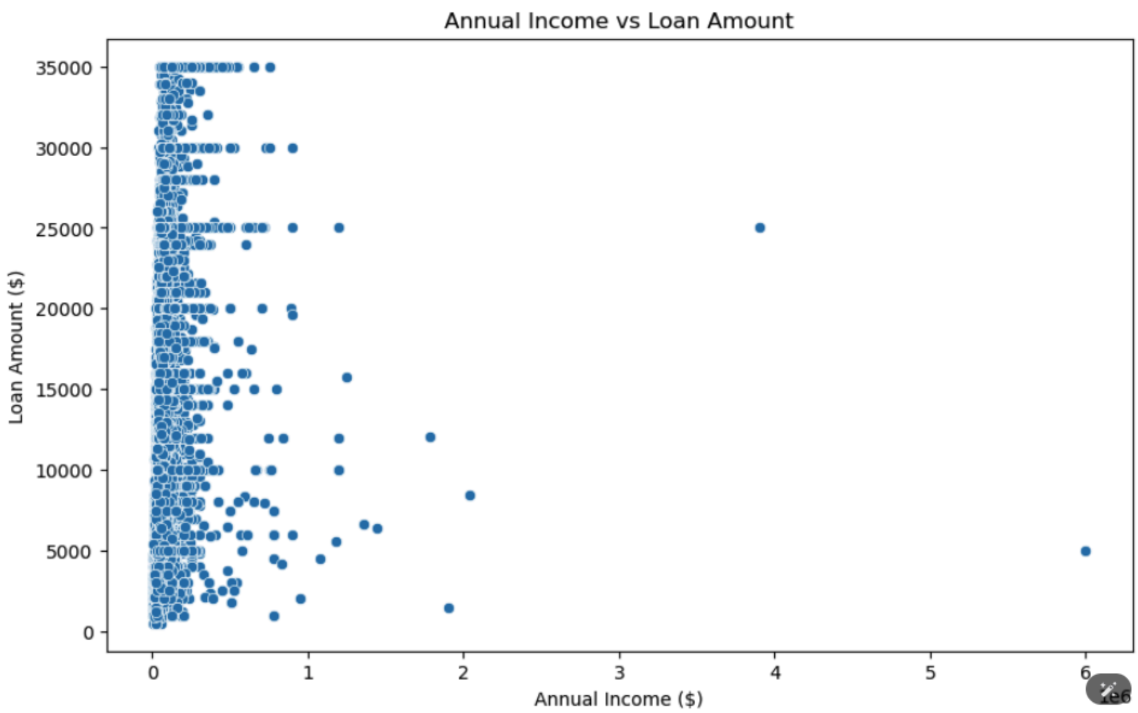
Bivariate analysis examines relationships between two variables, uncovering patterns that impact business outcomes.

1. **Interest Rate (`int_rate`) vs. Loan Status (`loan_status`):**



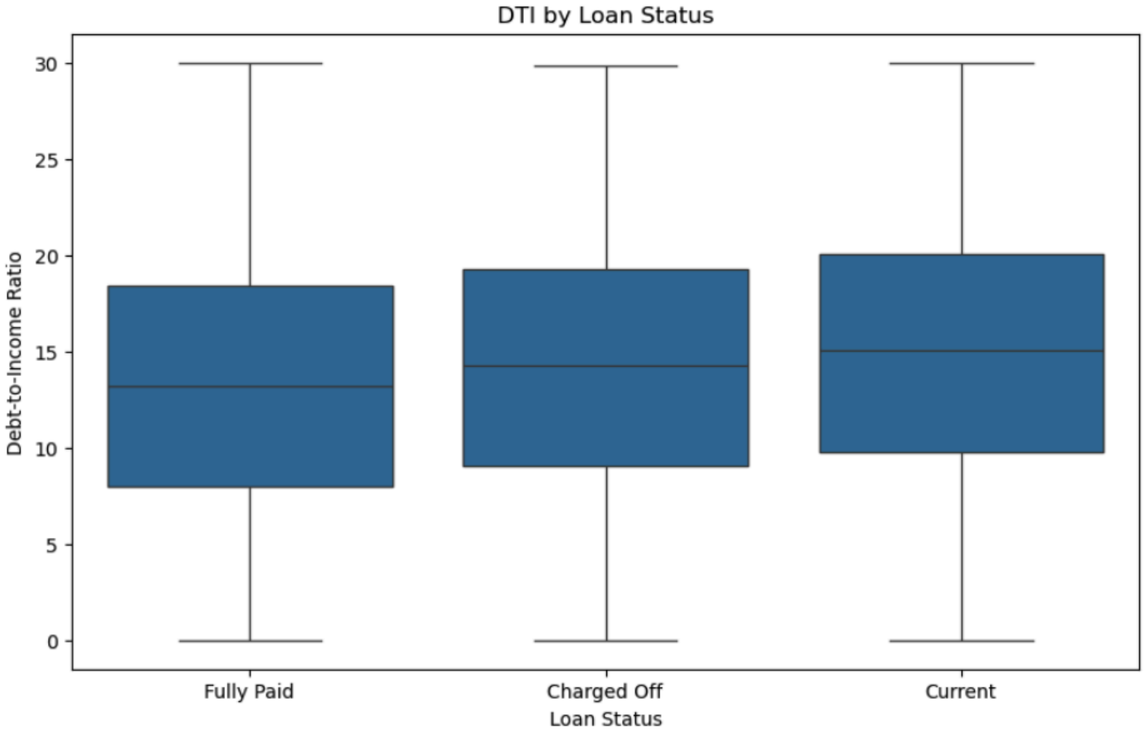
- **Insight:** Default rates are higher for loans with higher interest rates.
- **Business Interpretation:** Loans with higher interest rates might disproportionately attract riskier borrowers, leading to increased defaults. Adjusting risk-based pricing or enhancing credit assessments for such borrowers could reduce defaults.

2. **Annual Income (`annual_inc`) vs. Loan Amount (`loan_amnt`):**



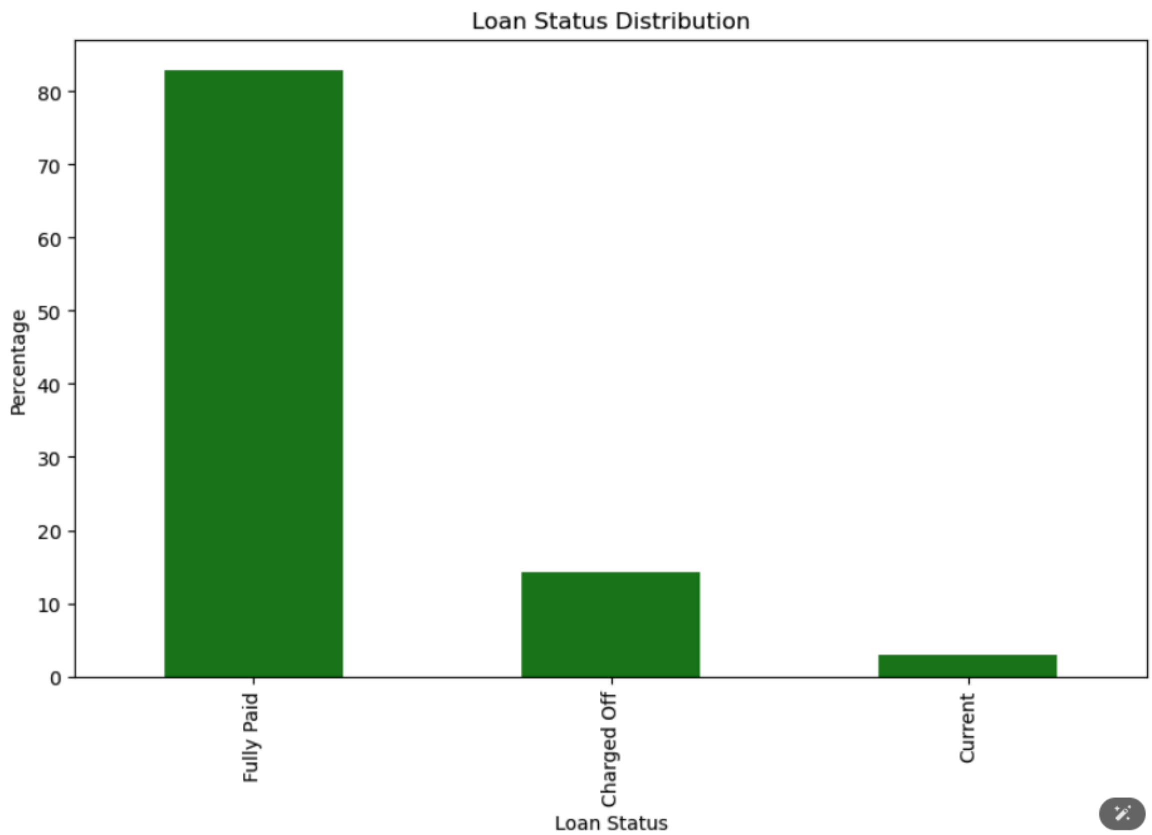

- **Insight:** Higher loan amounts are typically associated with borrowers with higher annual incomes.
- **Business Interpretation:** Borrowers' repayment capacity aligns with income levels. Encouraging higher-income borrowers to apply for larger loans might improve repayment rates and profitability.

3. **Debt-to-Income Ratio (`dti`) vs. Loan Status (`loan_status`):**

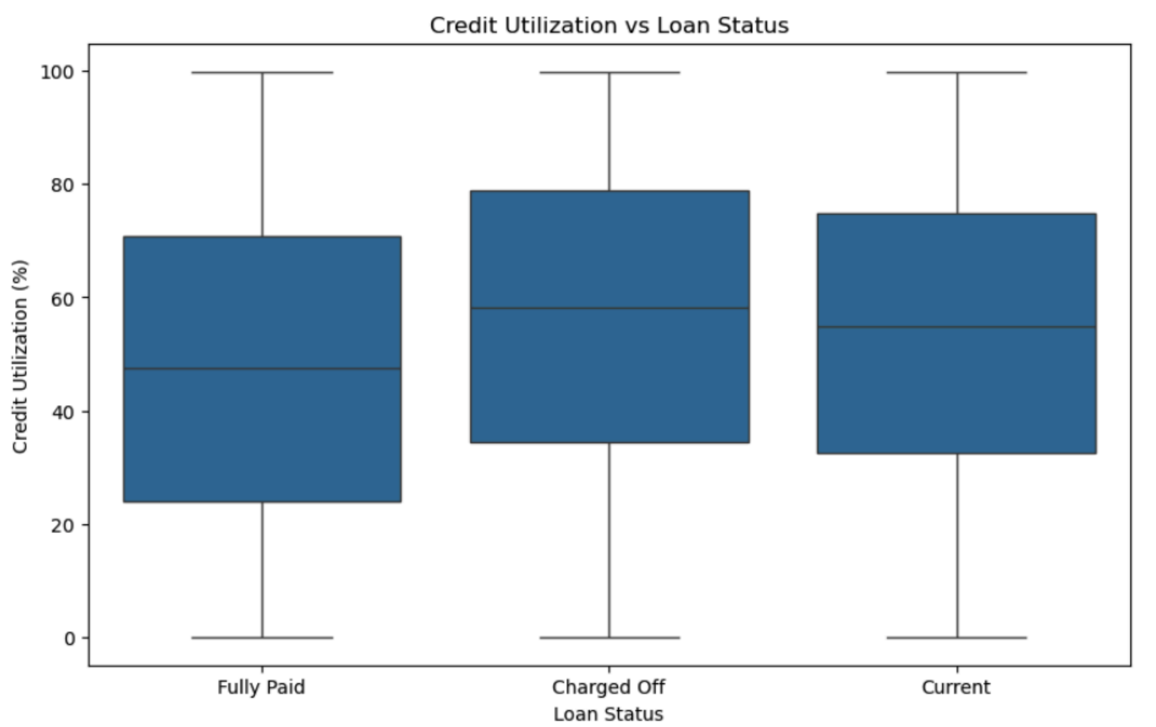



- **Insight:** Loans with higher DTIs have higher default rates.
- **Business Interpretation:** Borrowers with high debt burdens are less likely to repay loans on time. Implementing stricter DTI thresholds for loan approvals could mitigate this risk.

4. **Credit Utilization (`revol_util`) vs. Loan Status (`loan_status`):**



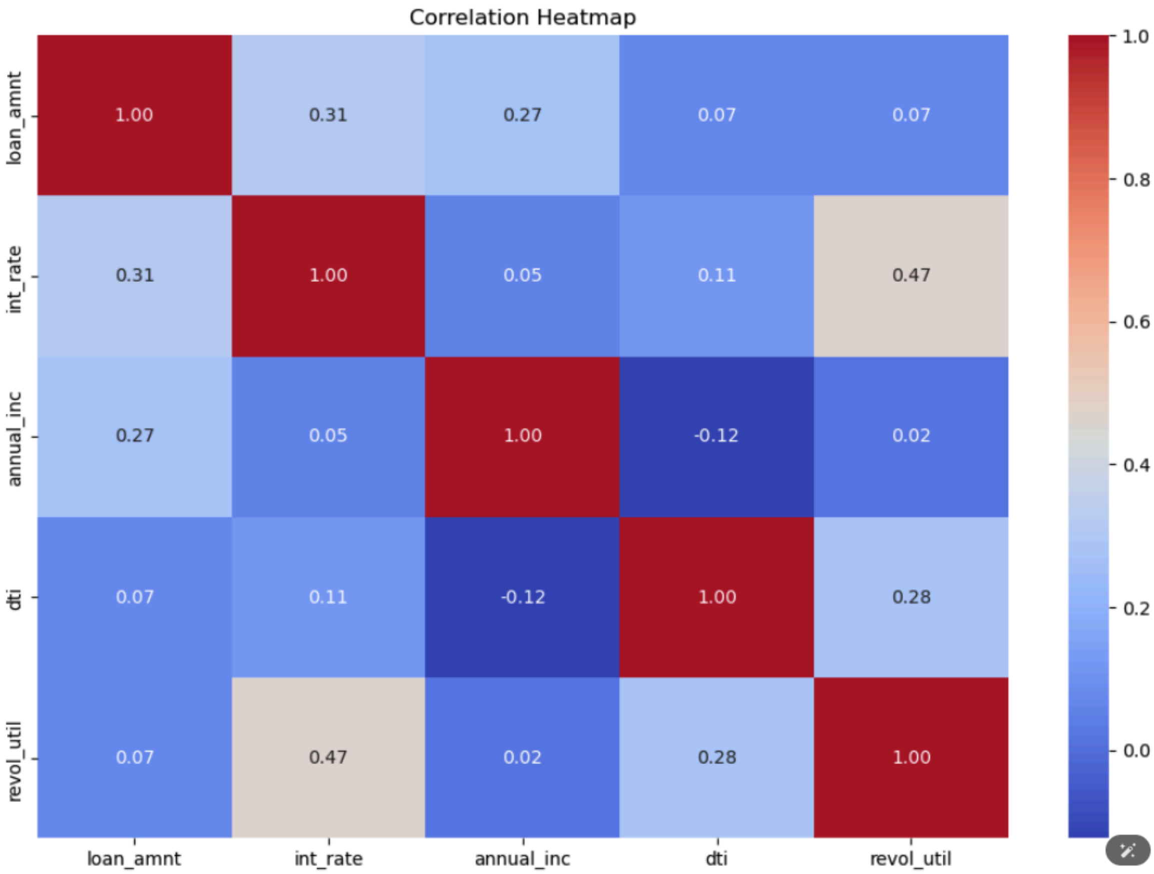

- **Insight:** High credit utilization correlates with a higher probability of default.
- **Business Interpretation:** Borrowers heavily utilizing their credit lines may indicate financial instability. Lending Club could prioritize reducing exposure to such borrowers or offer smaller loans with stricter terms.




5. **Loan Term (`term`) vs. Loan Status (`loan_status`):**

- **Insight:** Loans with 60-month terms have a higher default rate compared to 36-month loans.
- **Business Interpretation:** Longer-term loans increase borrower exposure to financial uncertainty. Offering incentives for shorter-term loans or stricter terms for 60-month loans could mitigate default risks.

Heatmap shows more of above relation between different metrics:

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## Business Recommendations Based on Analysis

1. **Risk-Based Pricing:**

    - Interest rates should reflect not just the borrower's creditworthiness but also other factors such as loan purpose and DTI ratio. For high-risk borrowers, consider smaller loans or higher collateral requirements.

2. **Loan Approval Policies:**

    - Use thresholds for critical metrics like DTI, annual income, and credit utilization to filter high-risk applicants.

3. **Customer Segmentation:**

   - Identify low-risk segments, such as borrowers with stable employment and low DTI, and target them with promotional loan products to improve profitability and reduce defaults.

4. **Monitoring High-Risk Factors:**

   - Continuous monitoring of borrowers with high credit utilization and longer loan terms can help in early identification of potential delinquencies.

5. **Dynamic Loan Terms:**

   - Offer tailored terms (e.g., interest rates, loan amounts, repayment periods) based on borrower characteristics to optimize repayment rates.

## Actionable Recommendations:

Based on the findings from the analysis, several actionable recommendations have been made to reduce credit loss for the company:

1. **Reject Loans for High DTI Ratios**: Applicants with high debt-to-income ratios are more likely to default. The company should consider rejecting loans for applicants whose DTI exceeds a certain threshold (e.g., 40%).
2. **Review Applicants with Low FICO Scores**: Applicants with low FICO scores are at a significantly higher risk of defaulting. A higher interest rate could be applied to high-risk applicants, or the loan amount could be reduced.

3. **Monitor Credit Utilization**: Applicants with high credit utilization rates (above a certain percentage) should be flagged for review as they tend to default at a higher rate. This is an indication of financial distress, and the company may want to reduce the amount of the loan offered or charge higher interest.
4. **Target Specific Loan Types**: Loans for certain purposes (e.g., credit card debt consolidation) may have a higher default rate. The company could adjust the interest rates based on the loan purpose or implement stricter credit requirements.
5. **Adjust Approval Criteria Based on Employment History**: Borrowers with shorter employment tenures were found to have higher default rates. The company should consider a minimum employment history requirement or use this variable as a factor in their loan approval decision-making process.

These recommendations are aligned with the analysis, focusing on minimizing credit loss by identifying high-risk applicants and adjusting the lending process accordingly.

## Assumptions:

Several assumptions were made during the analysis:

1. **Data Completeness**: It was assumed that the missing values in critical variables (e.g., `annual_inc`, `revol_util`) were addressed correctly using median/mode imputation methods.
2. **Risk Thresholds**: While specific risk thresholds (e.g., DTI ratio or FICO score) were not provided by the company, reasonable thresholds were chosen based on industry standards and the data analysis.
3. **Current Business Logic**: It was assumed that the company currently uses similar metrics (e.g., credit score, income, DTI ratio) for their loan approval process, and the analysis aligns with their decision-making criteria.

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