Gramener Case Study

Loan Credit Risk Analysis

Sailendra Kona

Swati Bansal

Pradosh Kumar Jena

Rituraj Achuthan

Business Objectives & Strategy

Objective

- To identify driving factors for loan defaults for the usage of portfolio and risk assessment of consumer finance business.

Strategy

- Leverage loan data for all loans issued through the time period 2007 to 2011 for *Exploratory Data Analysis*

- Identify various important factors metrics and add derive new variables

- Analyze data with various factors and identify the driving factors maximum credit loss

Problem Solving Methodology – Analysis Flow

Complete Loan Distribution Analysis

Step 1 Uni-Variate Analysis - Analyze distribution of loan amounts, credit loss, Annual Income, Geographies & Loan Status etc. and perform Outliers treatment

Step 2 Segmented Uni-Variate Analysis - Analyze with various important factors across Loan Statuses

Loan Defaults Analysis

Step 3 BI-Variate Analysis - Analyze Credit loss across various factors and identify influencing segments

Step 4 Multi-variate Analysis – Use Top 2 segments of critical factors and analyze Credit loss across loan terms etc.

Inference of Driving Factors

Step 5 - Identify specific driving factors and their contribution to Credit Loss

Step 6 – Inference of Top 3 suggestions for Credit loss
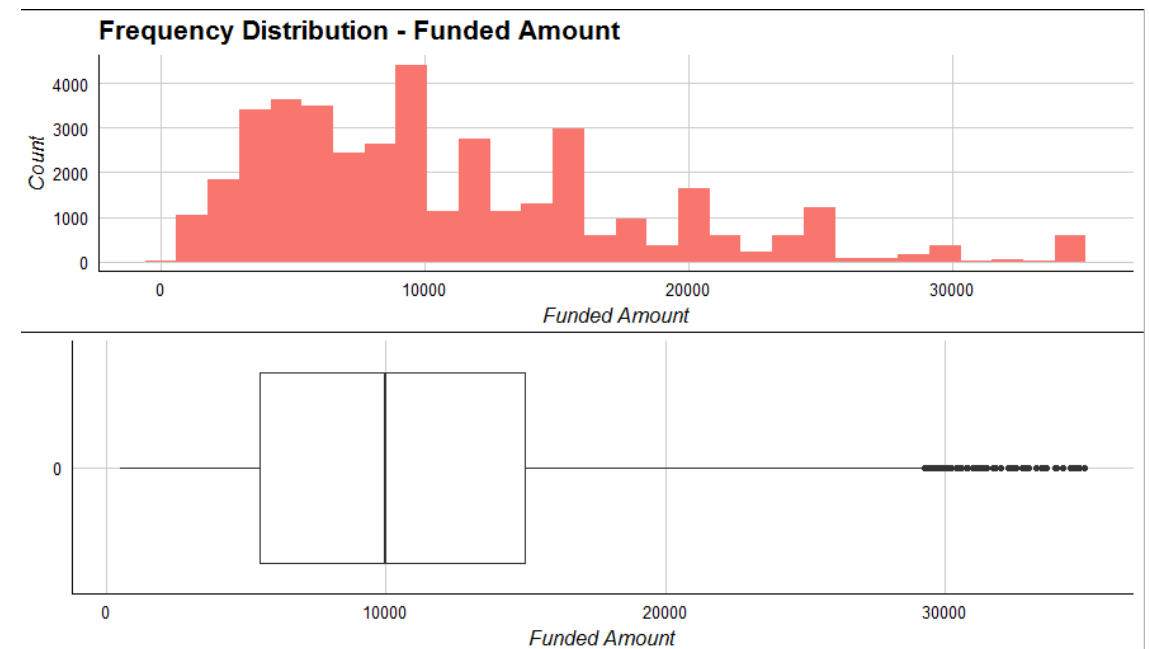
Uni-Variate Analysis

Loan Amount and Funded Amount

- Funded amount distribution is approximately same as requested/approved Loan Amount

- Total Funded is $**434 Million** amount against Total Loan Amount $**445 Million**
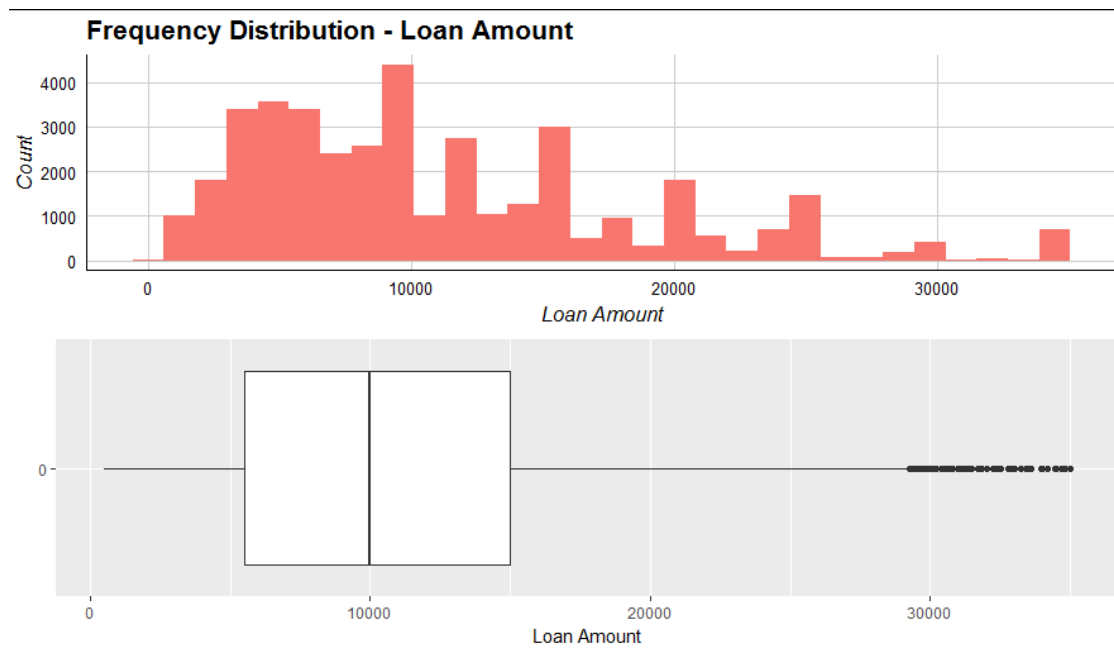
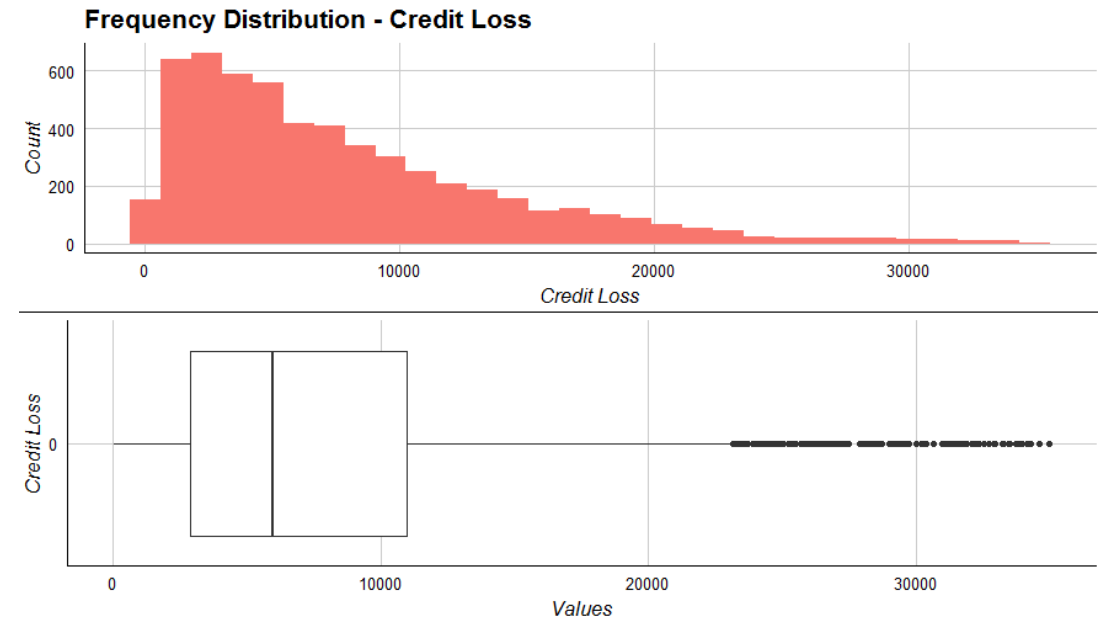*Plot*: Distribution showing Loan Amount *mean* as $**11.2 K**

Plot: Distribution showing Funded Amount *mean* as $**10.9K**

Annual Income and Credit Loss

- **$45.8 Million Credit Loss** calculated only for defaulted records as _**Funding Amount – Principle Received to Date**_.

- Extremely high values in _**Annual Income**_ data are treated as _**Outliers**_ and removed from analysis
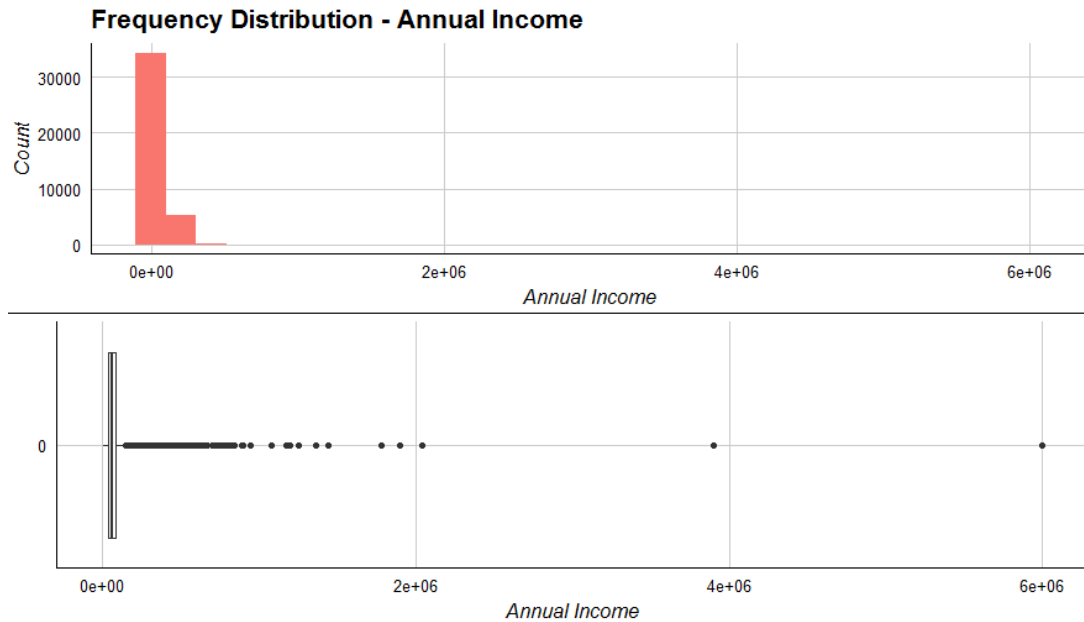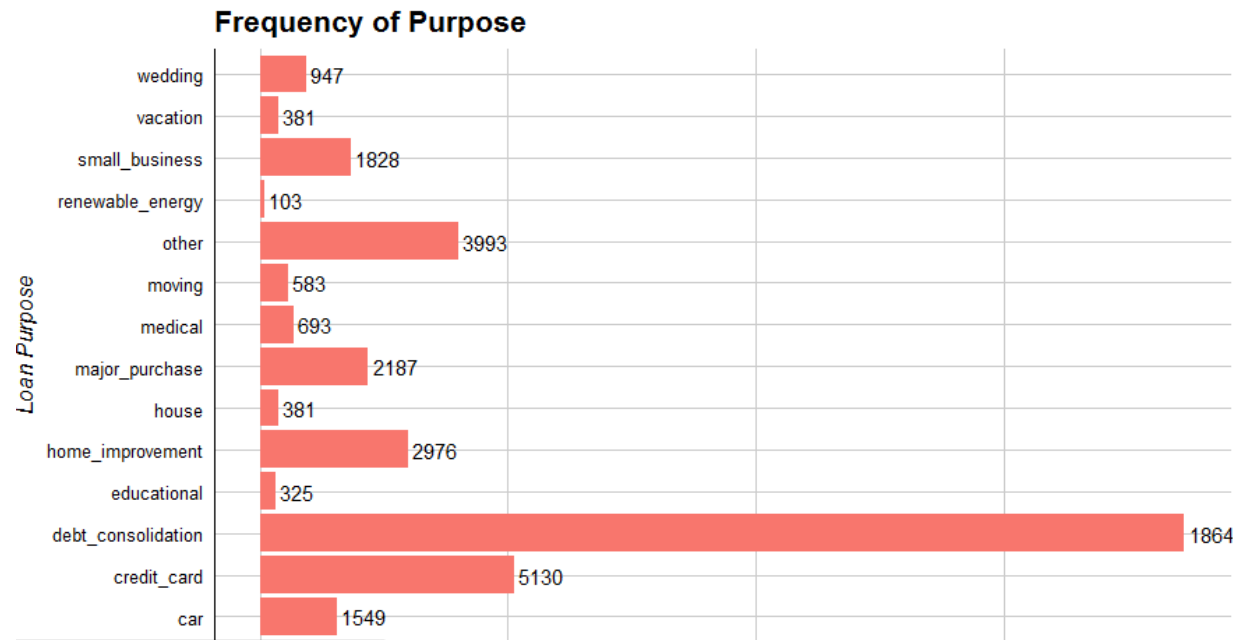

Plot: Distribution show there few extremely high values of Annul Income (i.e. **Outliers**)
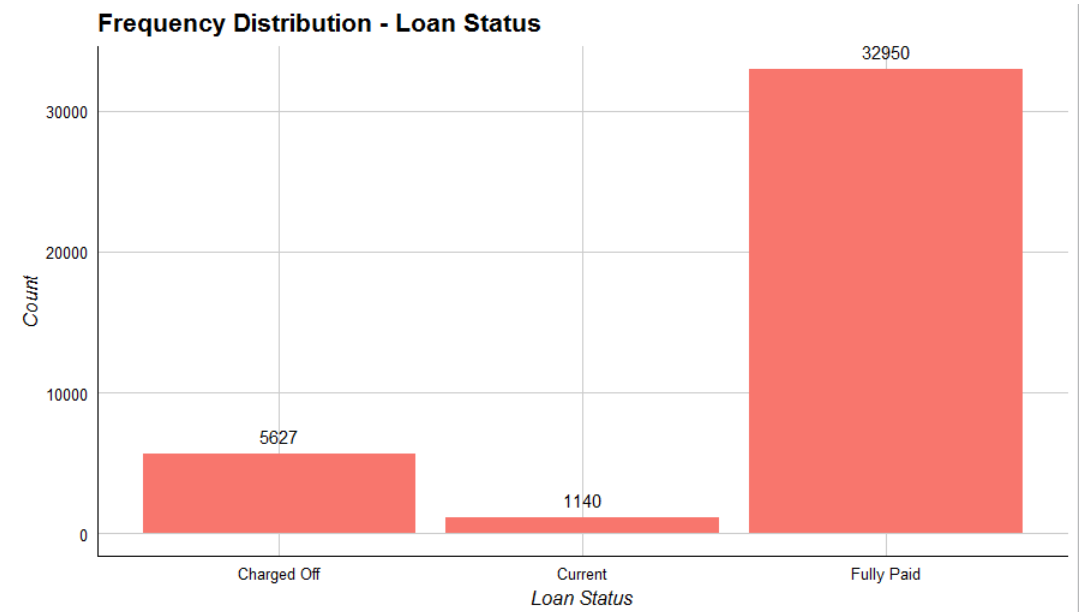
Plot: Distribution showing Credit Loss Amount **mean** as **$11.5K**

Loan Purpose and Loan Status

- **15%** of loans are defaulted
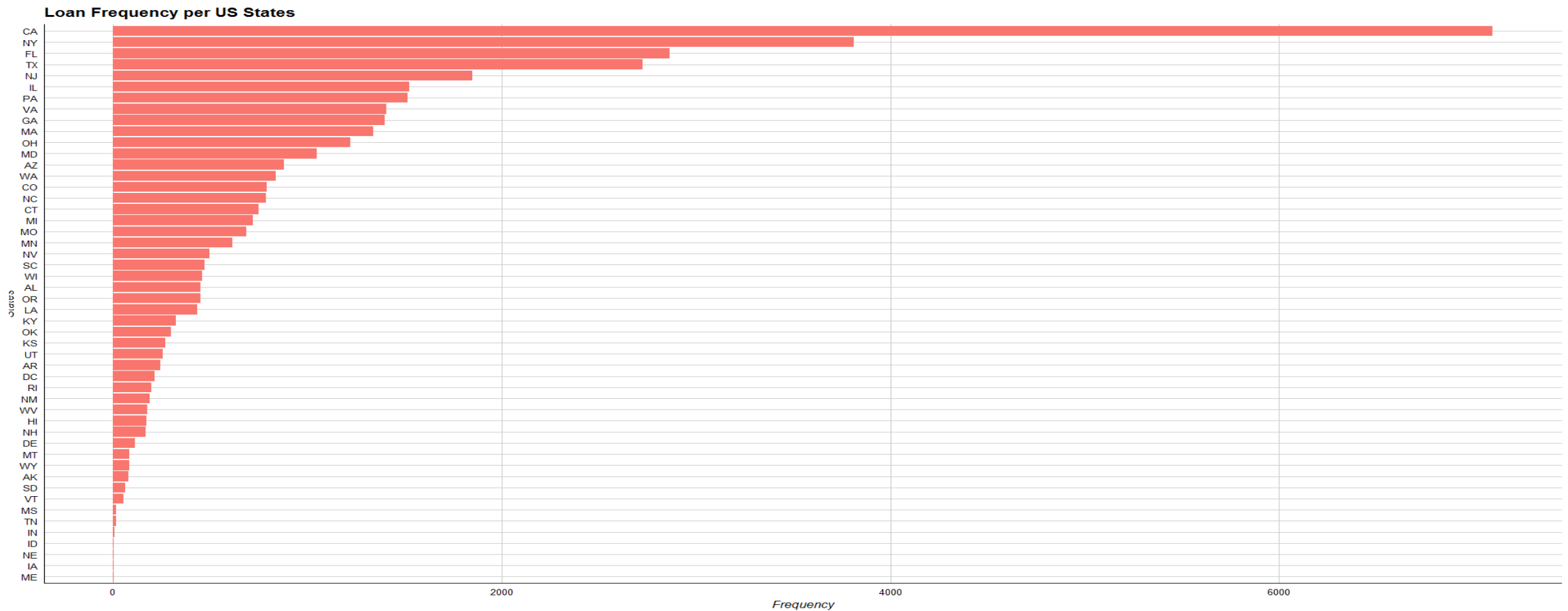
- **32%** of defaults are from Debt Consolidation

Plot: *Distribution showing of Loan Purpose*

Plot: *Distribution showing Loans Status*
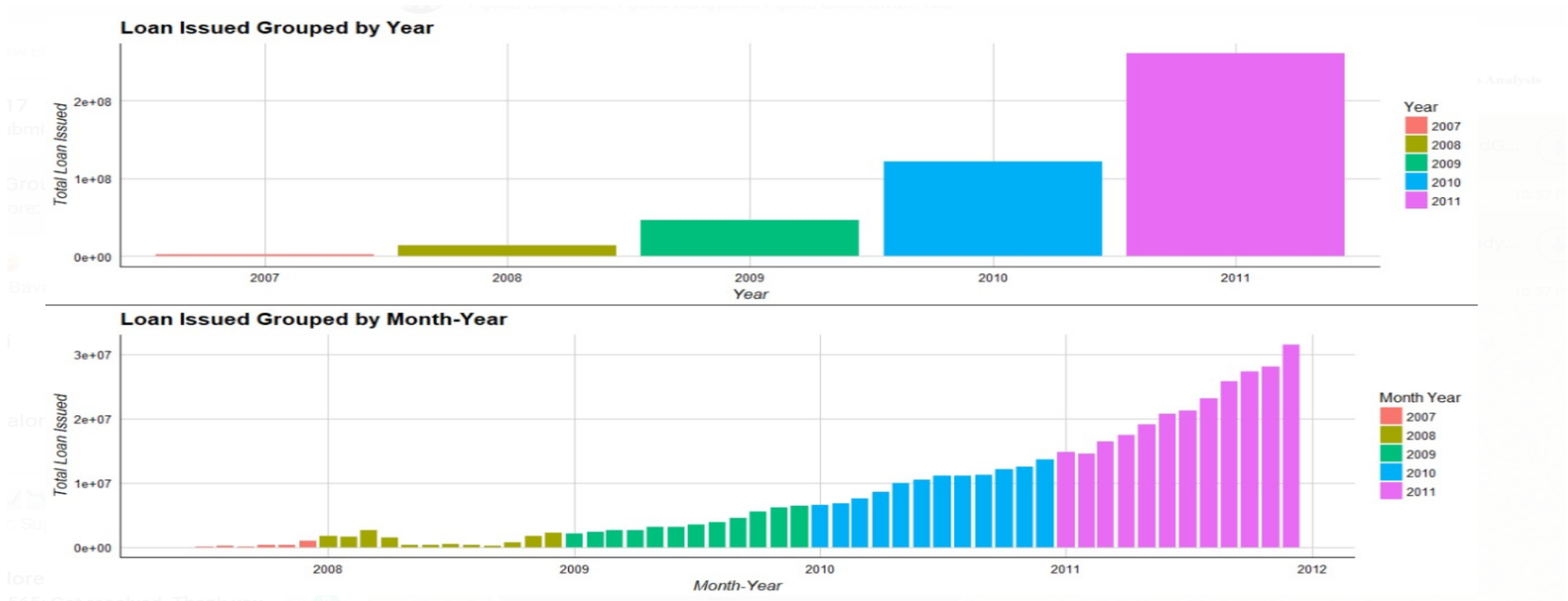
Loans across US States

US States - Top 5 States contribute more than **50%** of loans with California Highest

Plot: Distribution showing Loans US States wise

Loan Issued Date wise
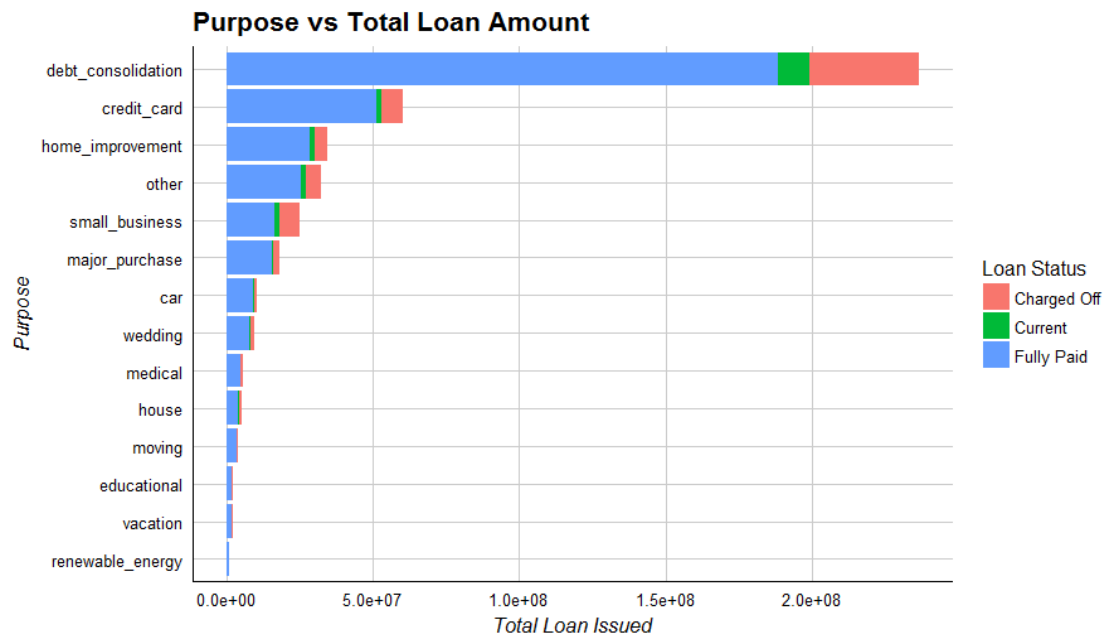
Volume of loans increased after year 2011

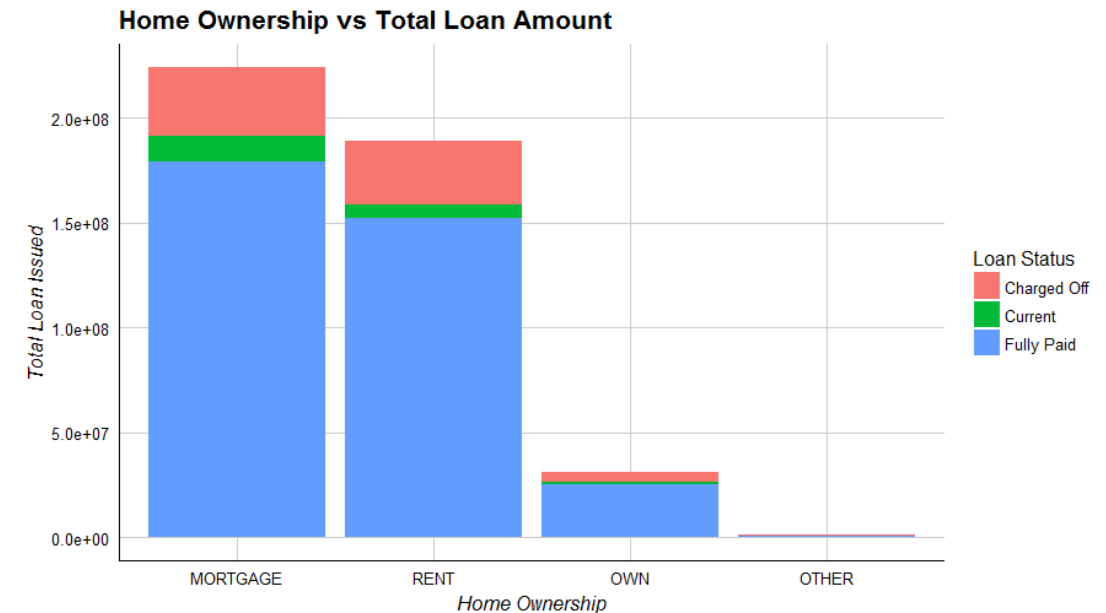*Plot*: *Distribution showing increasing number of Loans*

Segmented Uni-Variate Analysis

Frequency of Purpose and Home Ownership per Loan Status

- **49%** of defaults are from ***Debt Consolidation*** defaults

- **92%** of defaults are if Home Owner ship is ***Mortage* OR *Rent***

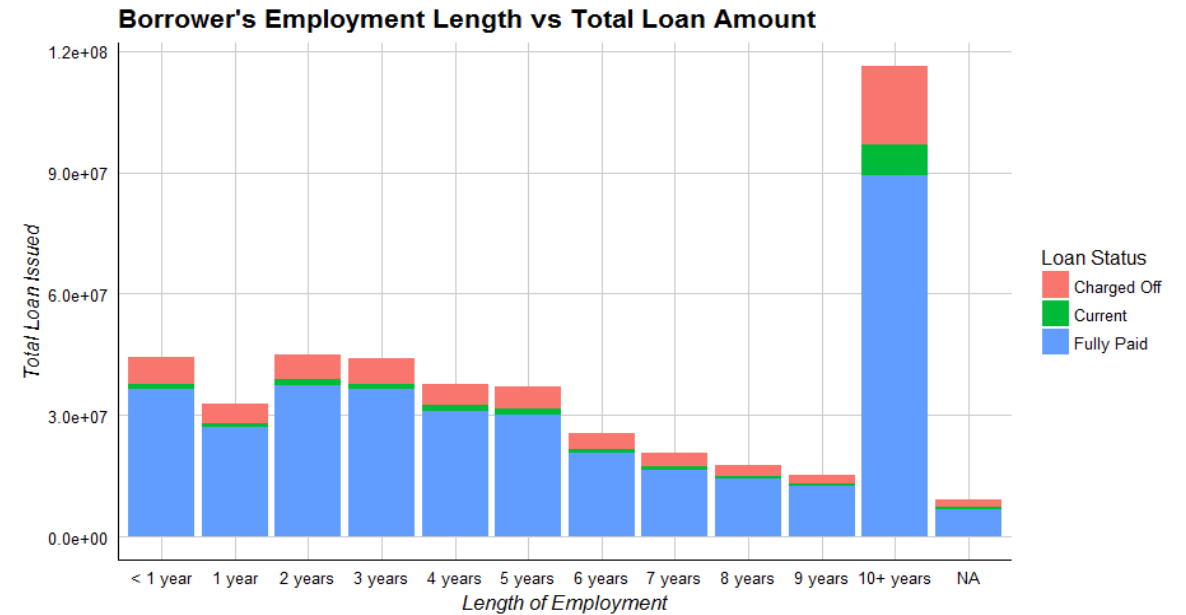*Plot*: Distribution showing Loan Purpose per Loans Status

Plot: Distribution showing Home Ownership per Loans Status

Frequency of Loan Term and Employment Length per Loan Status

- Credit Loss from Term **60 Months** is significantly higher than **36 Months**

- Employment Length **10+ Years** of defaults are if Home Owner ship is **Mortagage OR Rent**
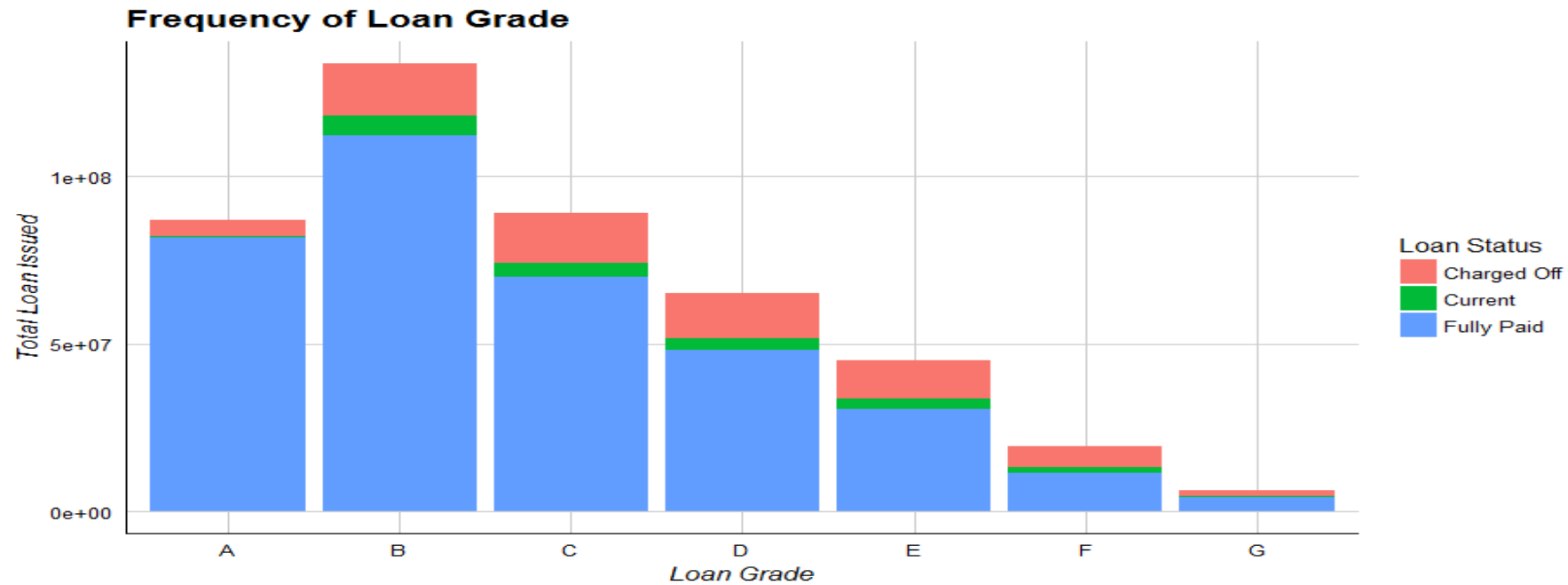

Plot: Distribution showing Term per Loans Status

Plot: Distribution showing Home Ownership per Loans Status
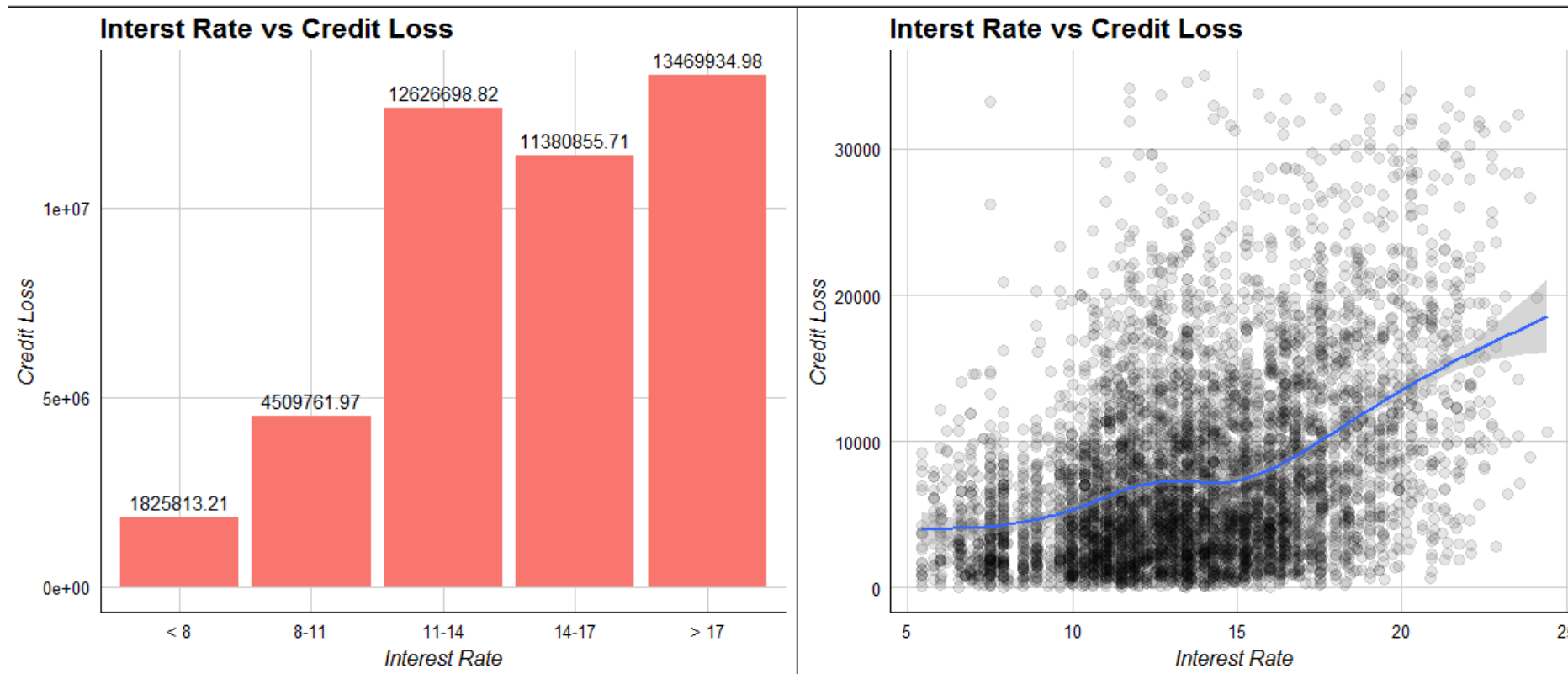
Frequency of Loan Grade

- Grades **B, C and D** have highest contribution to defaults

Plot: Distribution showing Loan Grade per Loans Status

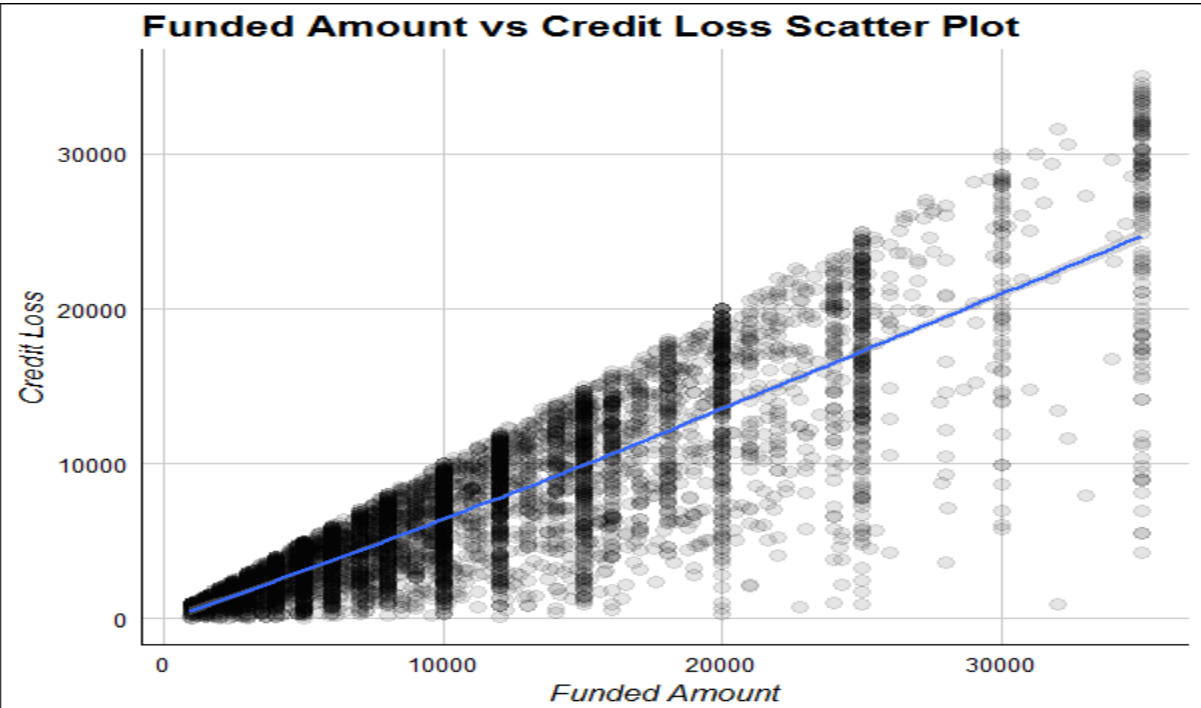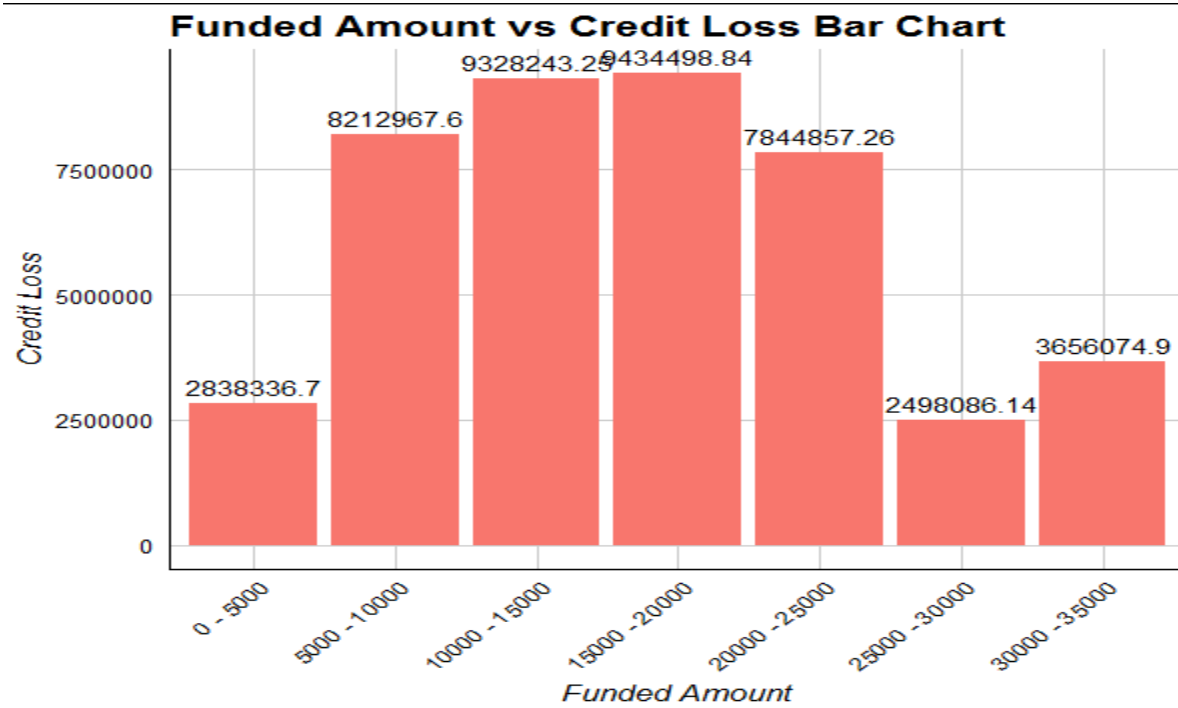# Bi-Variate Analysis for Credit Loss – Interest Rate Vs Credit Loss

- Business Strategy - Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

- Defaulted Loans with Interest Rate **>11%** contribute **85% Credit loss**

Plot: *Distribution showing trend of increasing Credit Loss with higher Interest Rates*

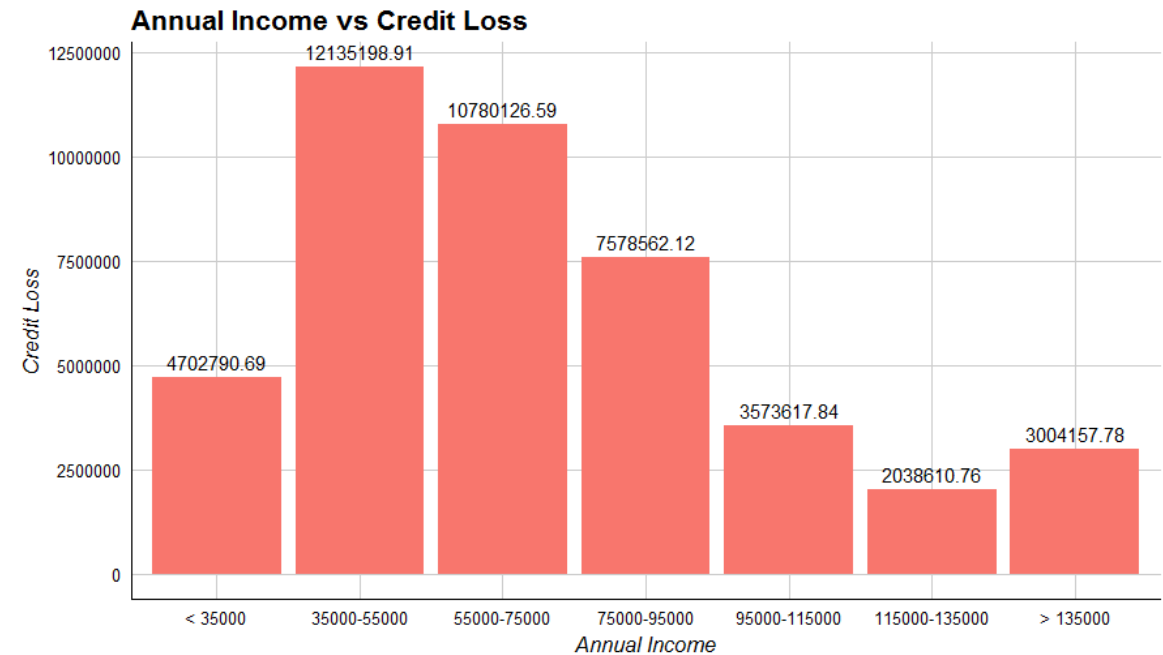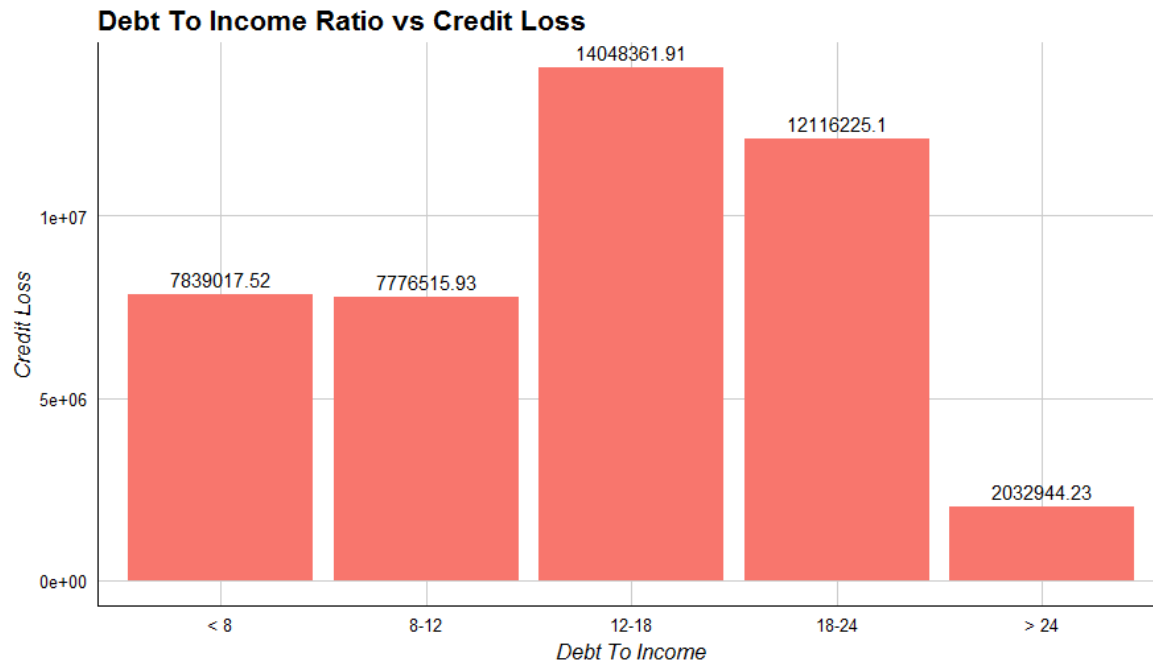# Bi-Variate Analysis for Credit Loss – Funded Amount Vs Credit Loss

- Distribution showing trend of increasing Credit Loss with higher Funded Amount

- However number of loan defaults are significantly for Funding Amount *$10-25K*

Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

Bi-Variate Analysis for Credit Loss – Debt to Income and Annual Income

- Debt to Income Ration between **12 and 24** contributed **65%** Credit Loss

- Annual Income Range **$35K-75** contribute highest default amount **55%** Credit Loss

Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

Bi-Variate Analysis for Credit Loss – Loan Term and Employment Length

- Loan Term **60 Months** contributed **57%** Credit Loss

- Employment **>10 Years** contribute highest default amount **31%** Credit Loss
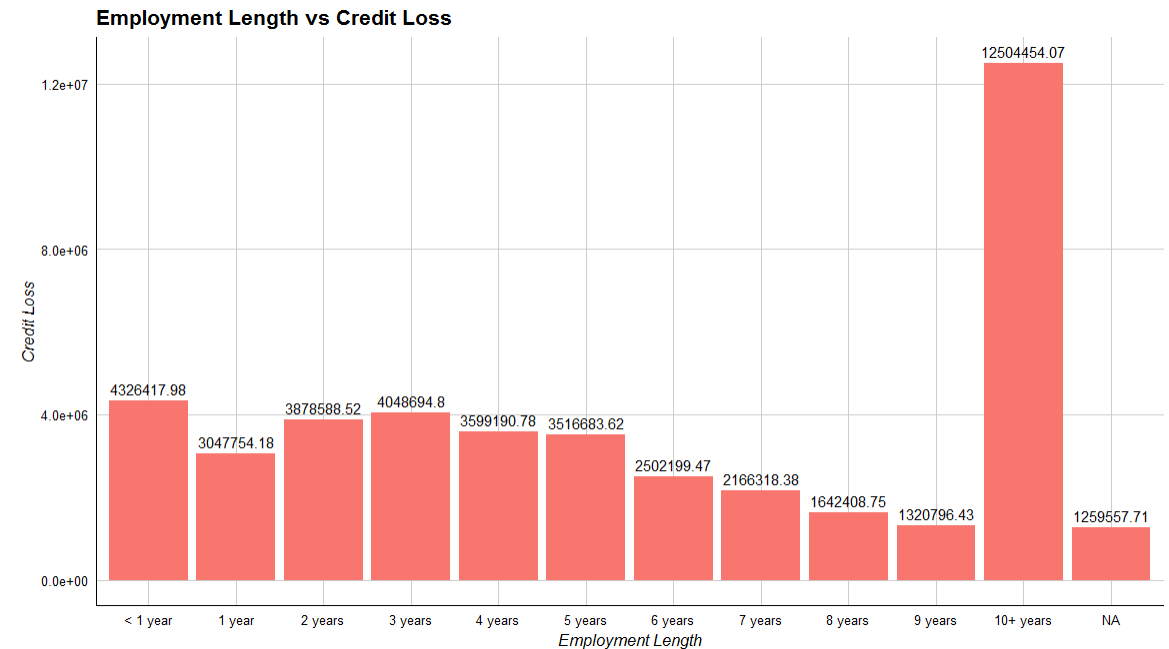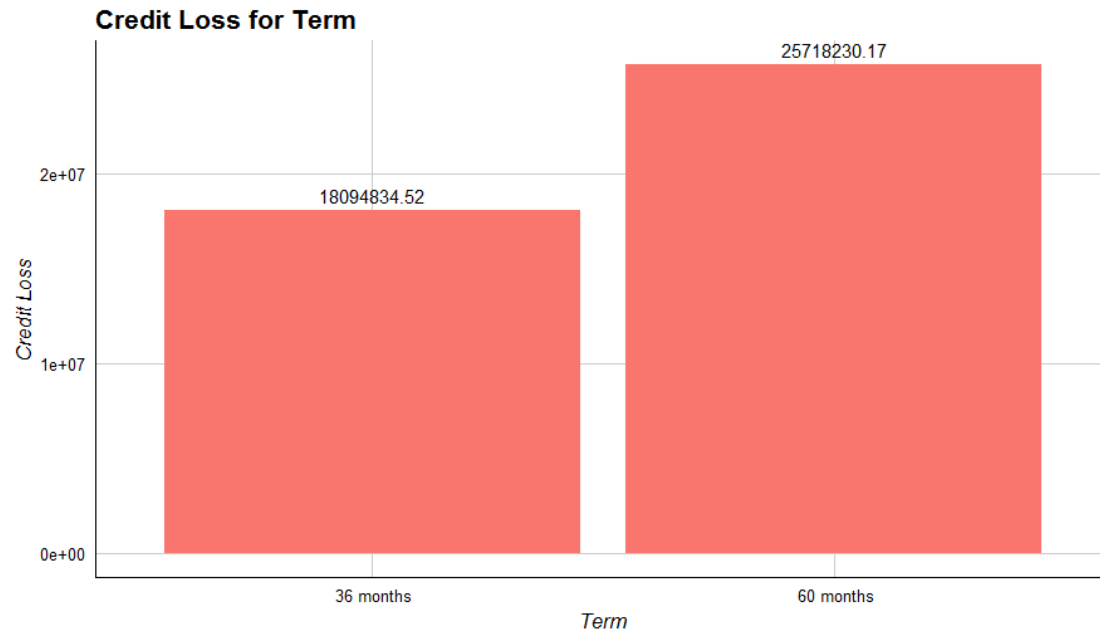
Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

Multi-Variate Analysis for Credit Loss – Interest Rates and Loan Term

- Loan Term **60 Months** contributed **57%** Credit Loss
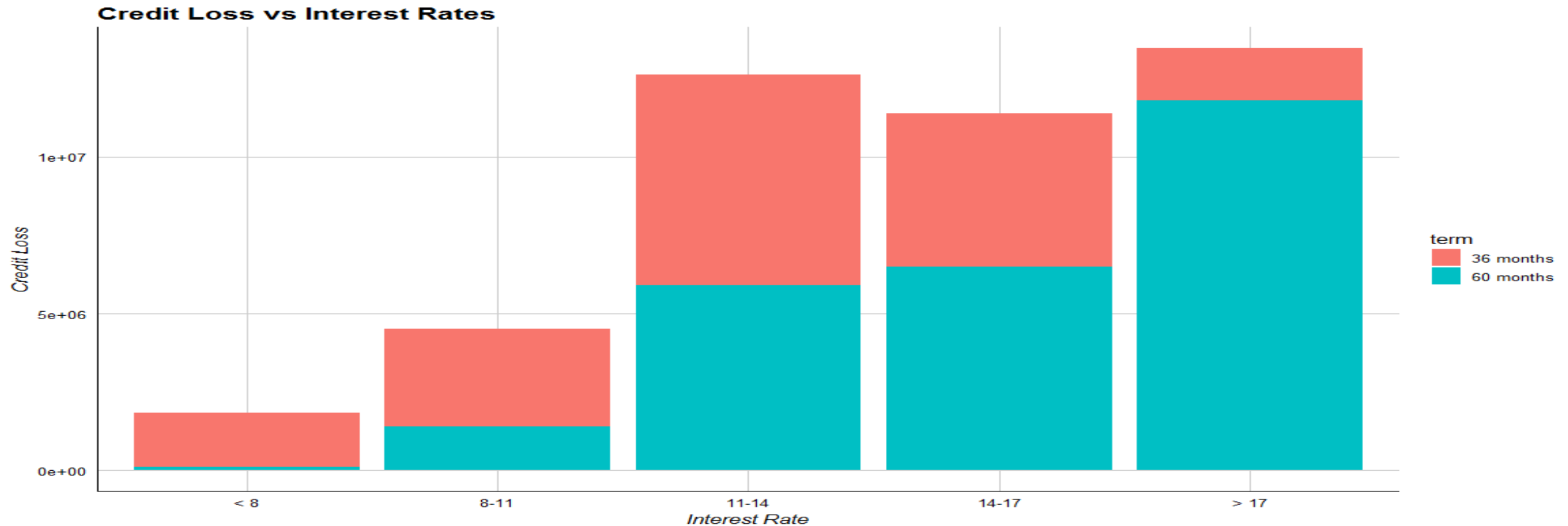
Credit Loss vs Interest Rates

Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

Multi-Variate Analysis for Credit Loss – Annual Income and Loan Term

- Loan Term **60 Months** for Annual Income Range **$35K-75K** has high credit loss

Credit Losses across various Annual Income Range

Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

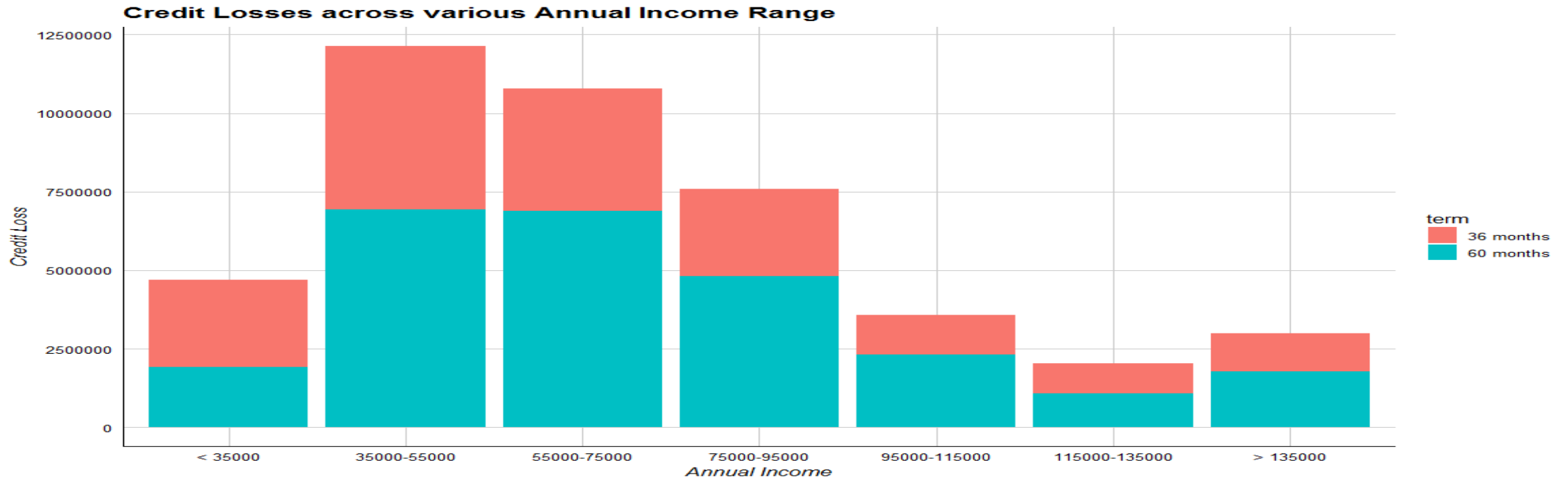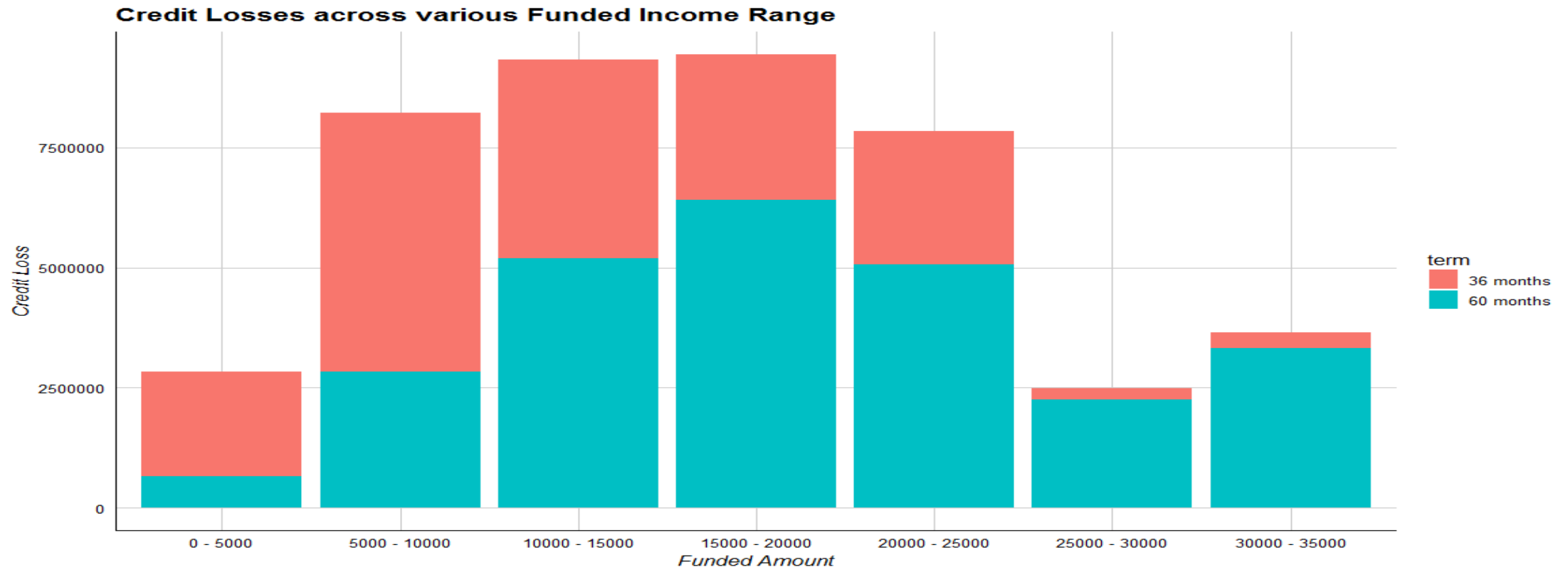# Multi-Variate Analysis for Credit Loss – Funding Amount and Loan Term

- Loan Term **60 Months** for Funding Amount Range **$10K-20K** has high credit loss

- Loan Term 36 Months for Funding Amount Range **5k-10K** has highest credit loss

Credit Losses across various Funded Income Range

Note: Defaulted Records of Home Ownership RENT/MORTAGAGE only considered

Driver Factors for Recommendation

Recommendation for Business Strategy

Future loan approval processes need consideration of following factors to mitigate Credit Loss

- **Loan Purpose –** Debt Consolidation highest Credit Loss

- **Home Ownership –** Rent and Mortgage has corresponding high frequency of loan amounts and also Credit Loss

- **Top US States -** California, New York, Florida, Texas and New Jersy
  - These states attract highest amount of loan requests and also the highest amount credit loss
  - Specific business improvements needed for these specific states.

- **Loan Term 60 Months**
  - Number of Loans for 60 needs conversion to 36 Months

- **Interest Rate**
  - > 17% not recommended for 60 Months
  - Between 11-17 has significant for both Loan Terms

- **Annual Income**
  - Between 35K-75K has highest contribution

- **Funded Amount -** Between 10-20K needs further stringent process to reduce the volume of defaults.