

Lending Club Case Study

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Problem Information - Background

Info

Lending Club is the largest online loan marketplace, offering personal, business, and medical procedure loans to urban customers through a fast online interface. When a loan application is received, the company must decide whether to approve it based on the applicant's profile. Two types of risks are associated with this decision:

- 1) losing business by not approving a loan to a likely customer
- 2) financial loss by approving a loan to a likely defaulter.

The provided data includes information about past loan applicants and their default status. The aim is to identify patterns that indicate a likelihood of default, which can inform actions such as denying the loan, reducing the loan amount, or lending at a higher interest rate to risky applicants.

Business Objective

To understand the driving factors (or driver variables) behind loan default, i.e. the variables which are strong indicators of default. The company can utilise this knowledge for its portfolio and risk assessment.

Data Understanding – Loan Metadata

LOAN INFORMATION

loan_amnt	Amount of loan applied for.
funded_amnt	Total amount funded.
term	Duration of the loan in months (e.g., 36 or 60 months).
int_rate	Interest rate on the loan.
installment	Monthly payment amount.
grade	LC assigned Loan grade
sub_grade	More detailed loan grade.
loan_status	Current status of the loan.

LOAN PERFORMANCE

total_pymnt	Payments received to date for the total amount funded.
total_rec_int	Interest received to date.
total_rec_late_fee	Late fees received to date.
last_pymnt_d	Date of the last payment received.
last_pymnt_amnt	Amount of the last payment received.

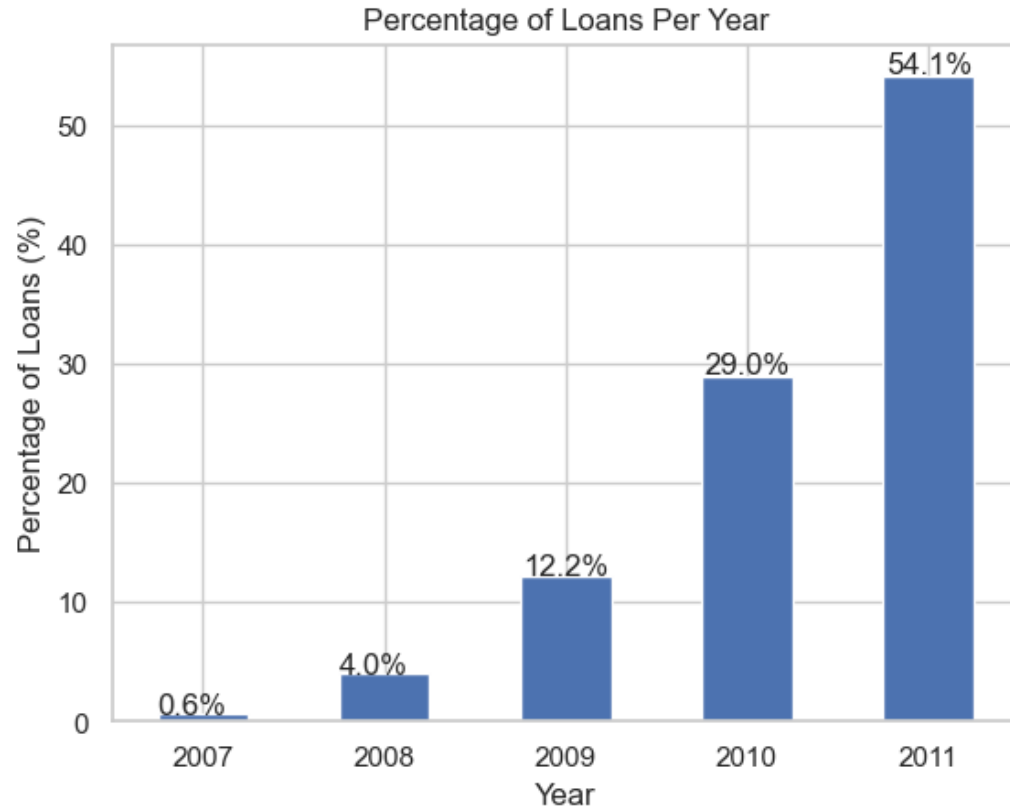
BORROWER INFORMATION

emp_title	Job title of the borrower.
emp_length	Employment length in years.
home_ownership	Home ownership status (e.g., RENT, OWN, MORTGAGE).
annual_inc	Self-reported annual income.
verification_status	Whether the income was verified by LC.
zip_code	First 3 numbers of zip code

CREDIT INFORMATION

delinq_2yrs	Number of 30+ days past-due incidences in the past 2 years.
earliest_cr_line	Date of the borrower's earliest reported credit line.
open_acc	Number of open credit lines.
pub_rec	Number of derogatory public records.
total_acc	Total number of credit lines in the borrower's credit file.
last_fico_range_high	Upper boundary of the borrower's FICO score range.
last_fico_range_low	Lower boundary of the borrower's FICO score range.

Data Understanding – Loan Information



Loan Time Frame: 2007 – 2011

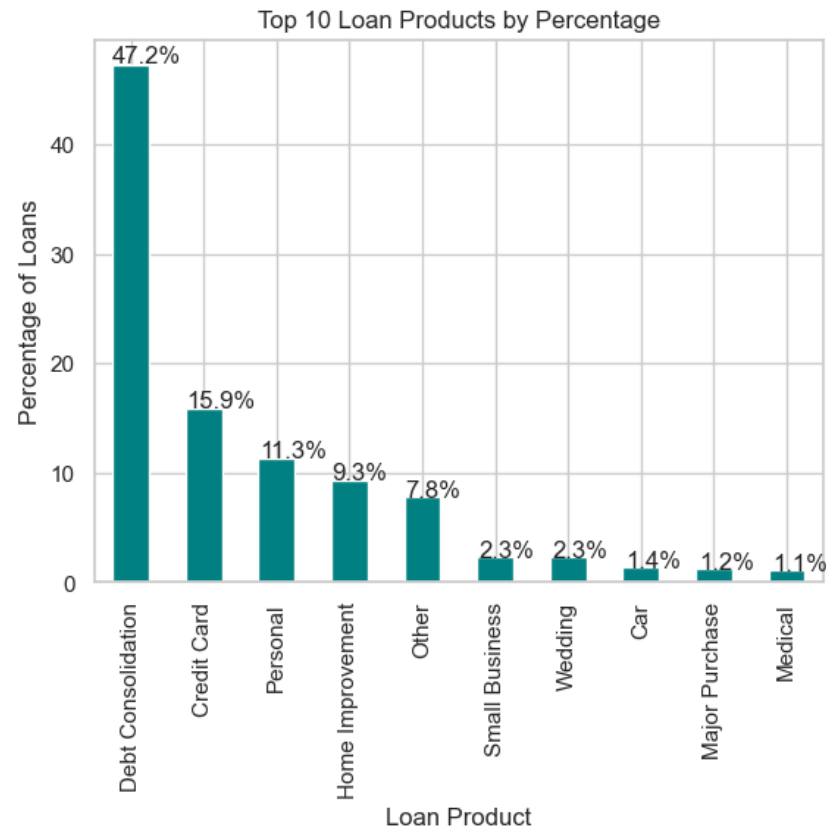
- Loans increase every year
- 86% increase in last year from 2010 to 2011



Loan Distribution – by Term (36 or 60 months)

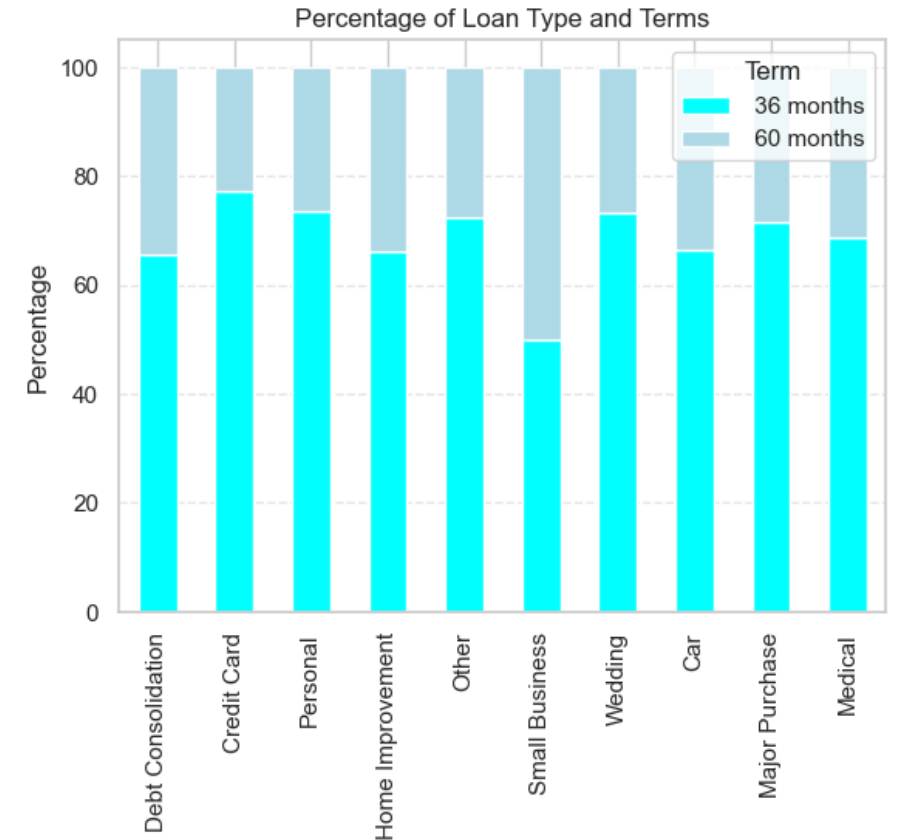
- Shorter term loan of 36 months three times more popular than longer 60 months term

Loan Distribution – Top Products



Loan Distribution – by Product Types

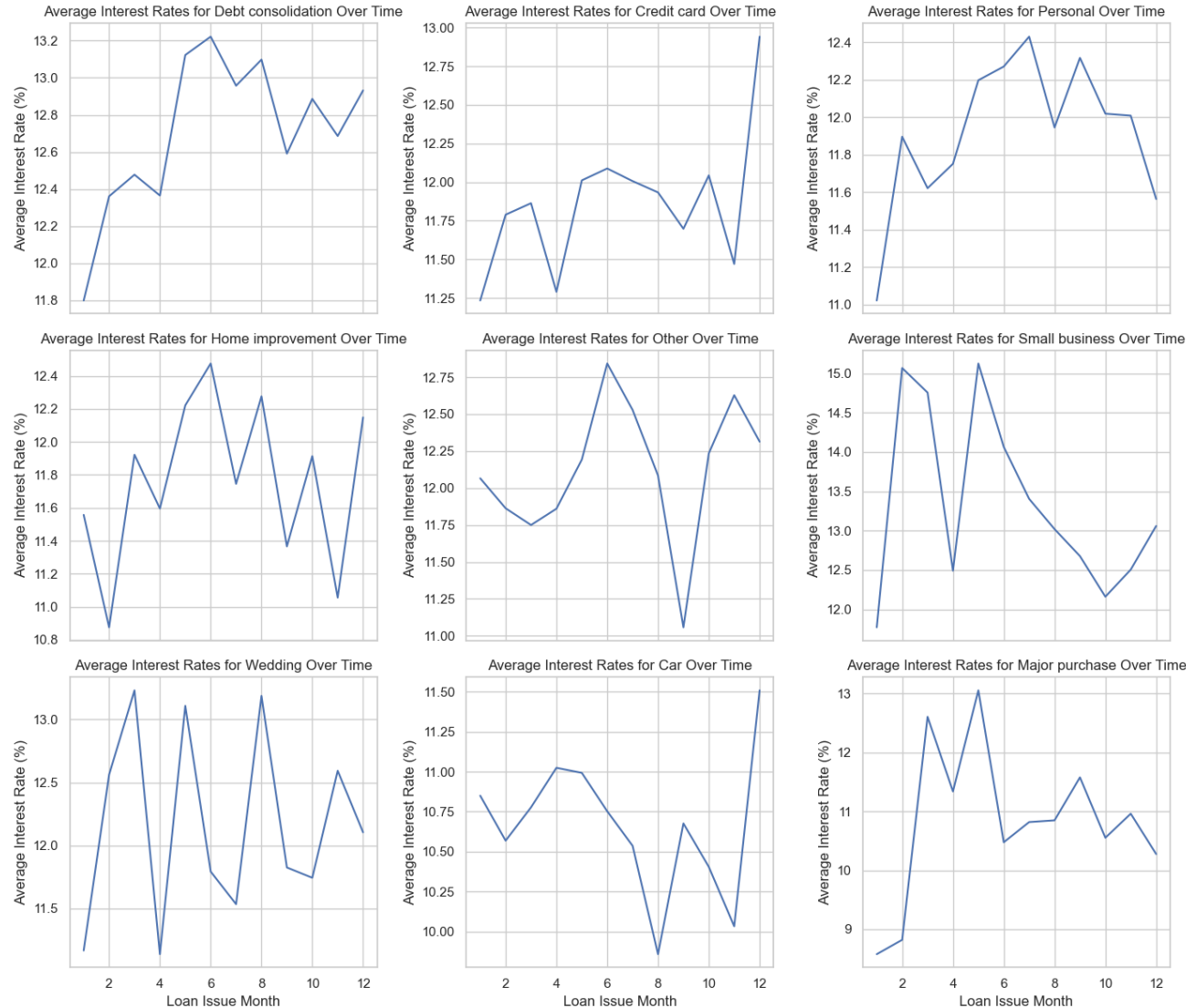
- Debt Consolidation Loan most popular with 47.2%
- Credit Card (15.9%) and Personal (11.3%) next most popular loans



Breakdown of Loan Distribution – by Product Type and Term (36 or 60 months)

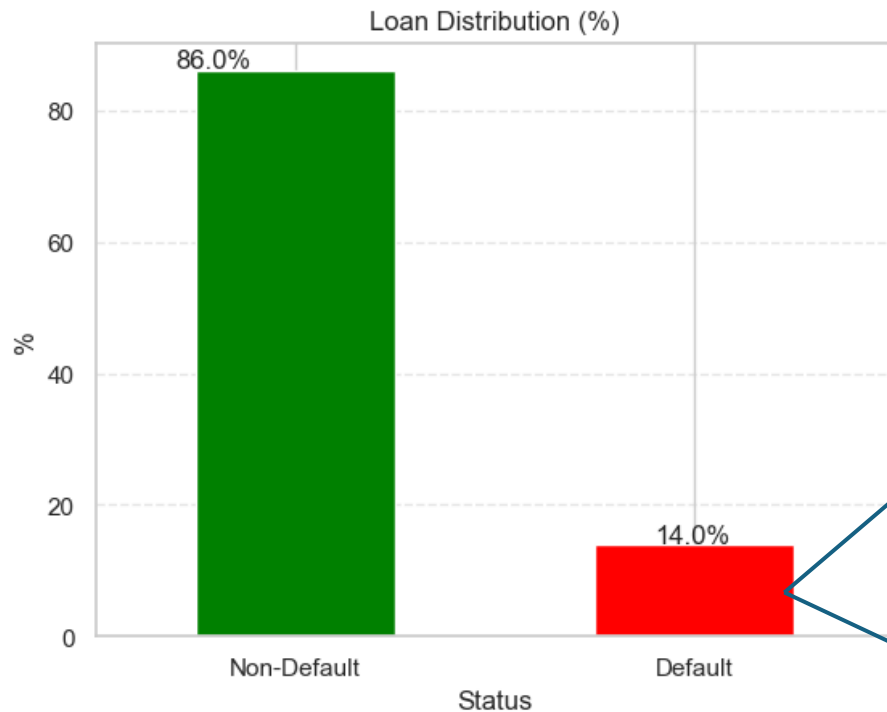
- Shorter term loan of 36 months is most popular in all categories apart from Small Business where its 50%

Loan Distribution – Average Interest rates for Top Products



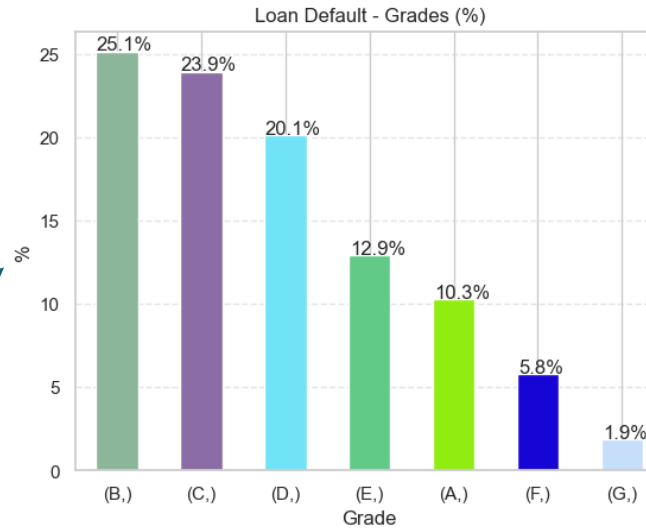
Loan Product	Avg Interest Rate (%)
Debt Consolidation	12.71
Credit Card	11.86
Personal	11.92
Home Improvement	11.76
Other	12.12
Small Business	13.34
Wedding	12.16
Car	10.67
Major Purchase	10.83
Medical	11.6

Loan Default – By Grades and Term Period



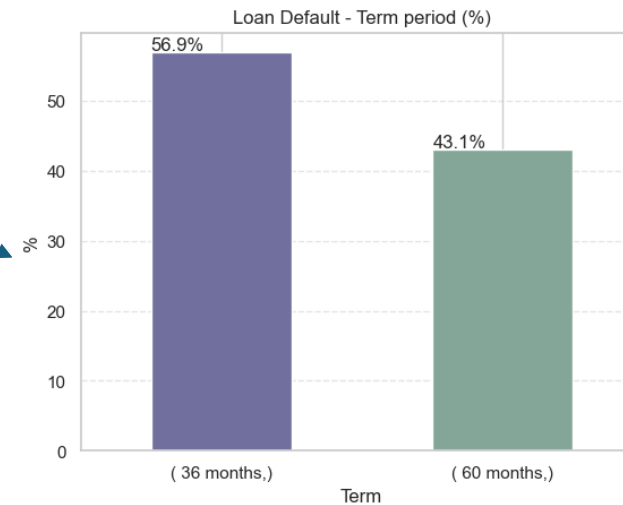
Loan Distribution by Status

- 14% of the overall loans default



Defaults by Grade Types

- B Grade loans default the most at 25.1%
- Approx 70% of defaults are in grades B, C and D
- 10.3% of A grade loans also default

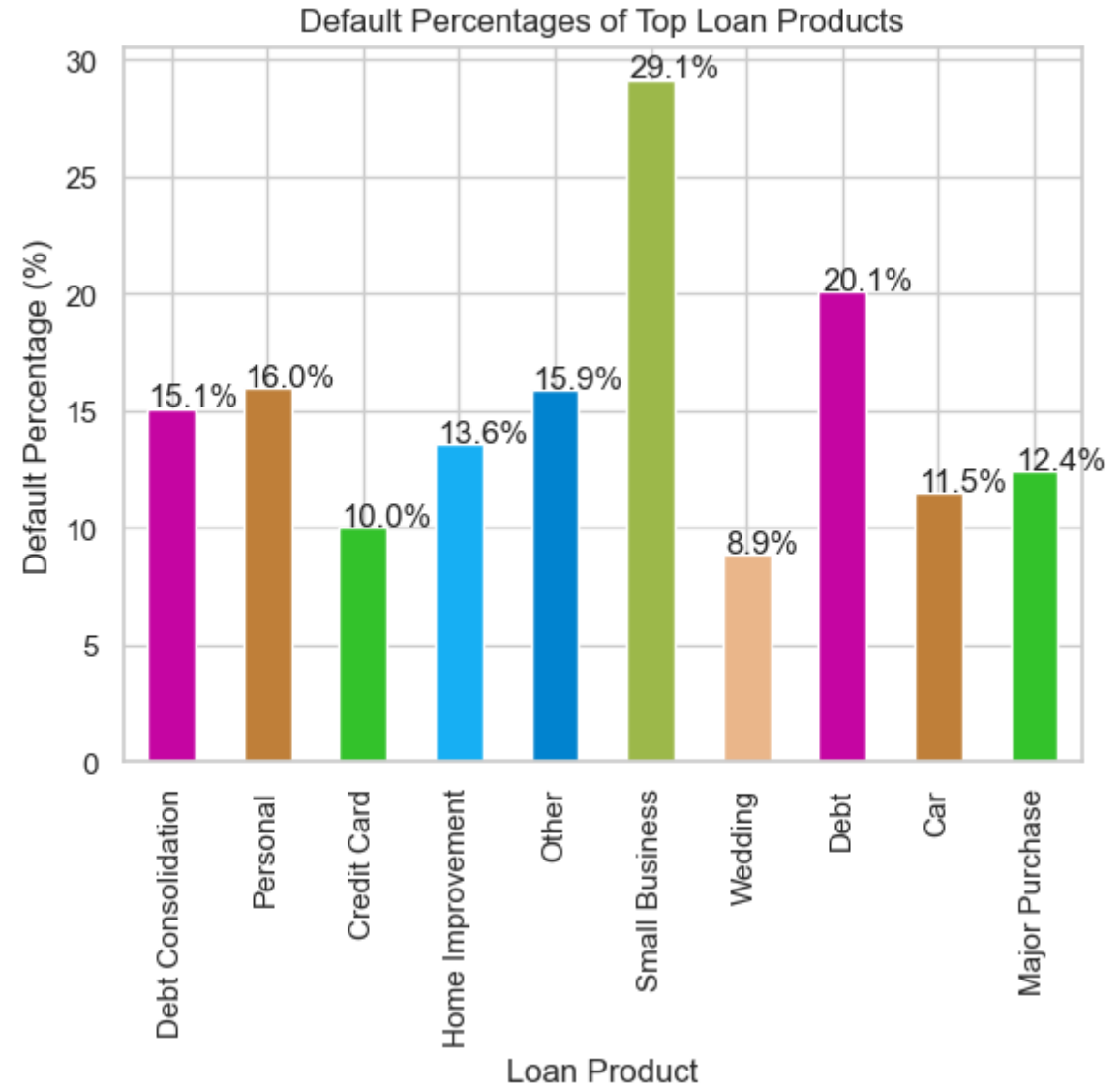


Defaults by Term Period

- Shorter term loans default more at 56.9%

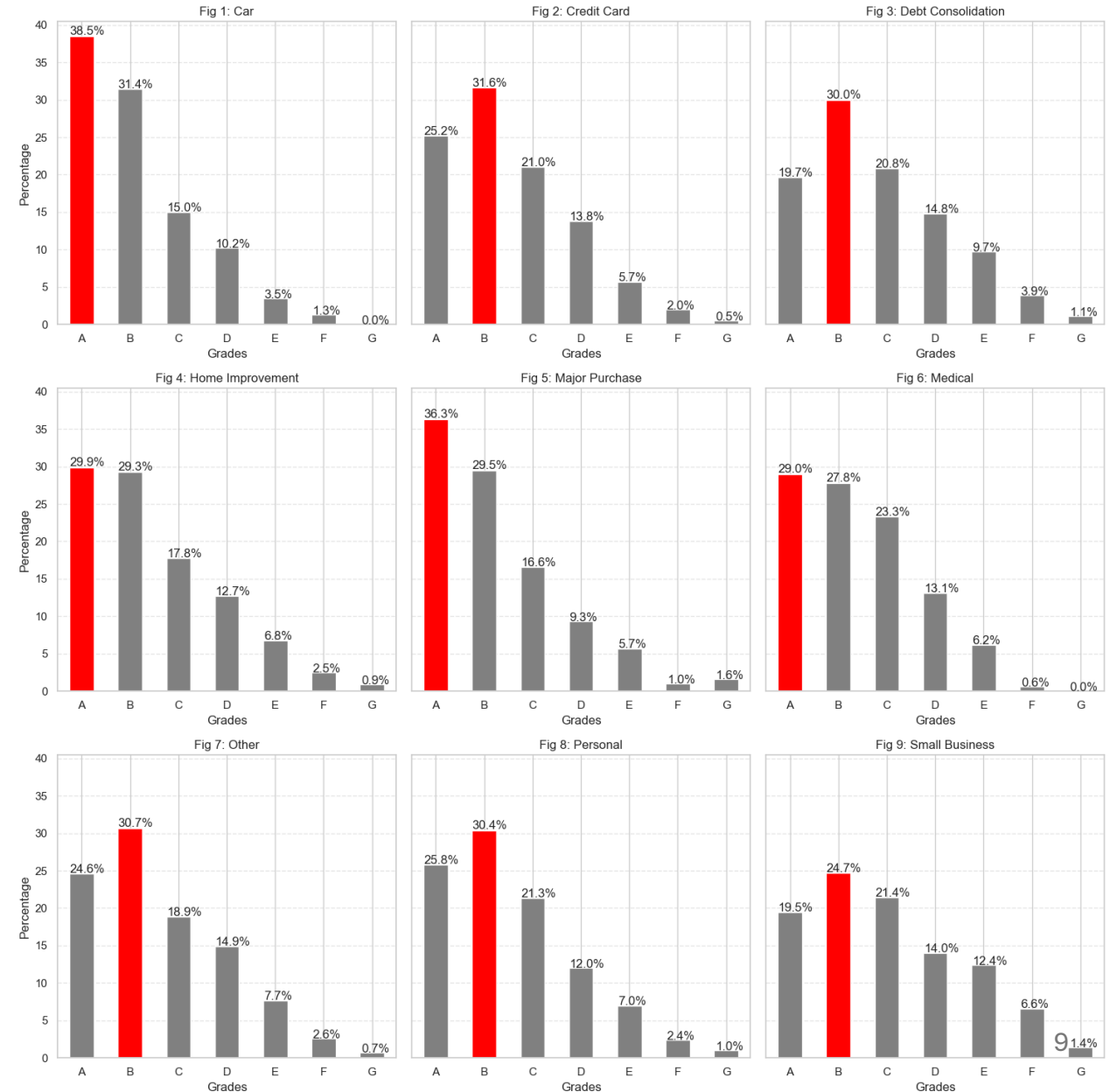
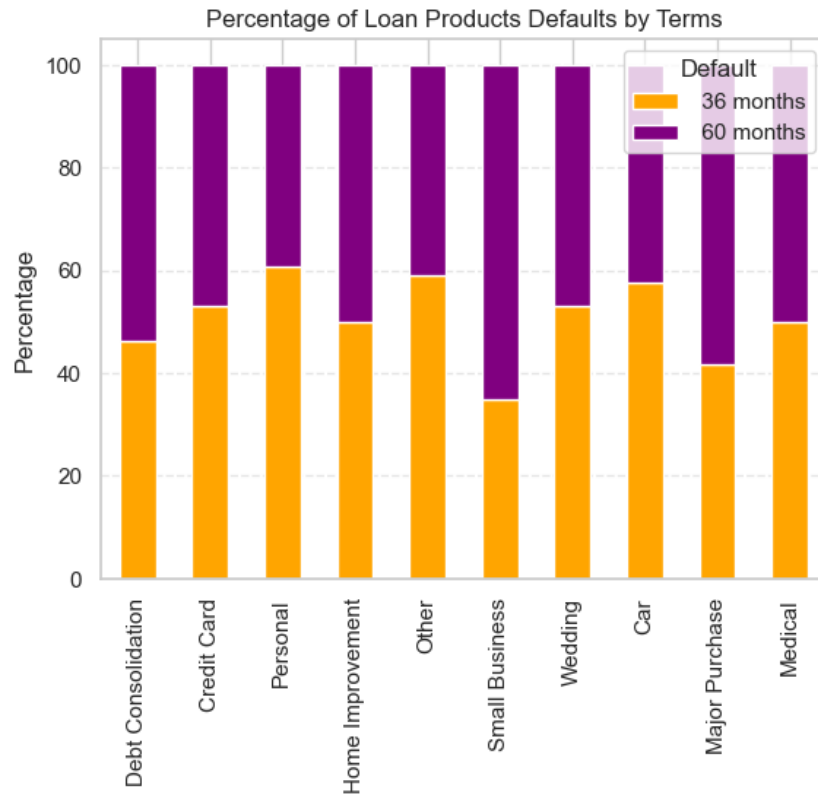
Loan **Default** Distribution – Top Products

- Debt Consolidation has default rate of 15.1%
- Personal Loan has default rate of 16%
- Highest default is for Small business at 29.1%

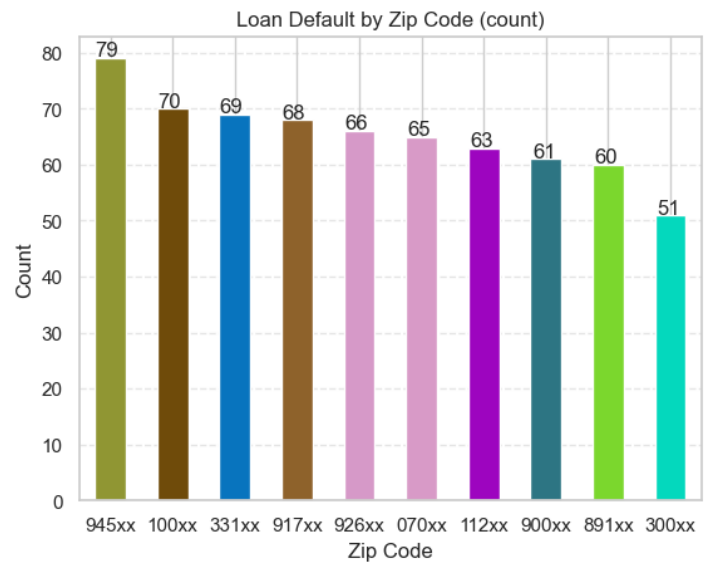


Loan Default Distribution – Breakdown by Term Periods and Grades

- Debt Consolidation is the most popular loan and has one-third of B category defaulting and overall, 15.1% default rate
- There's a mix of default rates by term period for different product categories

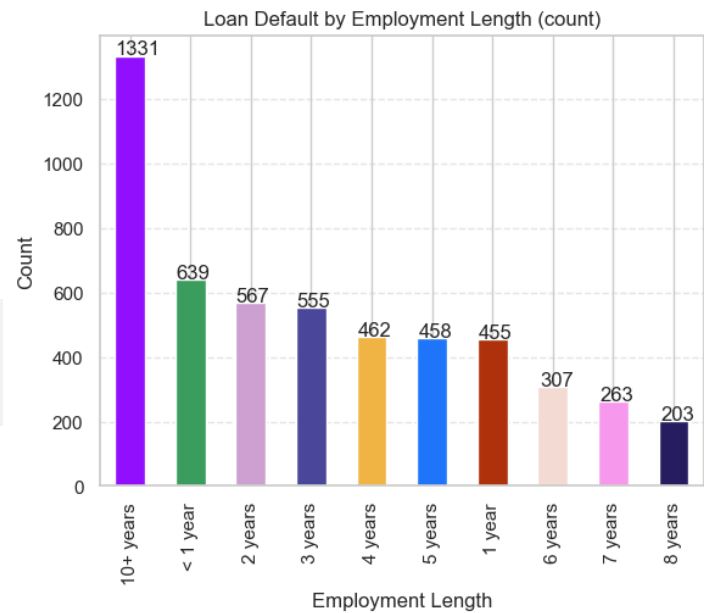


Loan Default Distribution – Borrower Information

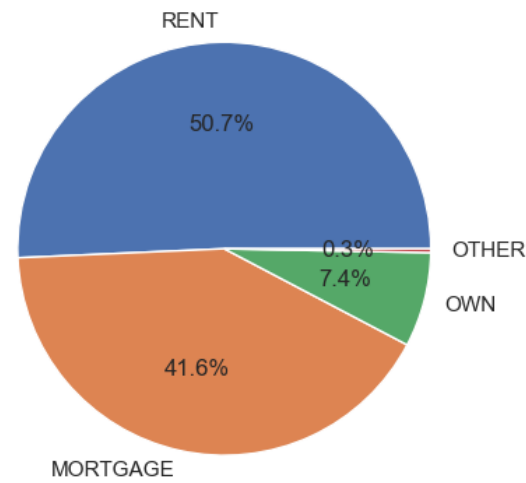


Top defaulting zip codes are 945xx, 100xx and 331xx

Defaults keep decreasing with employment length before doubling at > 10yrs

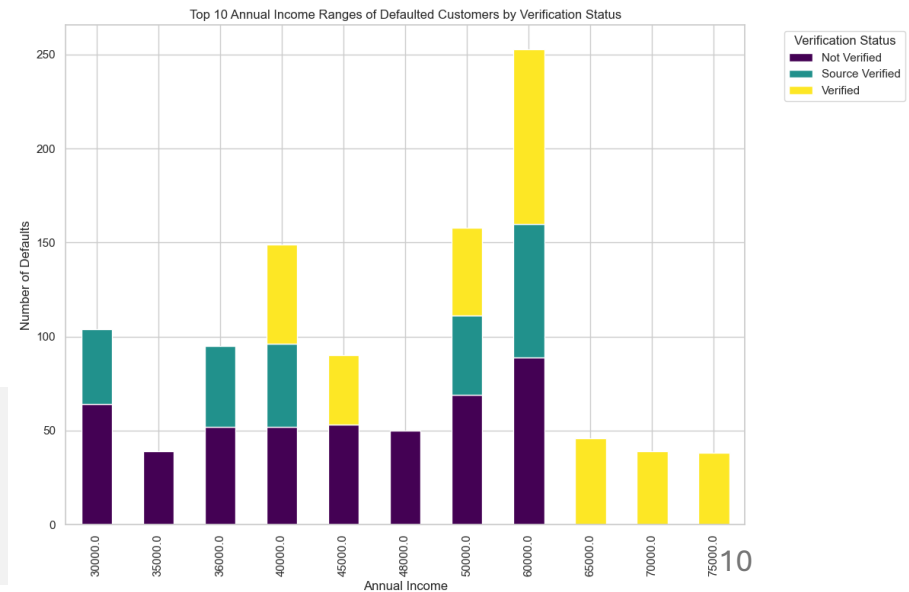


Loan Default by Home ownership type (%)



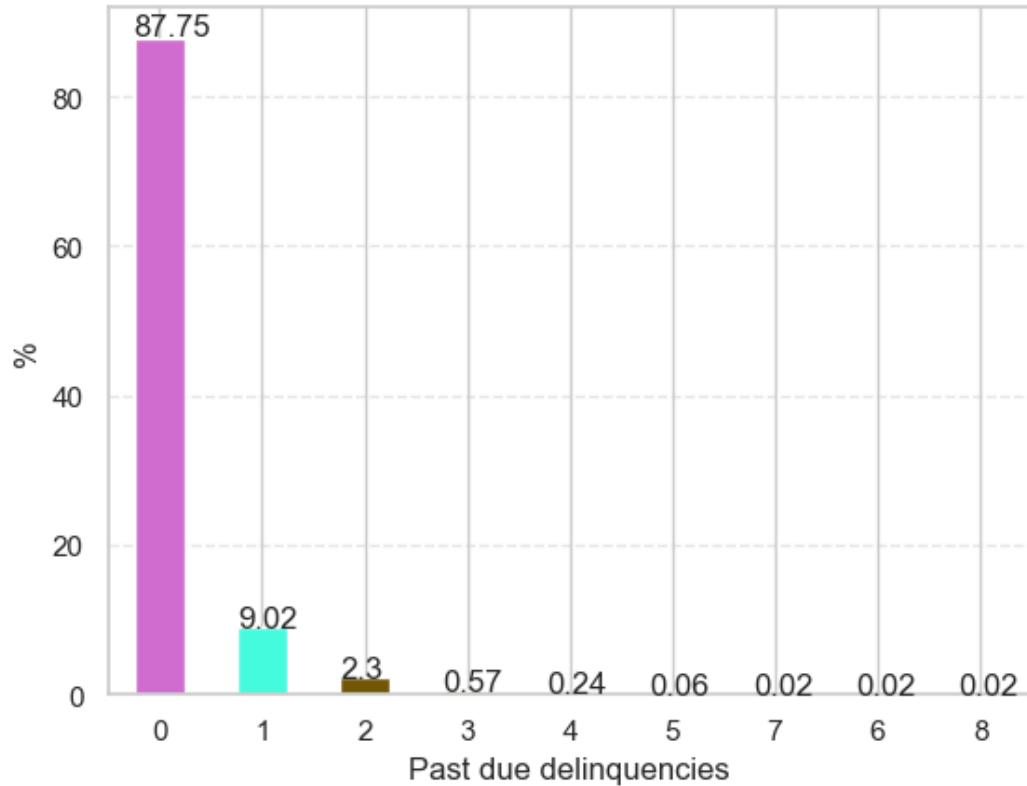
- People Renting are the highest defaulter rate at 50.7% followed by those with Mortgage at 41.6%
- Homeowners have very small proportion of defaults at 7.4%

- People with income range between 40k and 60k have most defaults
- Majority of defaults are with Not Verified Income group



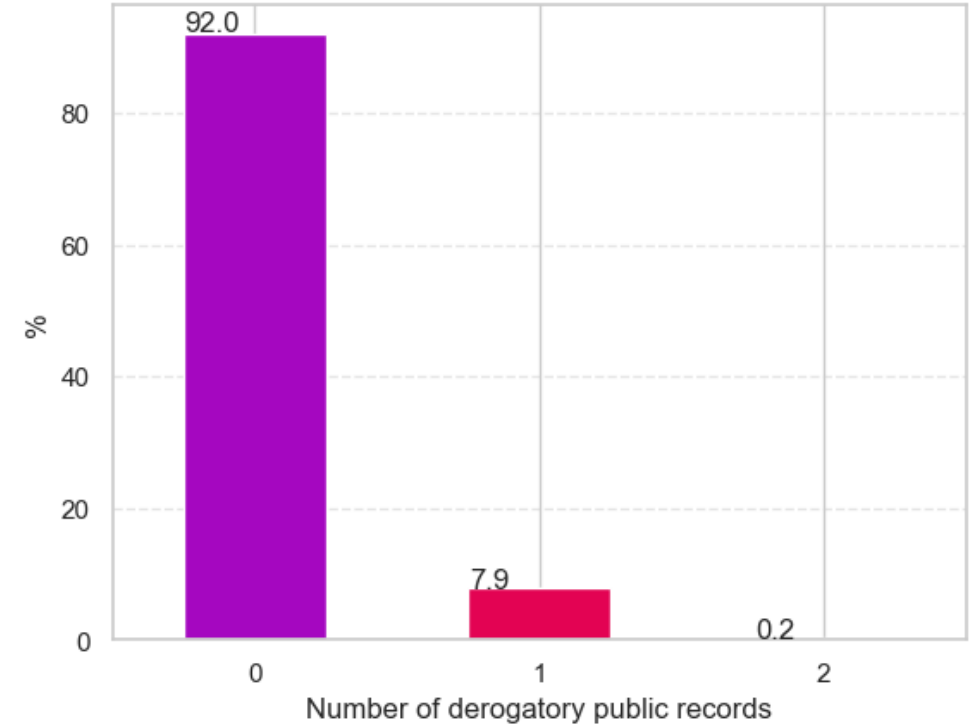
Loan Default Distribution – Credit Information

Loan Default by Number of 30+ days past-due incidences in the past 2 years



Defaults are maximum in customers with no past-due incidences in the last 2 years

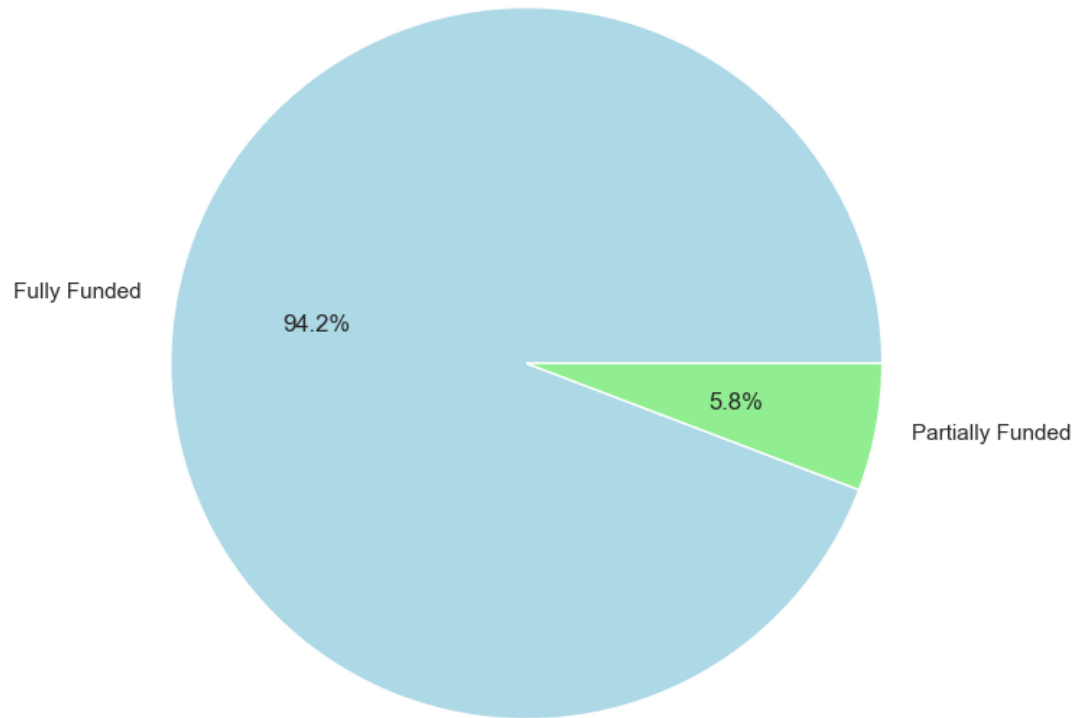
Loan Default by Number of derogatory public records



Defaults are highest with customers with no derogatory public records and negligible with customers with 2 such public records

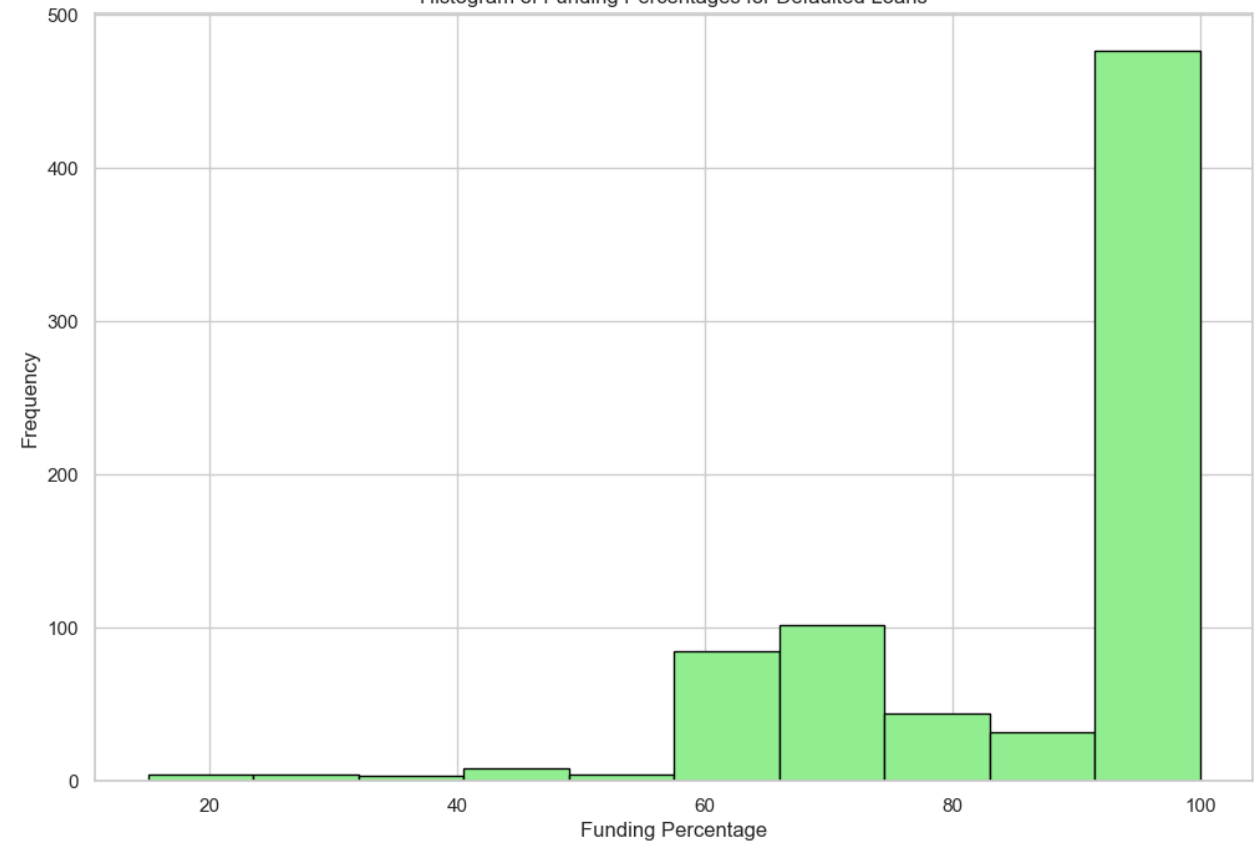
Loan **Default** Distribution – Credit Information

Funding Status of Defaulted Loans



- Defaults are very high for fully funded loans at 94.2%.
- For Partially funded loans, its relatively low at 5.8%

Histogram of Funding Percentages for Defaulted Loans



For funding below 50%, default rates decrease dramatically

Summary - Results

- 86% increase in last year from 2010 to 2011, with more short-term loans for all top products apart from Small Business
- Debt Consolidation Loan most popular with 47.2%.
- Overall default rate is 14%, which constitutes B grade and short-term loans more
- Default rate is highest for Debt Consolidation loan and for customers with 10+ years employment length
- People with Rent and Mortgage constitute the highest number of defaulters, along with people with income band 40k-60k
- People with no past delinquency and no derogatory public records are more likely to default
- Loans which are fully funded are most likely to default, compared to loans that are less than 50% funded

Recommendations

- Avoid B, C and D category loans in favor of A category loans
- Favor Homeowners more in lieu of those with Rent and mortgage
- Disburse loans for customers with shorter than 10 years of employment length
- Fully Funded loans need to be avoided by allowing up to 60% of overall ask
- People with delinquency and / or past derogatory public record should not be ignored for loan

Thank You
