Case Study Submission - Lending Club

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Agenda

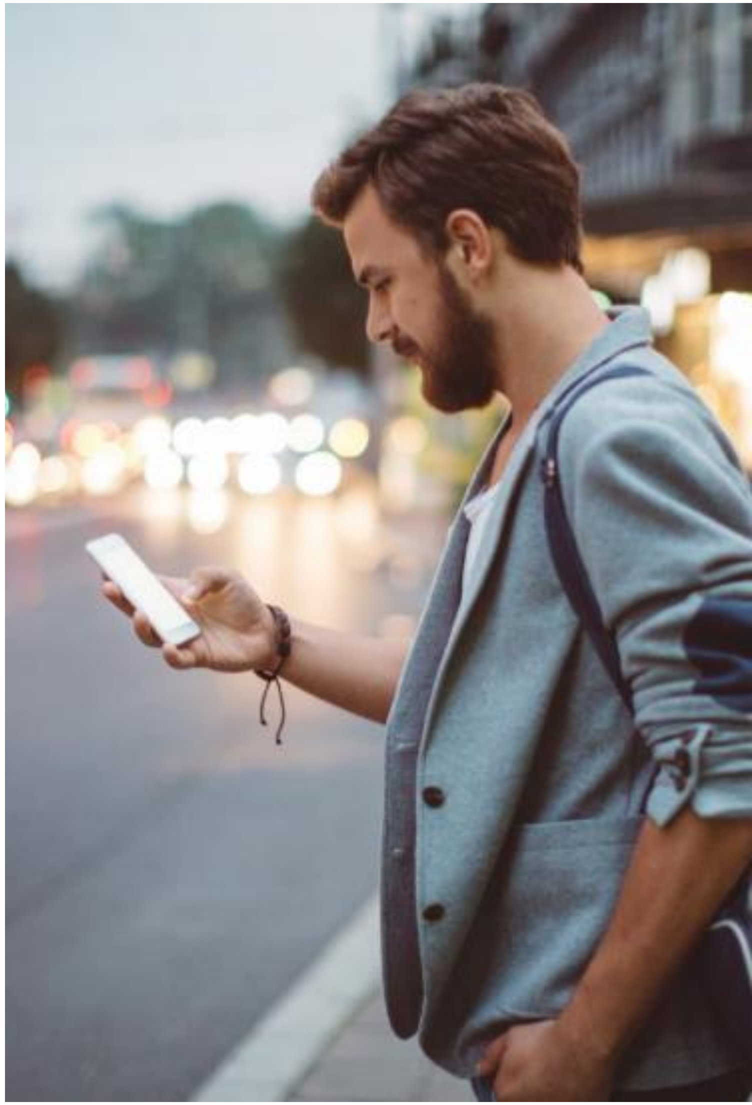
Understanding Loan Default Risks

Challenges in Lending Decisions

Analysis Approach

Key Insights

Recommendations



Understanding Loan Default Risks

- **Primary Risks Faced by the Company:**
    - **Loss of Business:**
        - Denying loans to borrowers who are likely to repay results in missed opportunities for revenue generation.
        - This leads to decreased competitiveness in the market and reduced customer satisfaction.
    - **Financial Loss:**
        - Approving loans for borrowers who are likely to default creates significant credit losses for the company.
        - Such defaults impact the company's profitability, financial stability, and reputation.
- **Objective:**
    - Conduct a thorough analysis of historical loan data to identify key patterns and variables influencing loan defaults.
    - Understand the relationship between borrower attributes (e.g., income, credit inquiries, loan grade) and loan performance.
    - Provide actionable insights to improve risk assessment strategies, optimize loan approval processes, and reduce the likelihood of financial losses.
    - Develop a data-driven approach to strike a balance between minimizing defaults and maximizing business opportunities.

Challenges in Lending Decisions

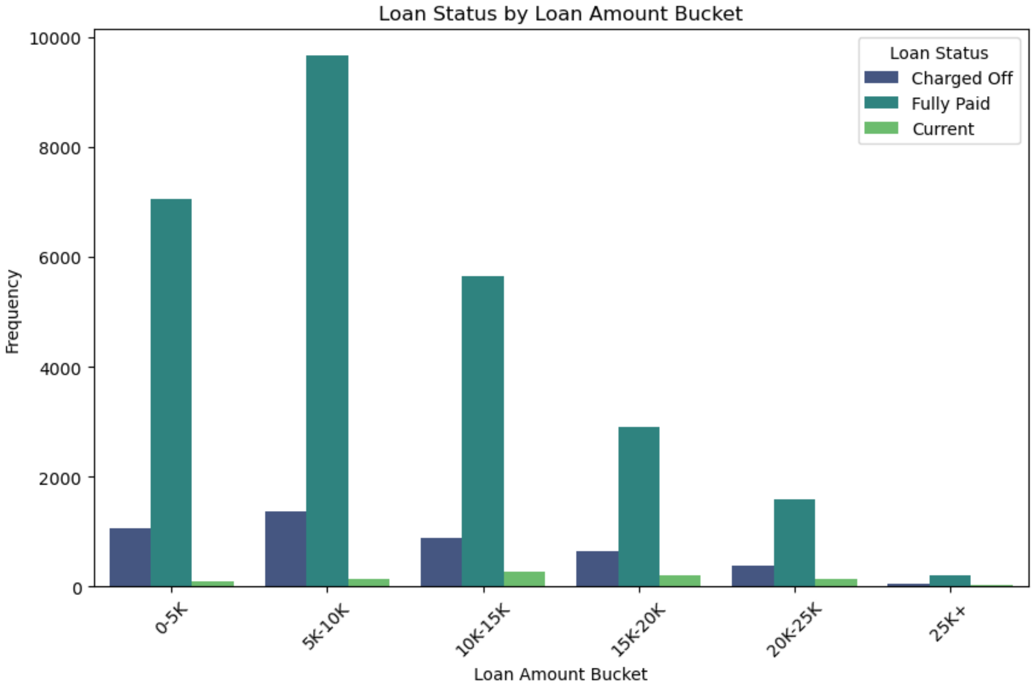
- **Diverse Borrower Profiles:**
  - Borrowers exhibit a wide range of financial behaviors, income levels, and credit histories, making it challenging to establish uniform approval criteria.
  - Understanding and predicting default risks across these diverse profiles is complex.
- **Inconsistent Repayment Behaviors:**
  - Default rates vary significantly based on factors like loan grade, interest rate, loan purpose, and borrower attributes.
  - Identifying patterns in these behaviors requires detailed analysis.
- **High Stakes Decision-Making:**
  - Every loan decision carries the risk of either financial loss (in case of defaults) or lost business opportunities (in case of denials).
  - Balancing risk and reward requires precise insights into default drivers.
- **Large Volume of Data:**
  - The dataset contains extensive records, including borrower demographics, financial history, and loan details from 2007 to 2011.
  - Effective data cleaning and analysis are necessary to extract actionable insights.
- **Dynamic Economic Factors:**
  - External factors like market fluctuations and economic downturns can influence borrower behavior and repayment capacity.
  - Incorporating these variables into risk models is essential for accurate predictions.

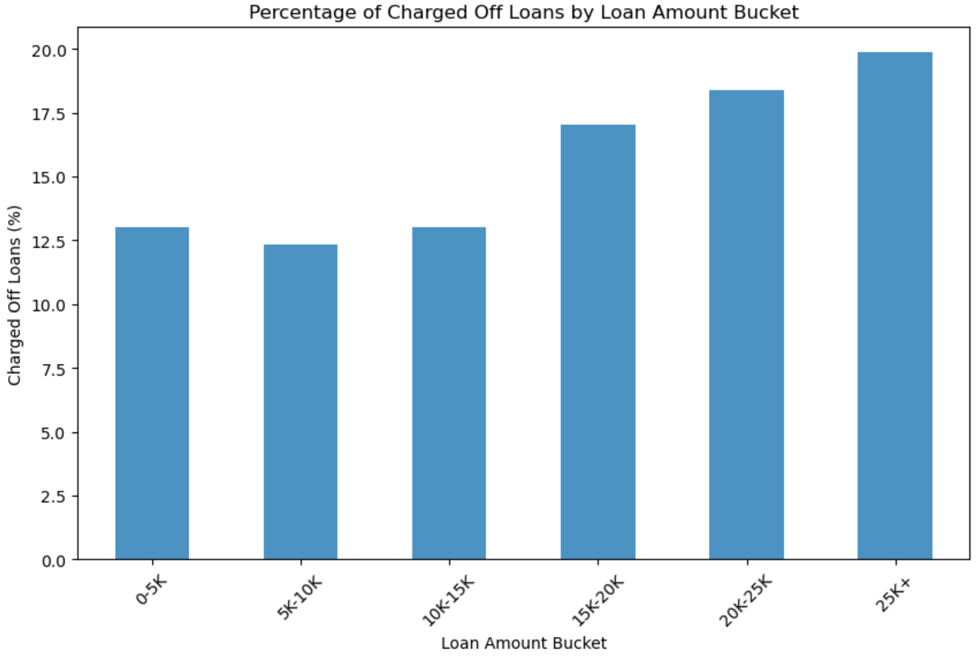
Analysis – Approach & Methodology

- **Data Understanding:**
  - Utilized the Lending Club dataset (2007–2011) with key variables such as loan amount, interest rate, annual income, loan grade, and loan status.
  - Focused on analyzing factors influencing loan defaults (e.g., Charged Off status).
- **Data Cleaning and Preparation:**
  - Removed irrelevant columns and handled missing values.
  - Transformed int_rate and annual_inc into buckets for segmentation.
  - Validated data consistency and completeness for accurate analysis.
- **Univariate Analysis:**
  - Explored individual variable distributions, including:
    - Interest rate (bucketized to identify risk levels).
    - Loan amount (segmented to analyze borrower behavior).
    - Loan grades and purposes.
- **Bivariate Analysis:**
  - Studied relationships between loan_status and key variables:
    - Relation between int_rate_bucket and default rates.
    - Trends in loan grades and annual income impacting Charged Off loans.
  - Visualized insights using heatmaps, bar plots, and pivot tables.
- **Insights and Recommendations:**
  - Highlighted actionable insights (e.g., high interest rates correlate with higher default rates).
  - Proposed risk mitigation strategies to optimize lending decisions.

Key Insights (1/8)

Impact of Loan Amount on Loan Status



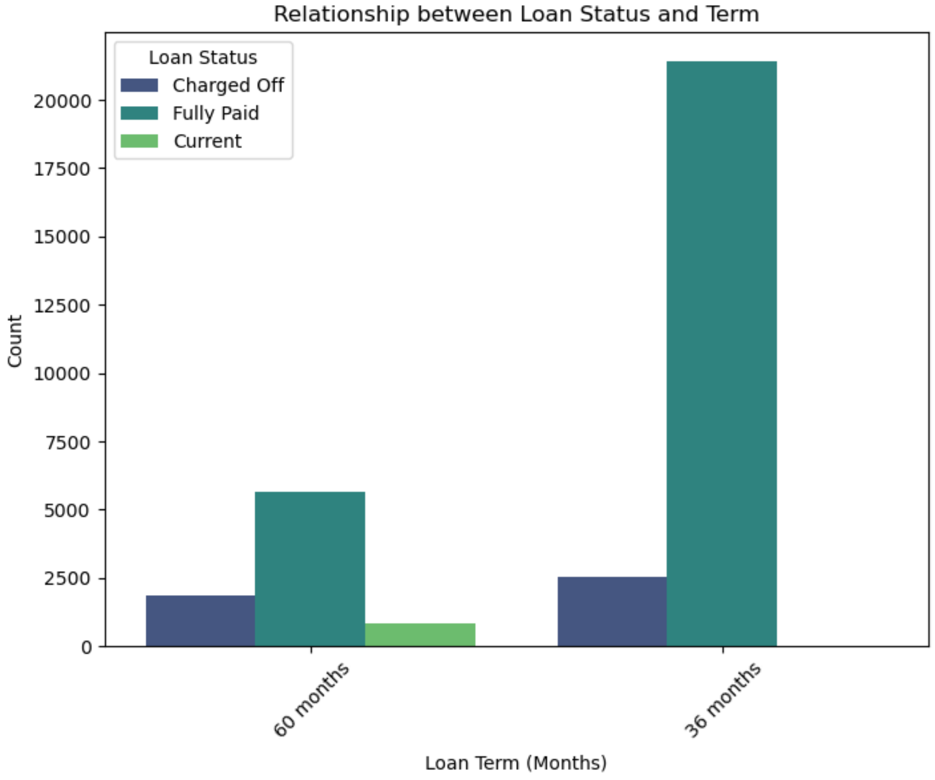


 # Finding # 1
 # The 'Loan Amount Bucket' of 5K - 10K have highest 'Charged Off' loans
 # The absolute no's of "Charged Off" loans gradually fall as we go to higher "Loan Amount Buckets"

 # Finding # 2
 # Whereas the absolute no of "Charged Off" loans are highest in the 'Loan Amount Bucket' of 5K - 10K and then gradually decline as we go up
 # However, when expressed as a percentage - "Charged Off" loans as a percentage of total loans in the respective Loan Amount Bucket - # The percentage of Charged Off Loans go up as the Pardue Loan Amount Bucket increases

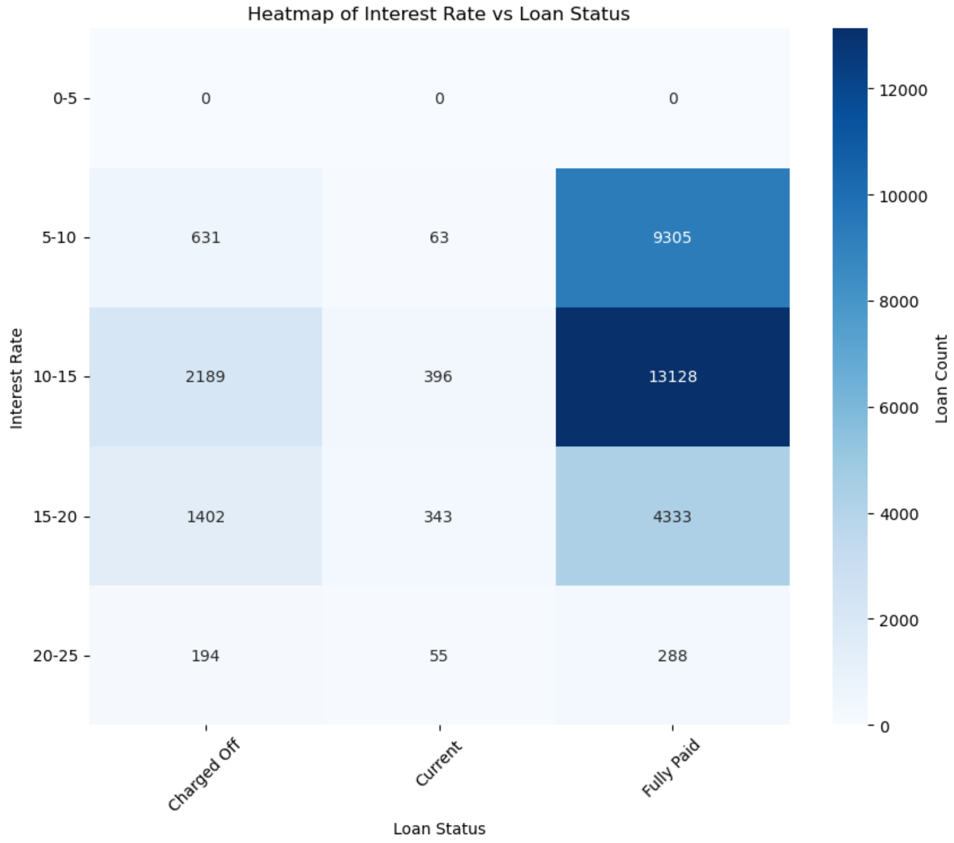
Key Insights (2/8)

Impact of Loan Term on Loan Status



 # Finding # 3
 # Given the larger base the high absolute However, are experienced for Charged Off Loans in lower loan tenure i.e. 36 months
 # However, "Charged Off" loans as a percentage of total loans for the respective tenures are higher for higher tenures i.e. in 60 months tenure

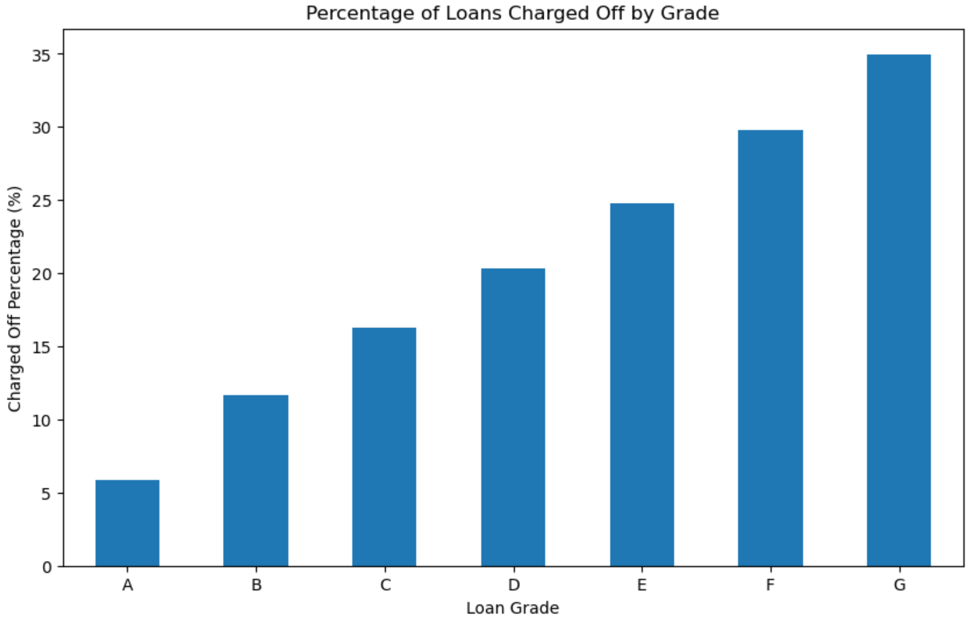
Impact of Interest Rate on Loan Status



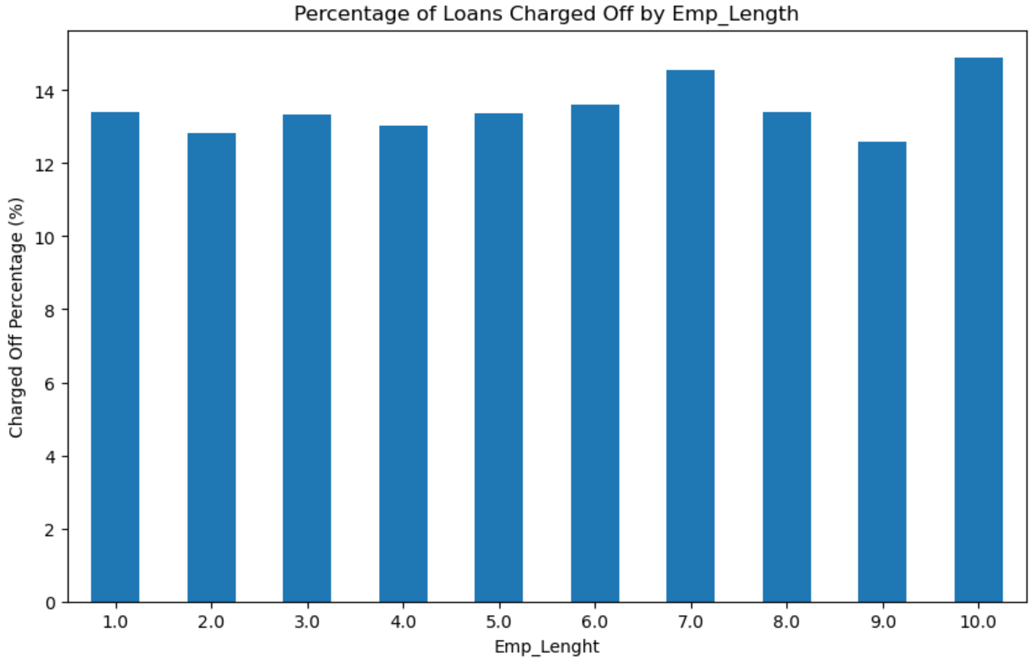
 # Finding # 4
 # Percentage of Charged Off loans increases as the Interest Rate increases.

Key Insights (3/8)

Impact of Loan Grade on Loan Status



Impact of Employment Length on Loan Status

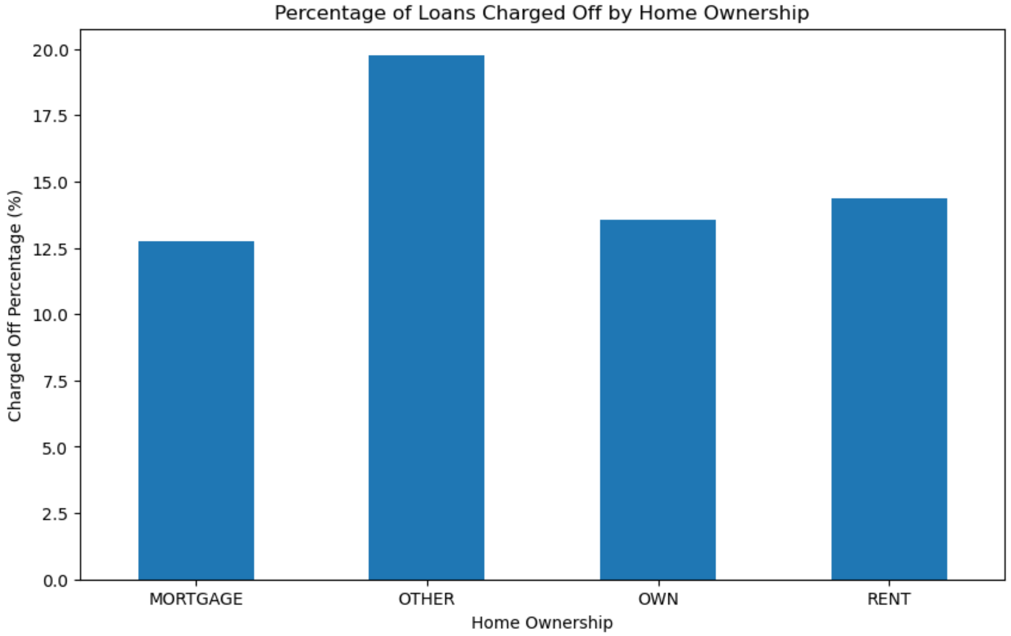


 # Finding # 5
 # Percentage of Charged Off loans increases as the Grade increases from 'A' to 'G'

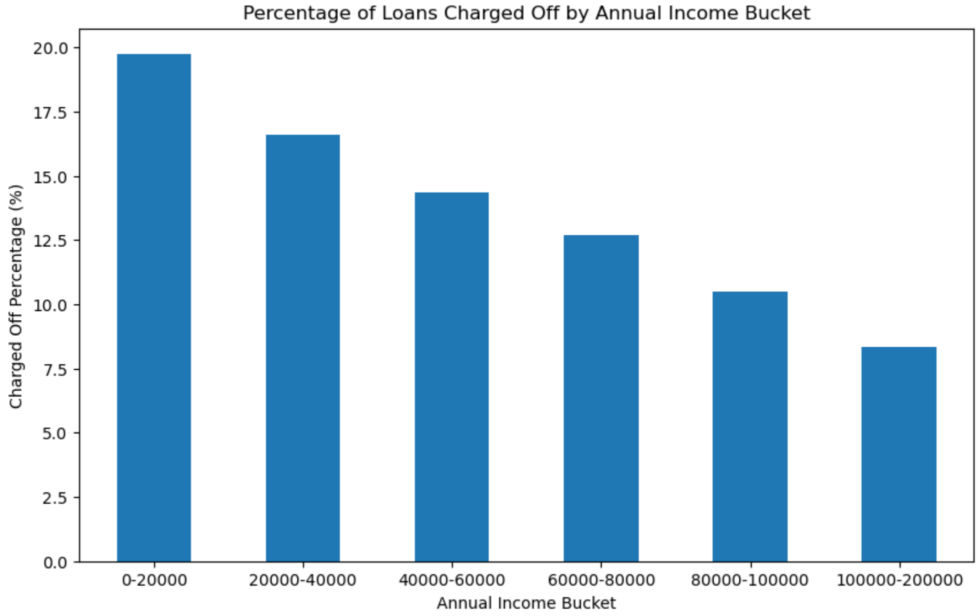
 # Finding # 6
 # No clear evidence to suggest that emp_lenth has an impact on loans that are charged off

Key Insights (4/8)

Impact of Home Ownership on Loan Status



Impact of Annual Income on Loan Status

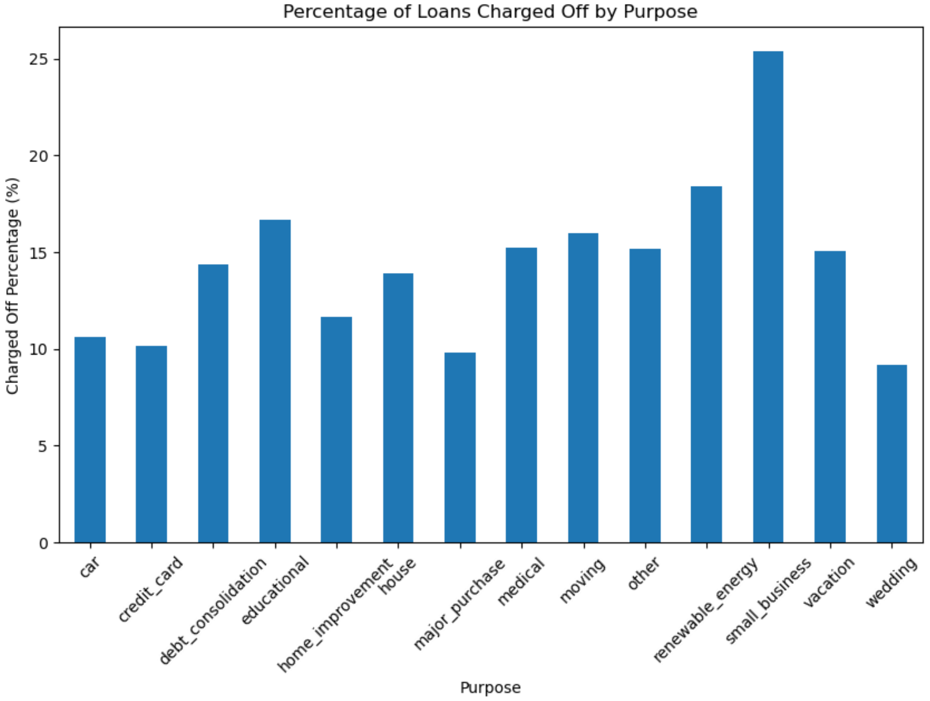


 # Finding # 7
 # No clear evidence to suggest that home_ownership has an impact on loans that are charged off

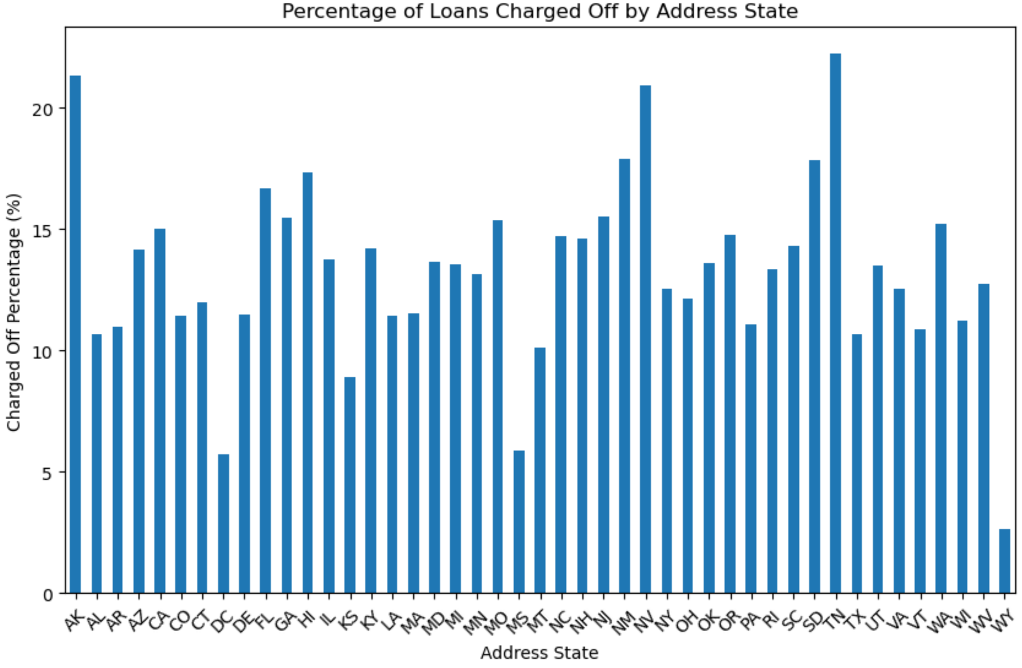
 # Finding # 8
 # Annual Income has a very significant impact on the Charged Off Loan
 # We experience high Charged Off loans in lower Annual Income brackets and they go down significantly as the Annual Income increases

Key Insights (5/8)

Impact of Purpose on Loan Status



Impact of Address State on Loan Status

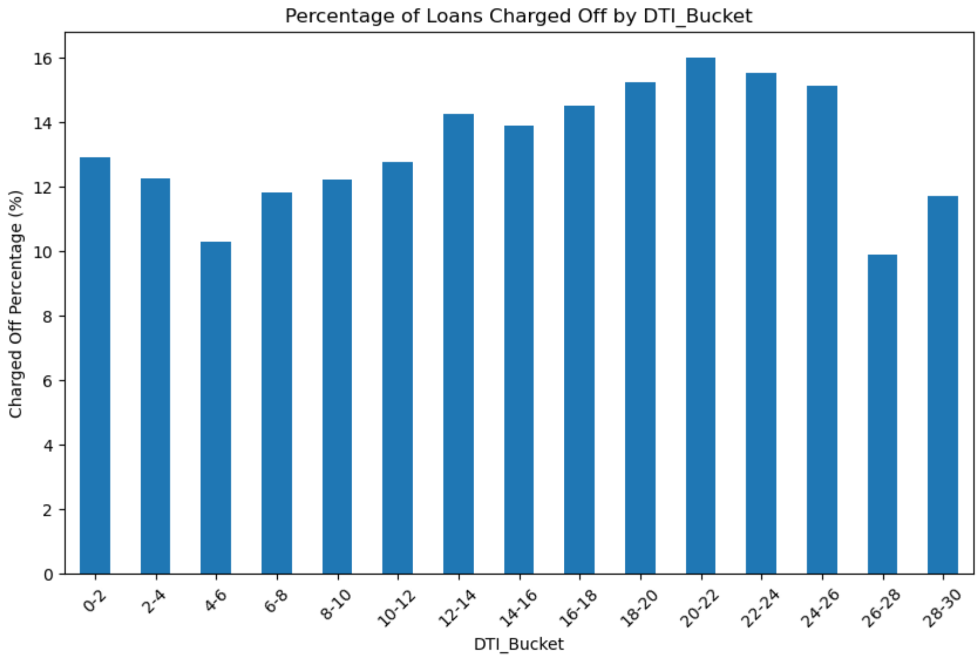


 # Finding # 9
 # Charged off loans as a percentage of Total Loans is highest where the purpose of the loan is for Small Business

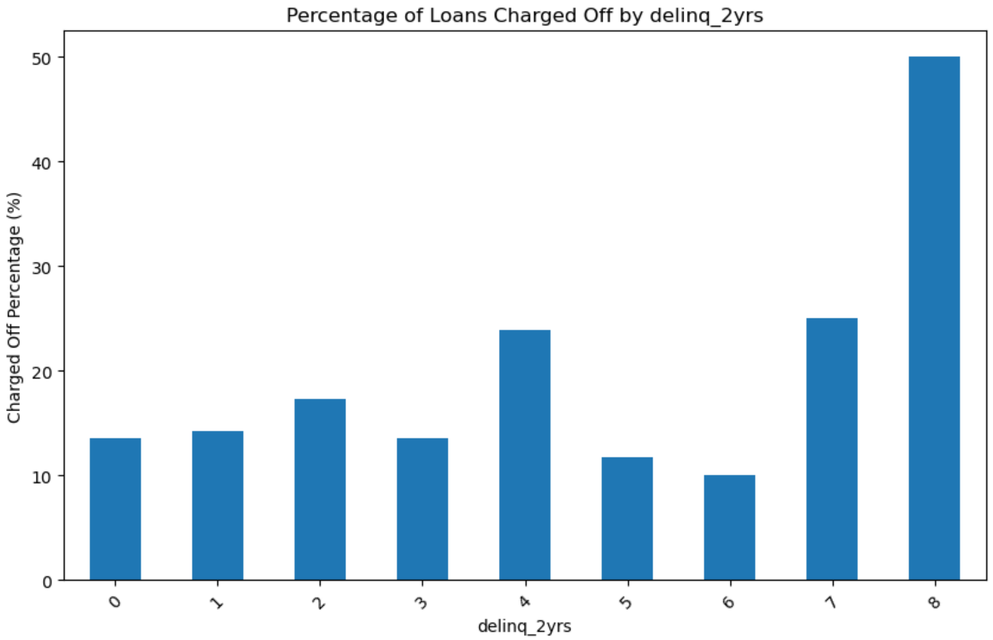
 # Finding # 10
 # Annual Income has a very significant impact on the Charged Off Loan
 # Charged off loans as a percentage of Total Loans is significantly high for AK, NV and TN and the lenders needs to be cognizant of that

Key Insights (6/8)

Impact of DTI on Loan Status



Impact of 30+ DPD in the borrower's credit file in past 2 years on Loan Status

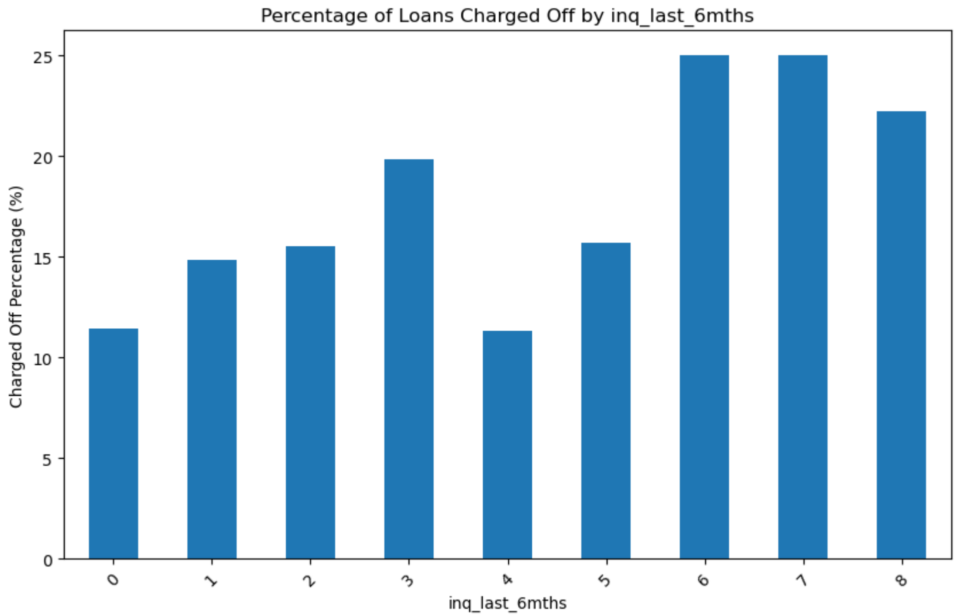


 # Finding # 11
 # Charged off loans as a percentage of Total Loans is shows an increase as the DTI increases
 # The increase starts from bucket '4-6' and peaks in the DTI bucket of '20-22' and the gradually tapering down again

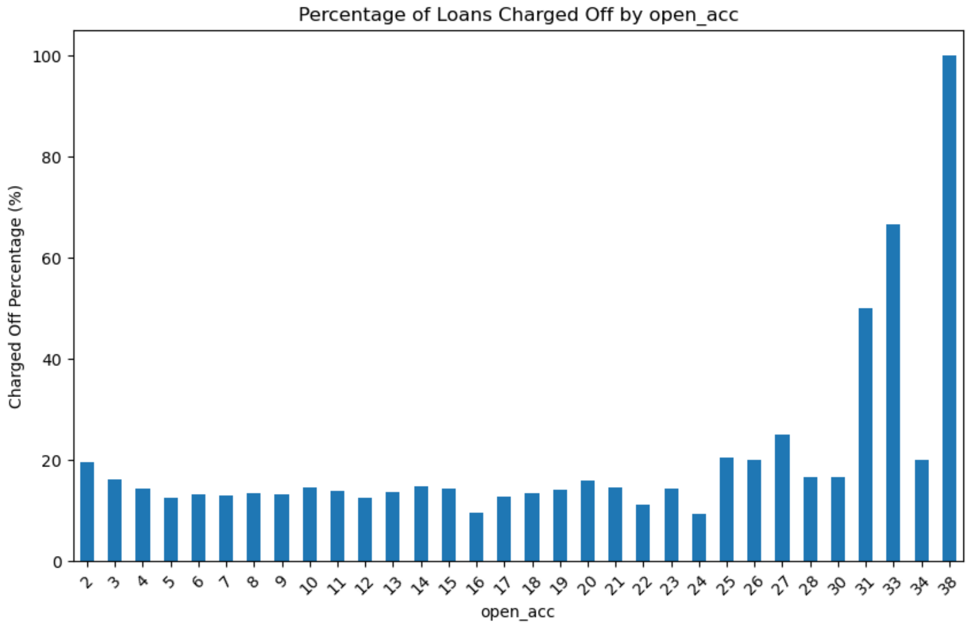
 # Finding # 12
 # Charged off Loans as a percentage goes up significantly as the number of 30+ days past-due incidences of delinquency in the borrower's credit file for the past 2 years exceeds 7

Key Insights (7/8)

Impact of Inquiries in last 6 months on Loan Status



Impact of Open Credit Line on Loan Status

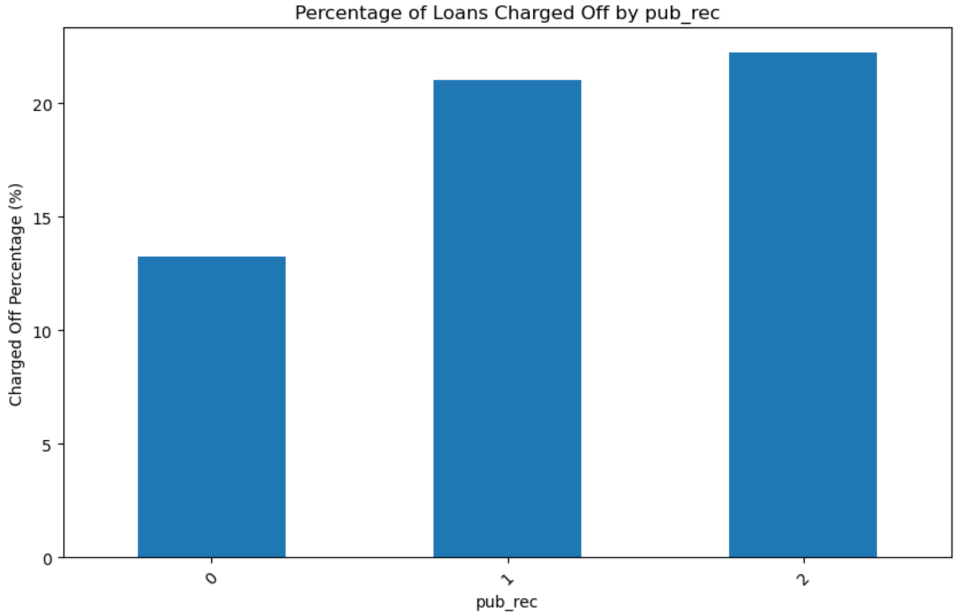


 # Finding # 13
 # Charged off Loans as a percentage goes up significantly as the number of inquiries in past 6 months (excluding auto and mortgage inquiries) exceeds 5

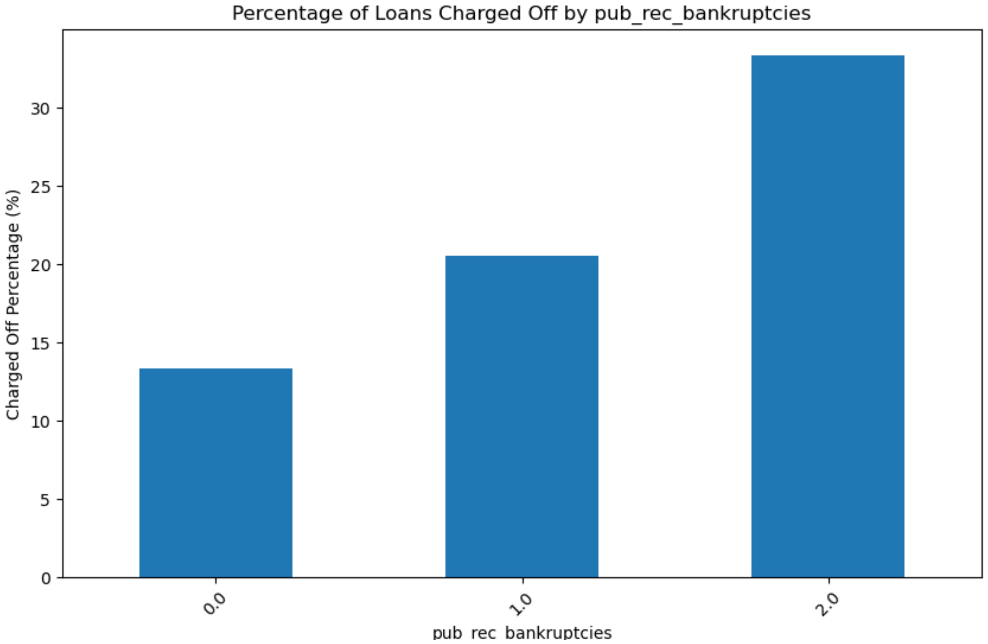
 # Finding # 14
 # Not really a very strong relationship but charged off Loans as a percentage goes up significantly as the number of open credit lines in the borrower's credit file exceeds 30

Key Insights (8/8)

Impact of Derogatory Public Records on Loan Status



Impact of no of public record bankruptcies on Loan Status



 # Finding # 15
 # Charged off loans as a percentage goes up significantly as the number of derogatory public records is more than '0' and goes up as we increase from '1' to '2'

 # Finding # 16
 # Charged off Loans as a percentage goes up significantly as the number of public record bankruptcies increases significantly as it increases from 0' to '1' and then again to '2'

Recommendations

- Loan Amount
  - Strengthen risk assessments for 5K-10K loans and high loan brackets to reduce defaults.
- Loan Term
  - Implement stricter policies for 60-month loans due to higher default rates; encourage shorter tenures.
- Interest Rates
  - Review high-interest rate tiers and provide financial counseling to borrowers.
- Loan Grades
  - Enhance credit evaluations for grades E, F, and G; incentivize risk-based pricing.
- Employment Length
  - Prioritize other attributes as employment length has minimal impact.
- Home Ownership
  - Address risks in the "Other" ownership category to reduce defaults.
- Annual Income
  - Focus on low-risk loans for higher incomes; support low-income borrowers with financial literacy.
- Loan Purpose
  - Monitor small business loans closely and strengthen credit checks for high-risk purposes.
- DTI and Delinquencies
  - Enforce stricter lending for DTI ratios of 20-22 and high delinquencies.
- Credit Inquiries and Open Lines
  - Limit inquiries and closely evaluate borrowers with over 30 open credit lines.
- Public Records
  - Monitor borrowers with multiple derogatory records and bankruptcies more stringently.

By adopting these recommendations, financial institutions can effectively mitigate the risk of charged-off loans while promoting responsible lending practices.

Thank You