LENDING CLUB CASE STUDY

SUBMISSION

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OBJECTIVE

About company:

- Lending Club is the largest online loan marketplace, facilitating different type of loans.Borrowers can easily access lower interest rate loans through a fast online interface. Like most other lending companies, lending loans to 'risky' applicants is the largest source of financial loss (called credit loss). When a person applies for a loan, there are **two types of decisions** that could be taken by the company: Loan Accepted or Loan Rejected.

Business understanding

- If the applicant is **likely to repay the loan**, then not approving the loan results in a **loss of business** to the company
- If the applicant is **not likely to repay the loan,** i.e. he/she is likely to default, then approving the loan may lead to a **financial loss** for the company

Objective

- The aim is to identify patterns which indicate if a person is likely to default, which may be used for taking actions such as **denying the loan, reducing the amount of loan, lending (to risky applicants) at a higher interest rate**, etc.
- The other aim is to identify the drivers through which we can identify that loan application which will have very less chance of getting charged off

Methodology

Data cleaning
- Drop columns having null values and insignificant.
- Drop the rows where loan is Fully Paid
- Convert the Percentage columns into Integer and Round the values to nearest Integer

Finding Key column
- Here key column is "loan Status".
- Loan status are Charged off, current, fully paid
- Our focus is on Charged off and Fully Paid

Univariate Analysis
- Univariate analysis with respect to loan status.
- Checking frequency and distribution of one variable.
- Counts are more important to understand the data

Segmented Univariate Analysis
- Analyze variables against segments of other variables.
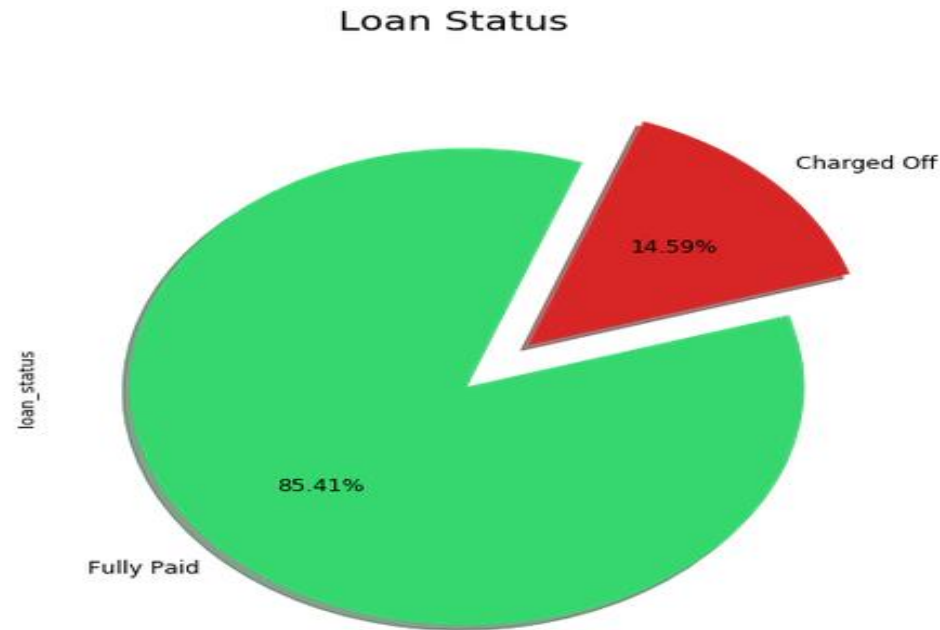
Bivariate Analysis
- Analyze joint distribution and correlation.

Results
- Observations

Loan Status

Our main objective of analysis is to identify the loan which are being charged off due to different reason. So we will remove the data of loan application which are currently in progress.

From the Below pie chart we can conclude that there are around 14.5% of loans which are charged off. The 14.5% of loan getting defaulted is the serious concern for a lending club. Also the investor will also think twice before investing next time

Impact of Interest Rate on Loan Application

The interest rate is levied on customer based on its annual income, job stability and various other factors. After doing the univariate analysis on interest rate on the people who defaulted on loan, we can say if we offer the loan at higher interest there is more chance of people defaulting on loan. Below Graph will imply the observation
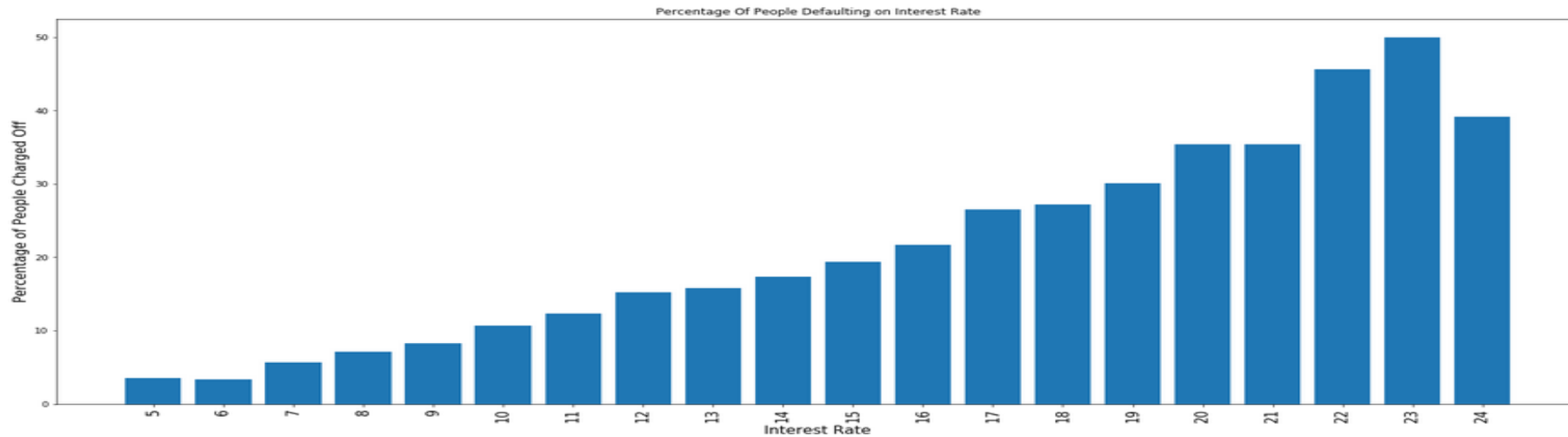
If we categorize the interest rate as below
Lower Interest rate as <11.93%
High Interest rate as >11.93%
The number of people defaulting their
Loan is more in Higher Interest category
as

# Analyzing the Interest Rate and Annual Income
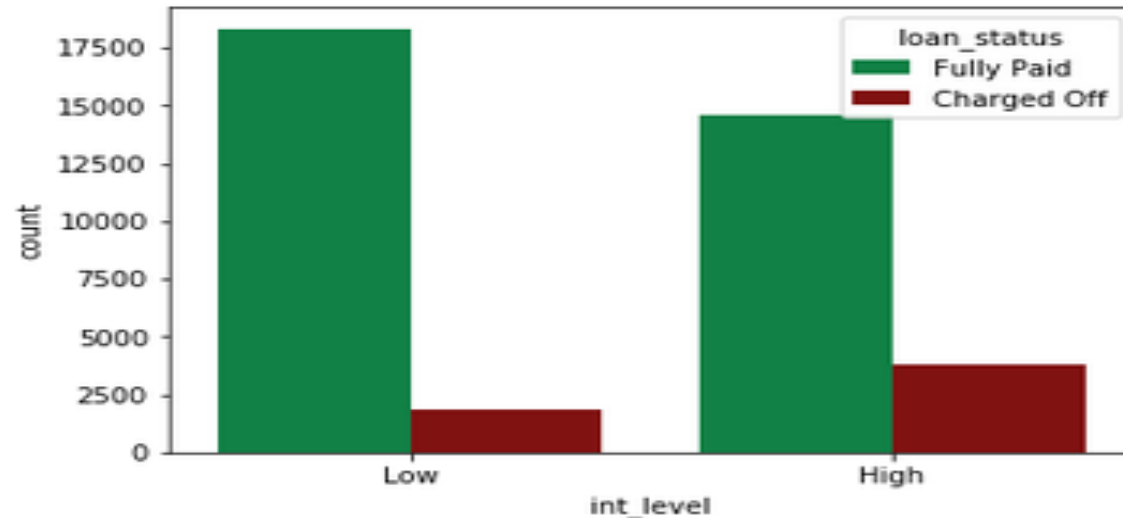
Since the people with higher interest is likely to default on loan. We will consider the data of people to whom loan was given at the interest rate of more than 16%
.We will consider the annual income of the person to decide, if the annual income of person is low and we give them the loan with higher interest rate, what is the chance of people defaulting on loan

Percentage Of People Defaulting based on Range of Annaul Income with Interest rate greater than 16
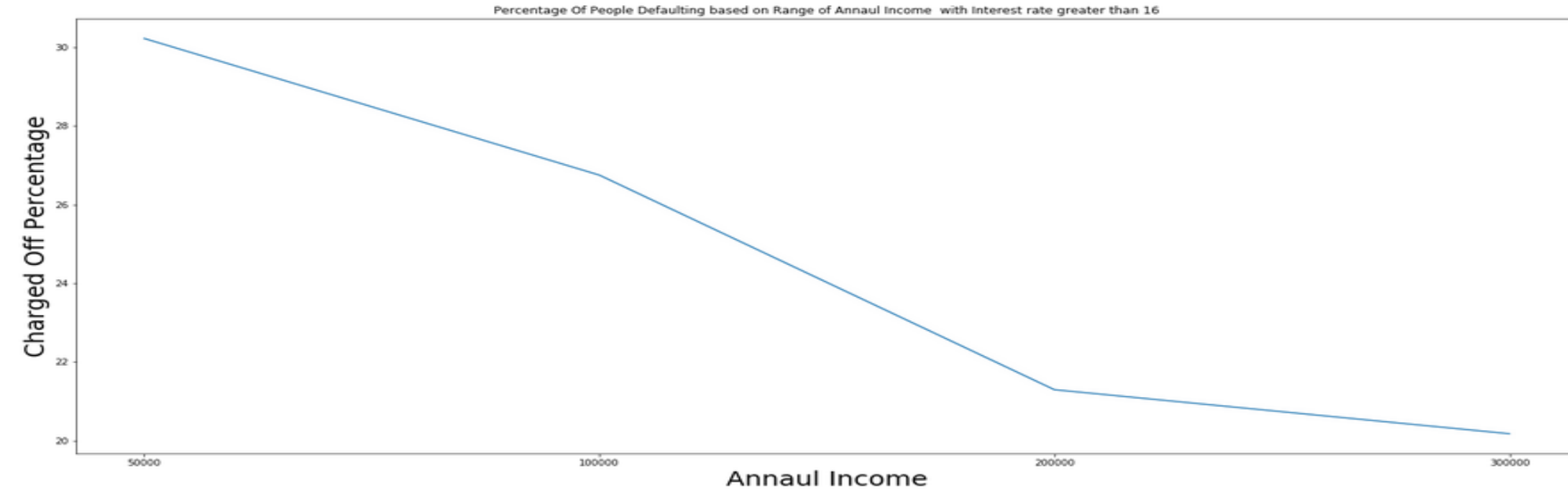
Observations

From the above graph, if the annual income of people is low and loan is given at higher interest rate there is more probability of people defaulting on loan

Bivariate Analysis of Interest Rate and Employement Tenure
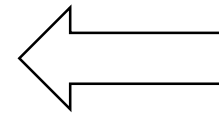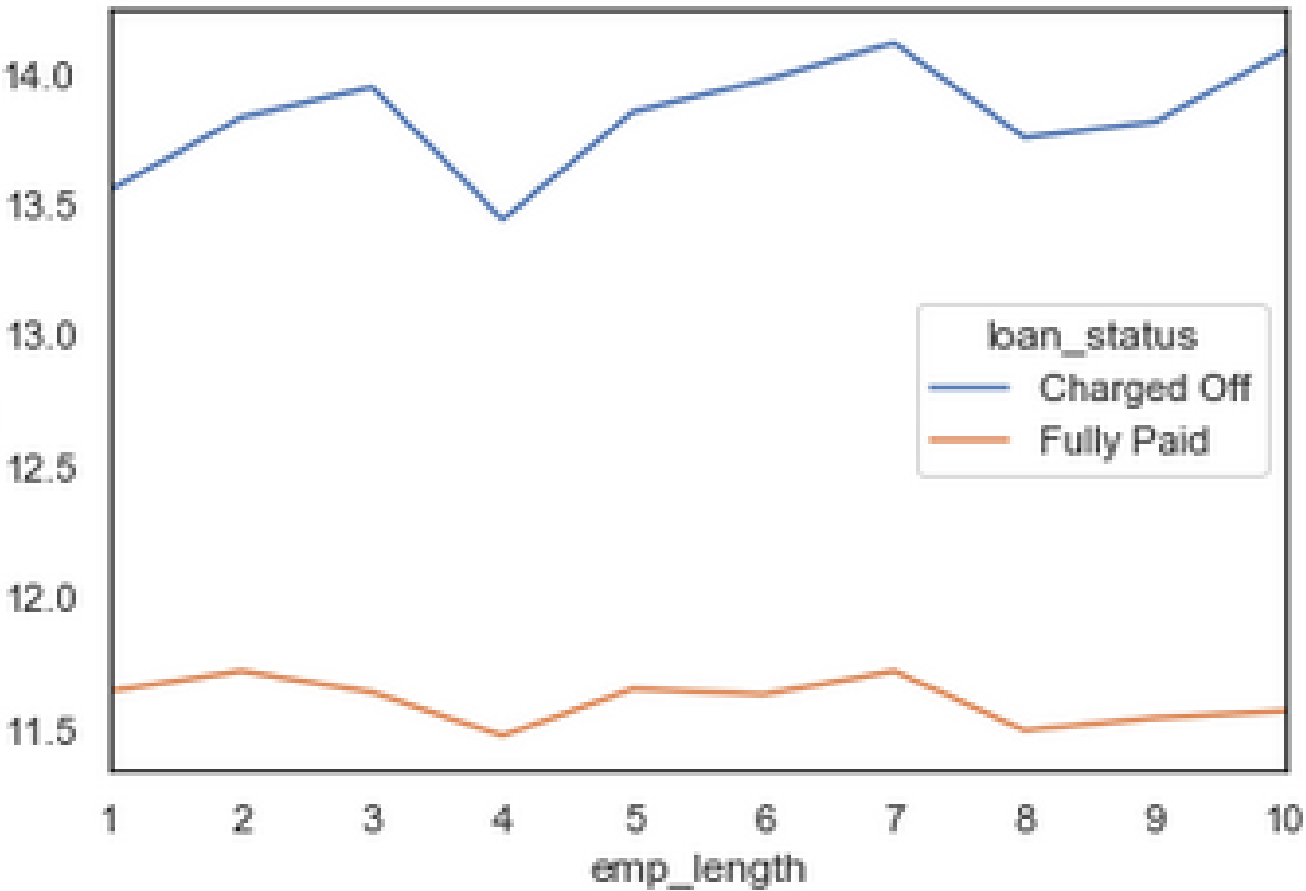
Observations
Despite the employement length, if the loan is given at higher interest rate , people will default on loan

# Analyzing the Impact of Location on Loan Application

People from Over All USA can apply online for loan for different purposes. People in developed states are much more economically stable as compared to people in other states. The Below Graph show the total number of people who paid the loan and number of people who defaulted on loan

California, New York and Florida have the most number of loans where people defaulted
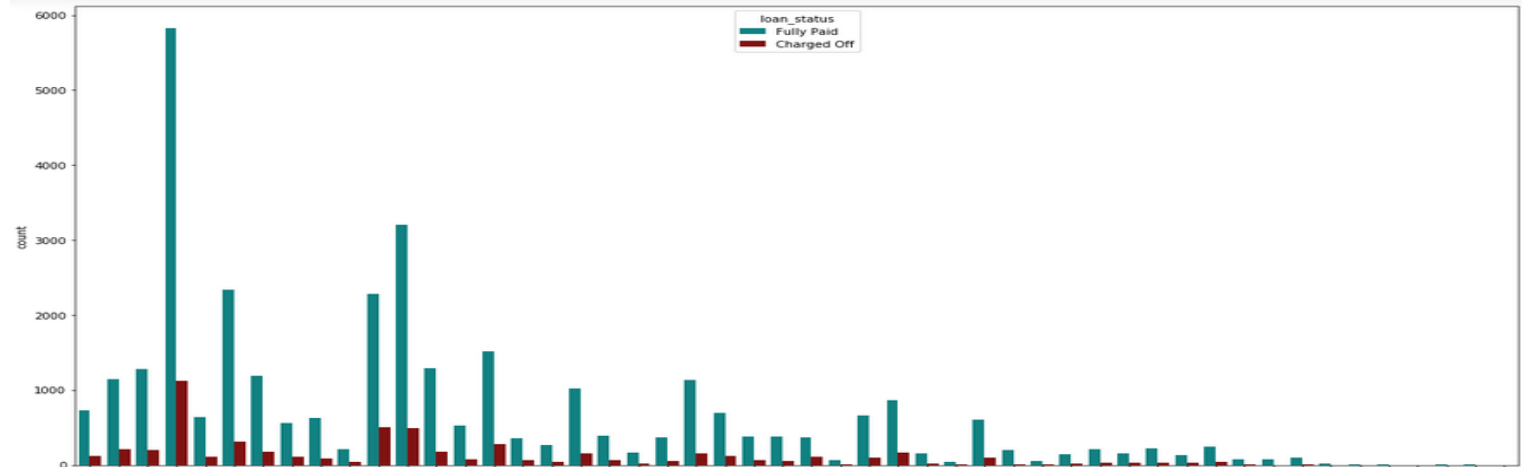
The below graph contains the state where more than 1000 application were more than defaulted

Top three states to default in loan are Florida, Missouri and California, if we consider the ratio of people who defaulted to people who fully paid loan

Grade, subgrade Analysis
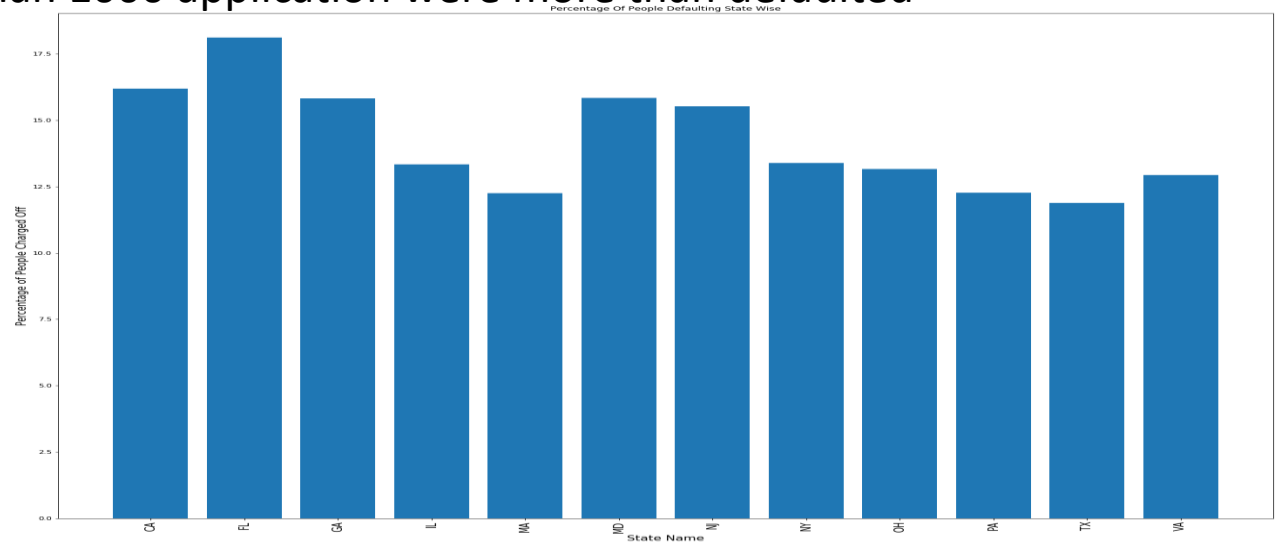
loan_status	addr_state	grade	Charged Off	Fully Paid
28	CA	A	111.0	1545.0
29	CA	B	292.0	1882.0
30	CA	C	259.0	1153.0
31	CA	D	236.0	736.0
32	CA	E	154.0	362.0
33	CA	F	58.0	115.0
34	CA	G	15.0	31.0
62	FL	A	59.0	686.0
63	FL	B	145.0	711.0
64	FL	C	112.0	434.0
65	FL	D	86.0	277.0
66	FL	E	65.0	116.0
67	FL	F	25.0	42.0
68	FL	G	12.0	11.0
205	NY	A	56.0	887.0
206	NY	B	133.0	973.0
207	NY	C	105.0	658.0
208	NY	D	98.0	404.0
209	NY	E	63.0	185.0
210	NY	F	31.0	74.0
211	NY	G	9.0	22.0
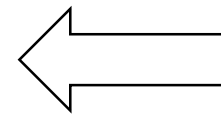
Observations
1) California with grade 'B' has more number of risky loans .
2) 'Florida' with grade 'B' has more number of risky loans .
3) 'New York' with grade 'B' has more number of risky loans It means that B grade has more number of charged of with respective top three charged countries

Impact of Purpose on Loan Application

People will apply for various purpose like marriage,education,business etc. If we analyse the purpose of loan we will get more insight on data

Percentage Of People Defaulting on Loan based on Purpose
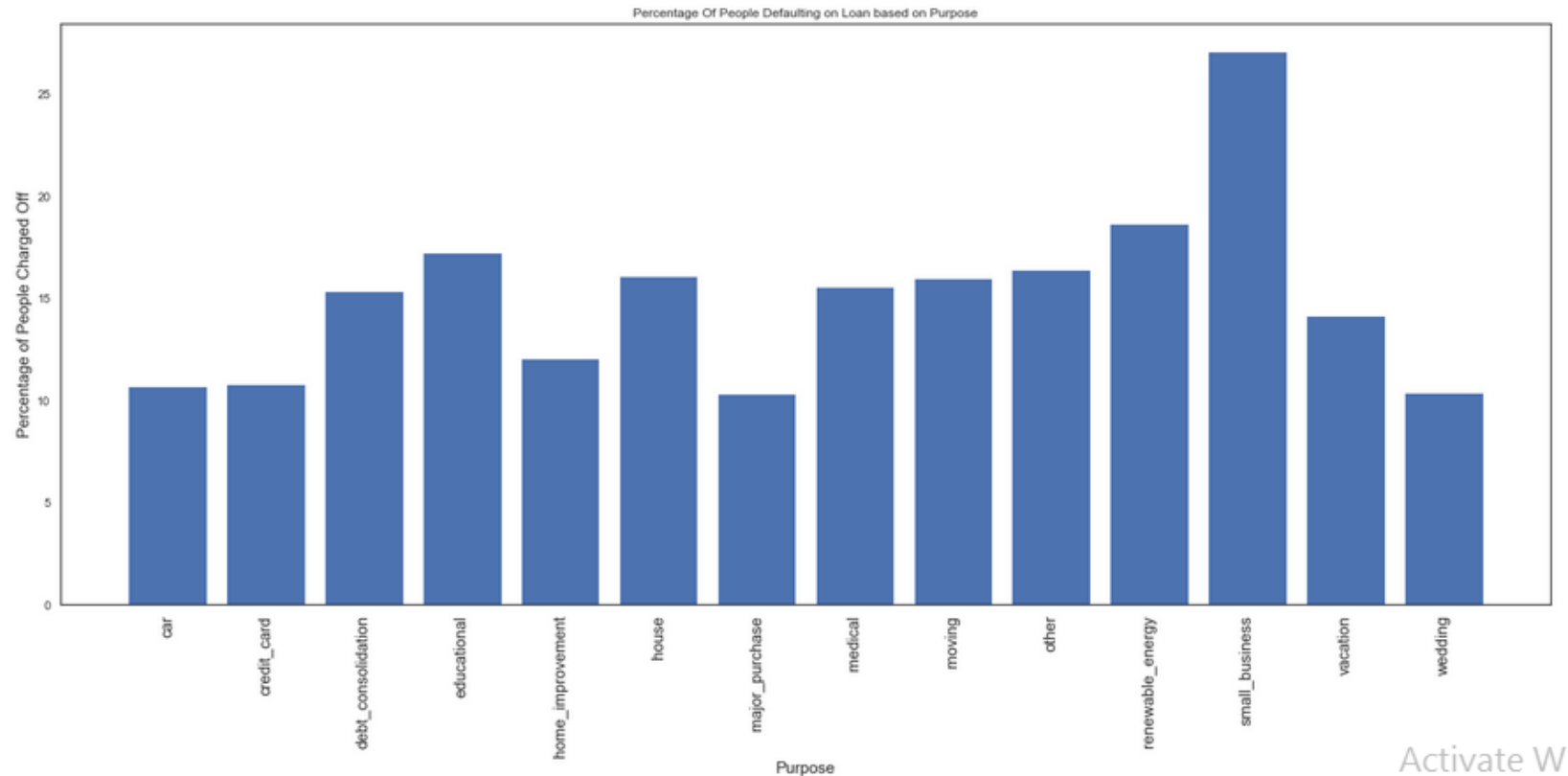
From the above graph we can conclude people talking loan for small business and renewable energy have more probability of defaulting on loan

Since the people taking loan for small business, we will consider the impact of Revolving Utility balance on the people who have applied loan for purpose of Small Business. In credit card terms, a revolving balance is the portion of credit card spending that goes unpaid at the end of a billing cycle. The amount can vary, going up or down depending on the amount borrowed and the amount repaid. If you revolve a balance — that is, not pay it off at the end of the month — the lender will charge you for the privilege of borrowing their money. The amount of the charge for revolving a balance will depend on the size of the balance and the interest rate of the card.
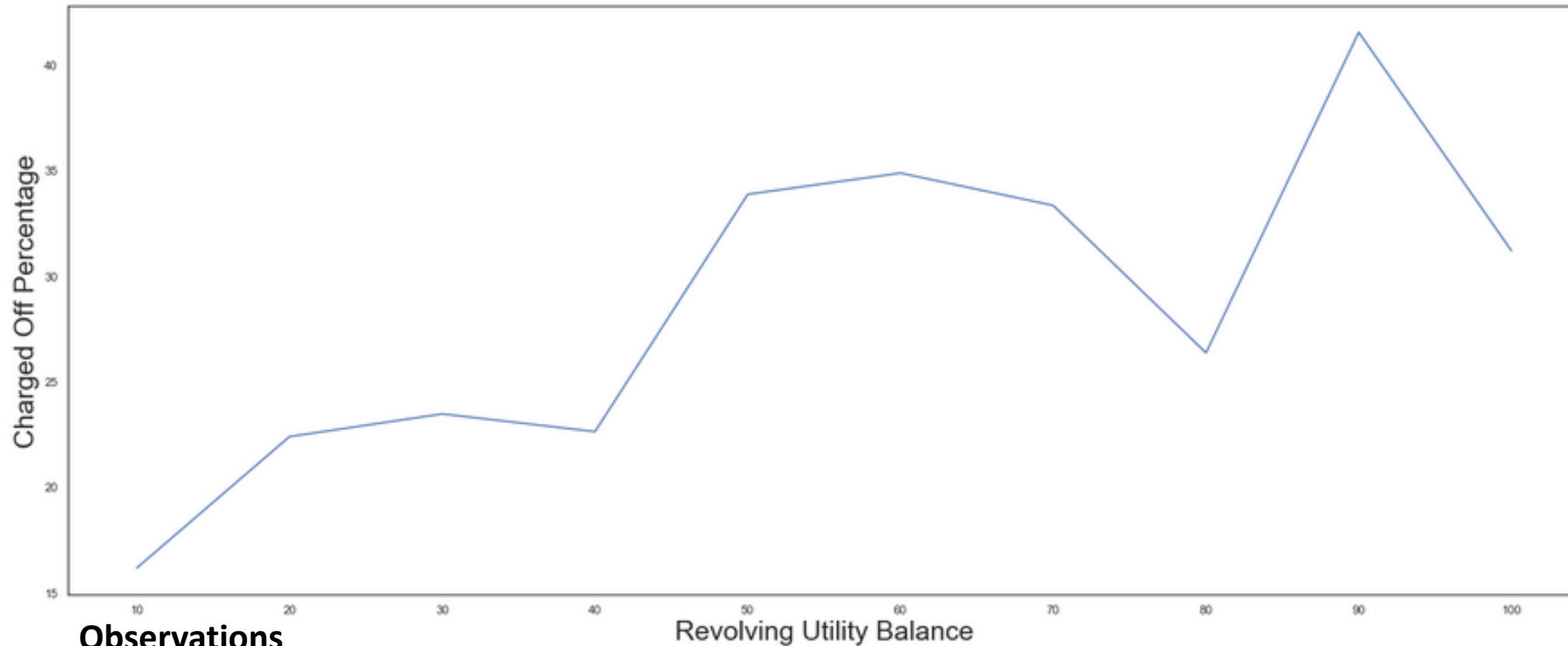
Observations

If the revolving utility balance is greater than 10% of person who is applying for a loan for a purpose of small business is likely to default on.

DTI is ratio of person total monthly EMI amount and total monthly income. If the DTI is more, there is a chance of People defaulting on loan. If the person has already more DTI there is more probability of person defaulted on loan

Observations
**People having DTI between 14 and 26, there are around 15-20% of people defaulting on loan**

Impact of Employemet Tenure
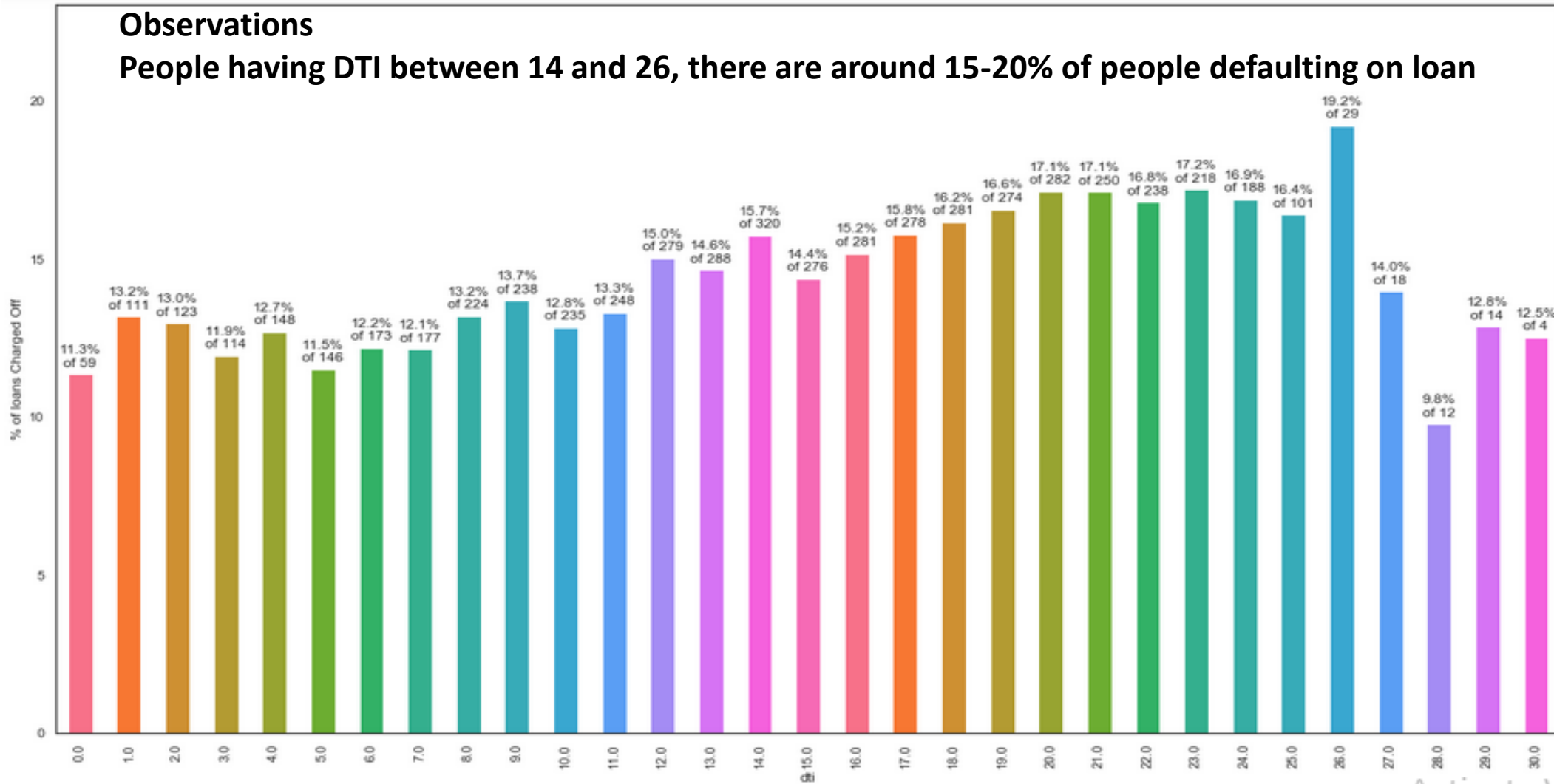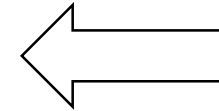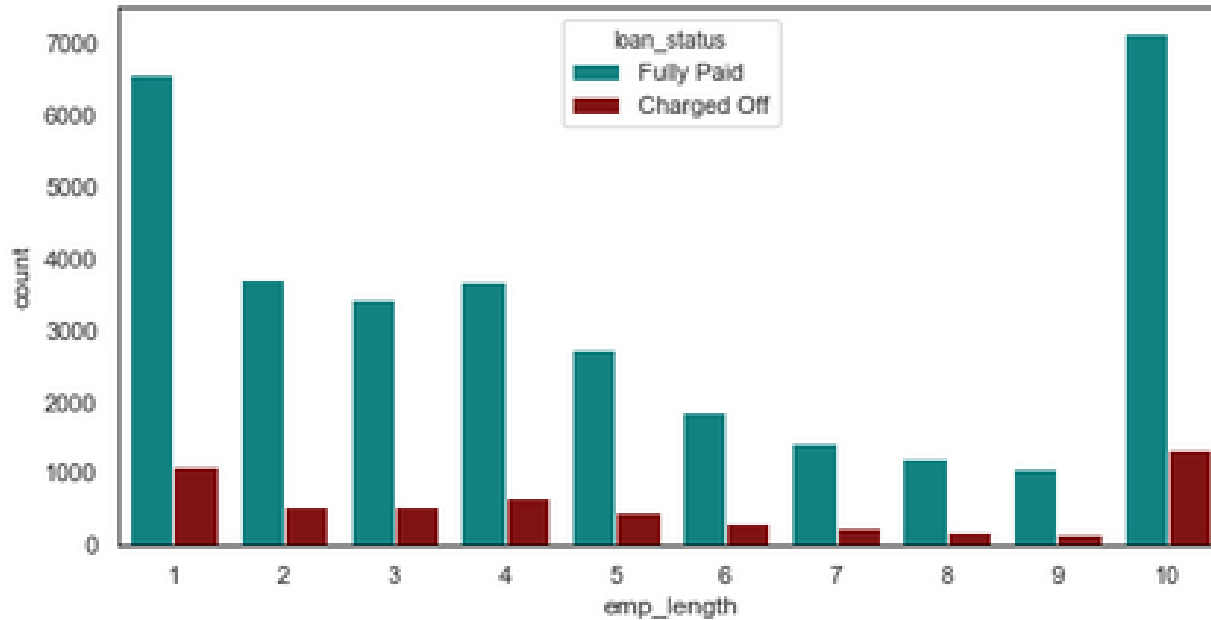
Employee Length is also another factor which play a key role . As we can see the people with experience of less than 1 year and more than 10 years have more number of defaulted.

Impacts of Loan Amount

The Loan Amount is very important factor to decide people default on loan. If we give the higher loan amounts without considering other factors there is more chance of people defaulting on loan.
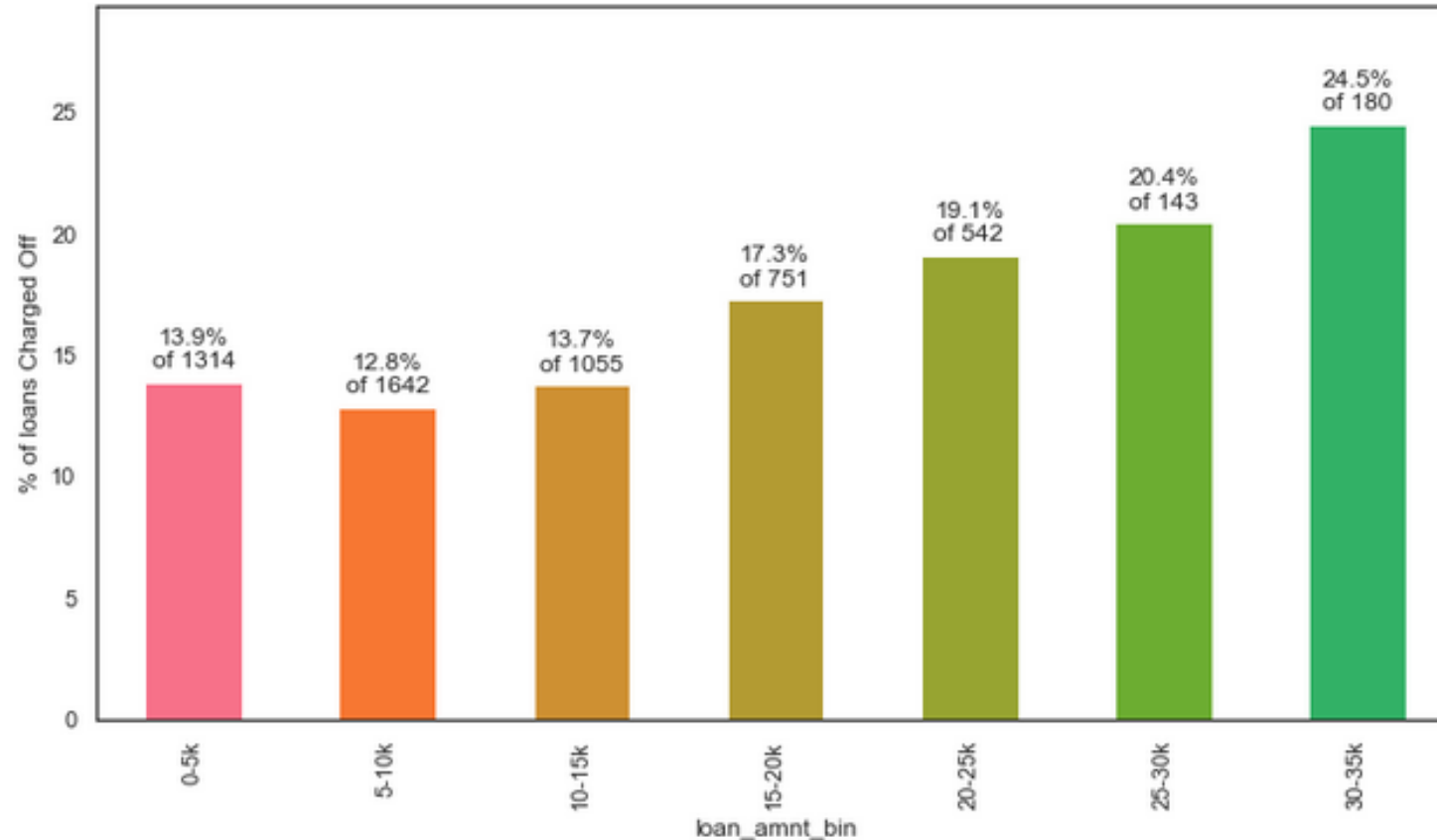
Observations

The % of charged off loans increases substancially as we go up the loan amount buckets. Most loans are below 20000 amount.

There is almost 25% chance of people defaulting on loan when people are given higher amounts
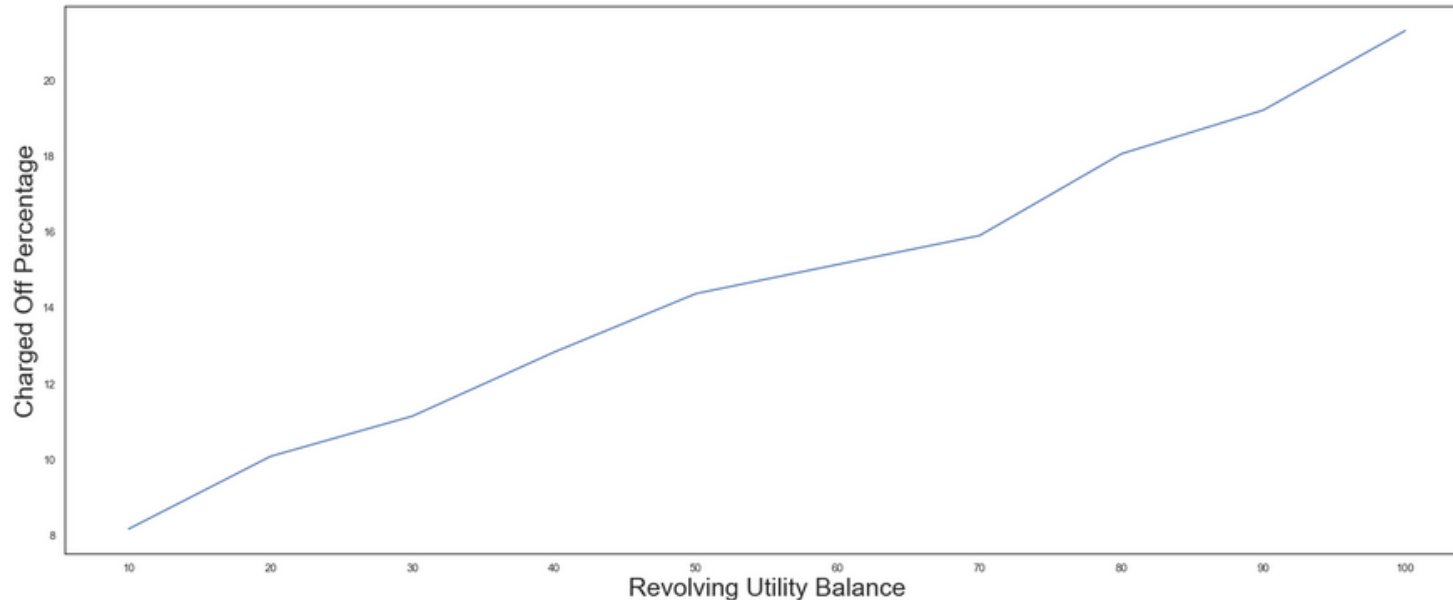
Impact of 'Revolving Balance'

Observations
Person with more high revolving balance have the more chance of defaulting on loan
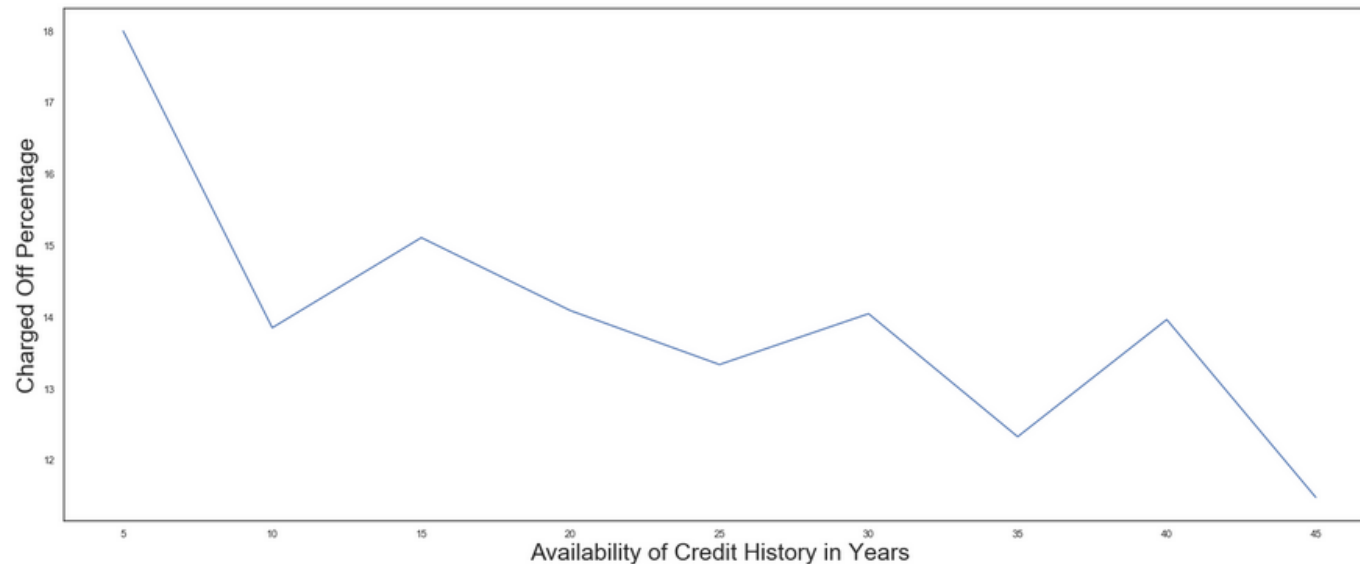
Variable 'Availability of credit history'

Observations
More the Credit History available of person, it is less likely to default considering other factors also like job stability DTI Ratio, Debt to asset ratio etc.

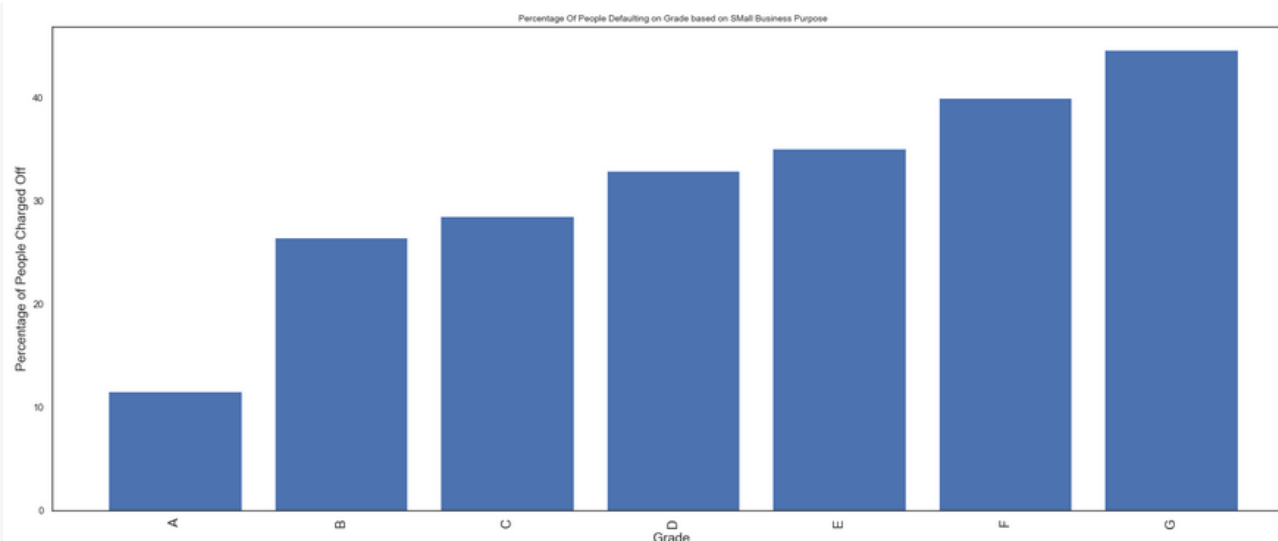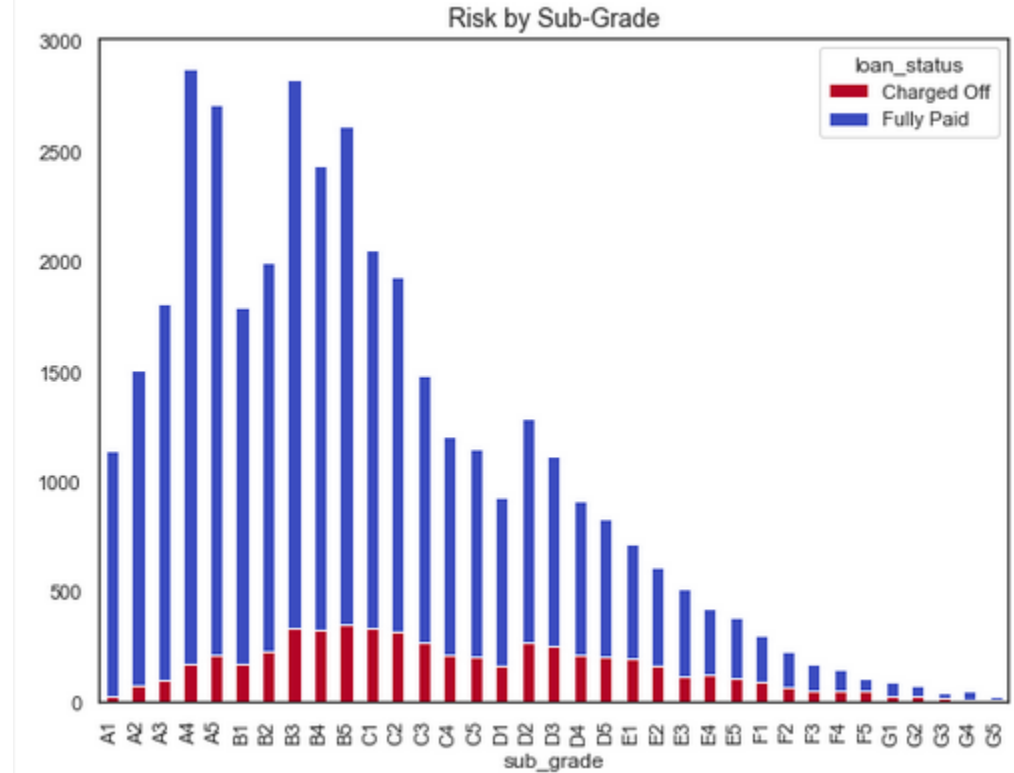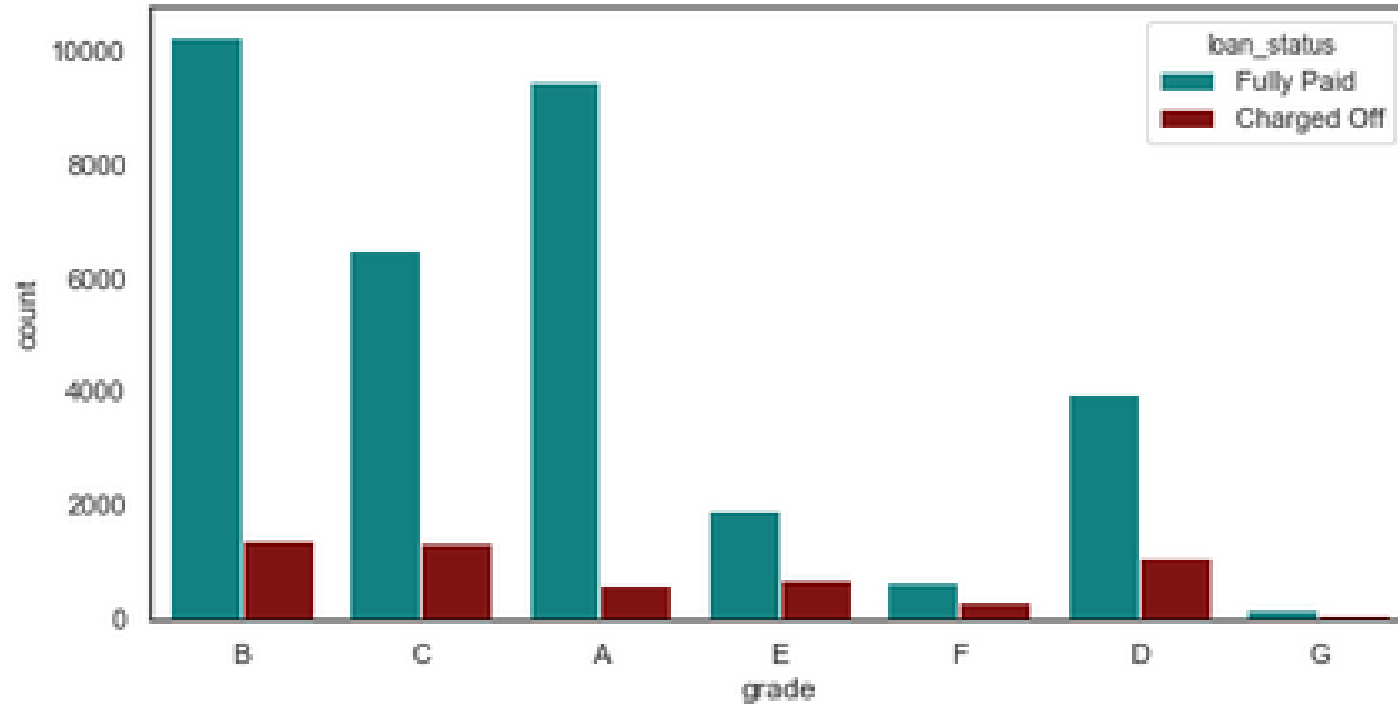If the company verifies all the information given by applicant, it will give sense of security to company that person will have less chance of default on loan

As we can see the loan application where sources and documents are verified there are very less number of loan getting defaulted, where as in case of non-verification the number of people going default is increased by three times

UpGrad
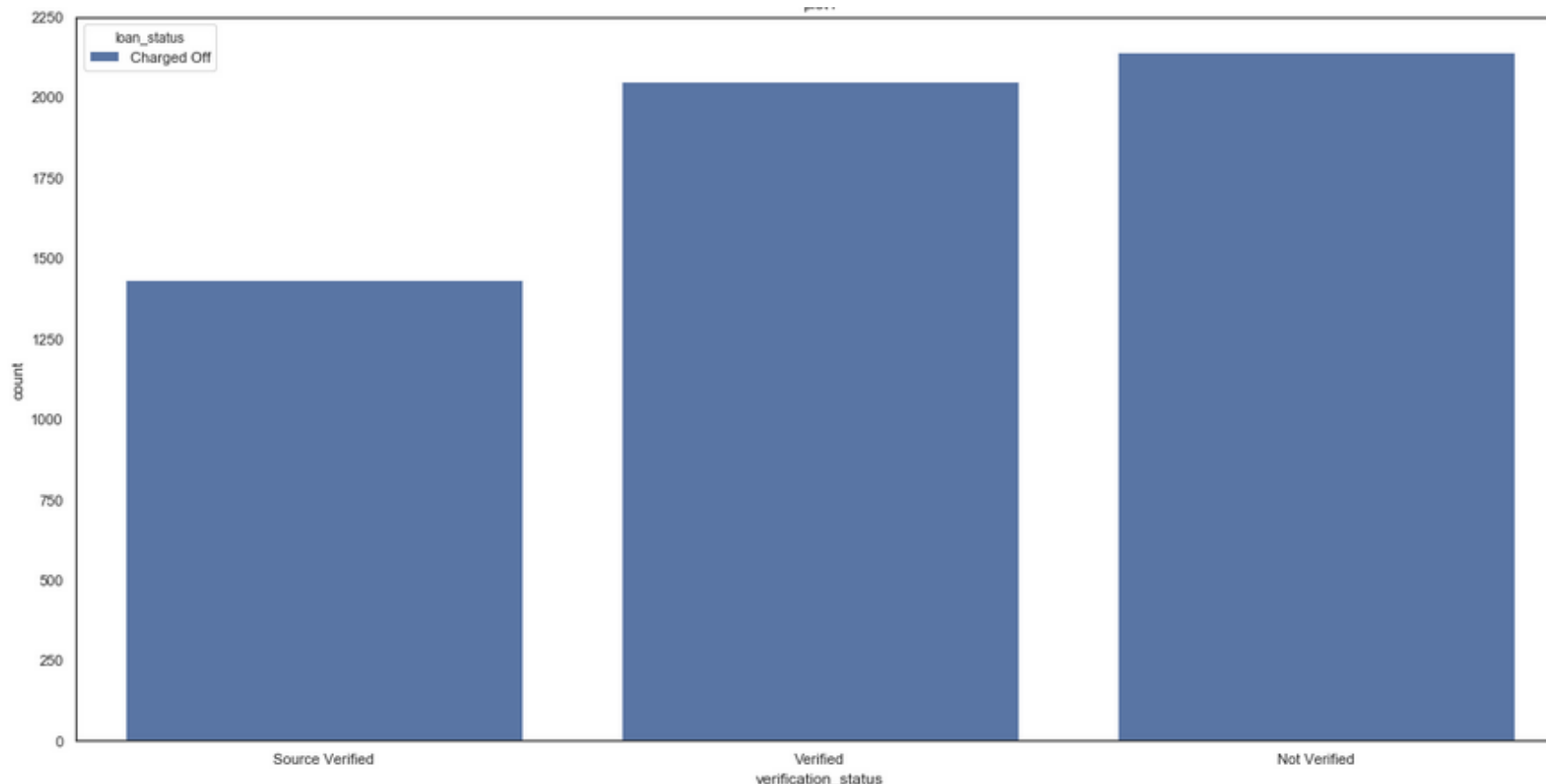
1)People having other type of property like Joint Tenancy, Joint Tenancy With Rights of Survivorship (JTWROS),Tenancy in Common, Community Property are with most to default on loan.
 2)People having own or mortgage house are less likely to default on loan
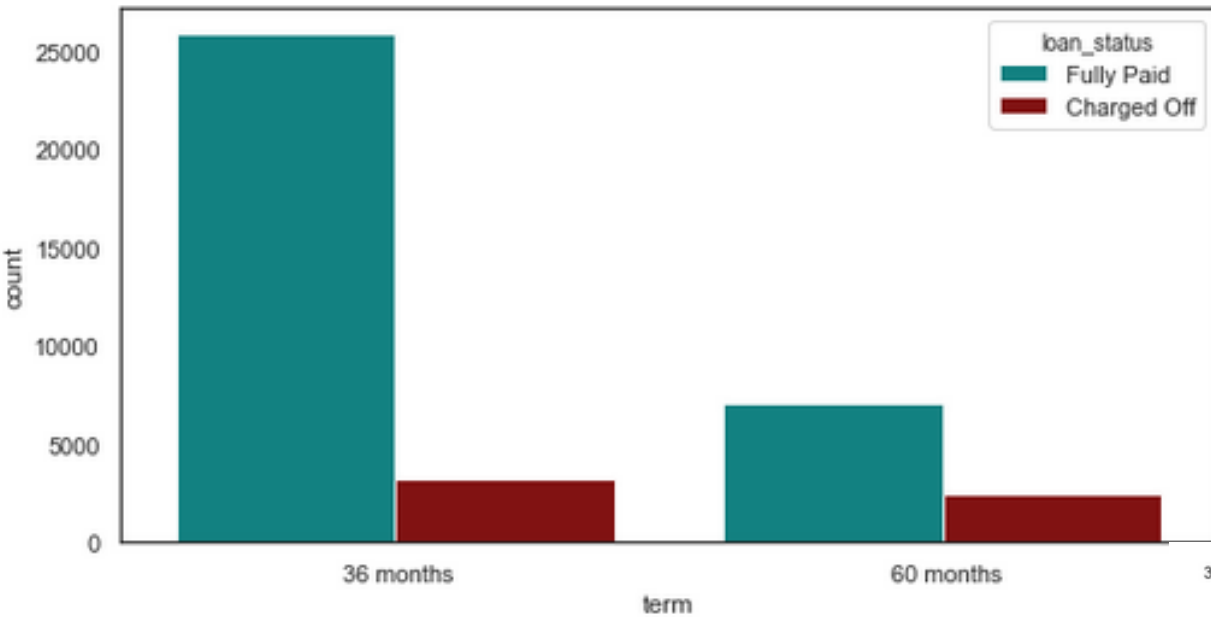3)The highest Charged off are under other i.e. 18.4% and having more risk.

Variable 'Grade'

Risk by Sub-Grade

Percentage Of People Defaulting on Grade based on SMall Business Purpose
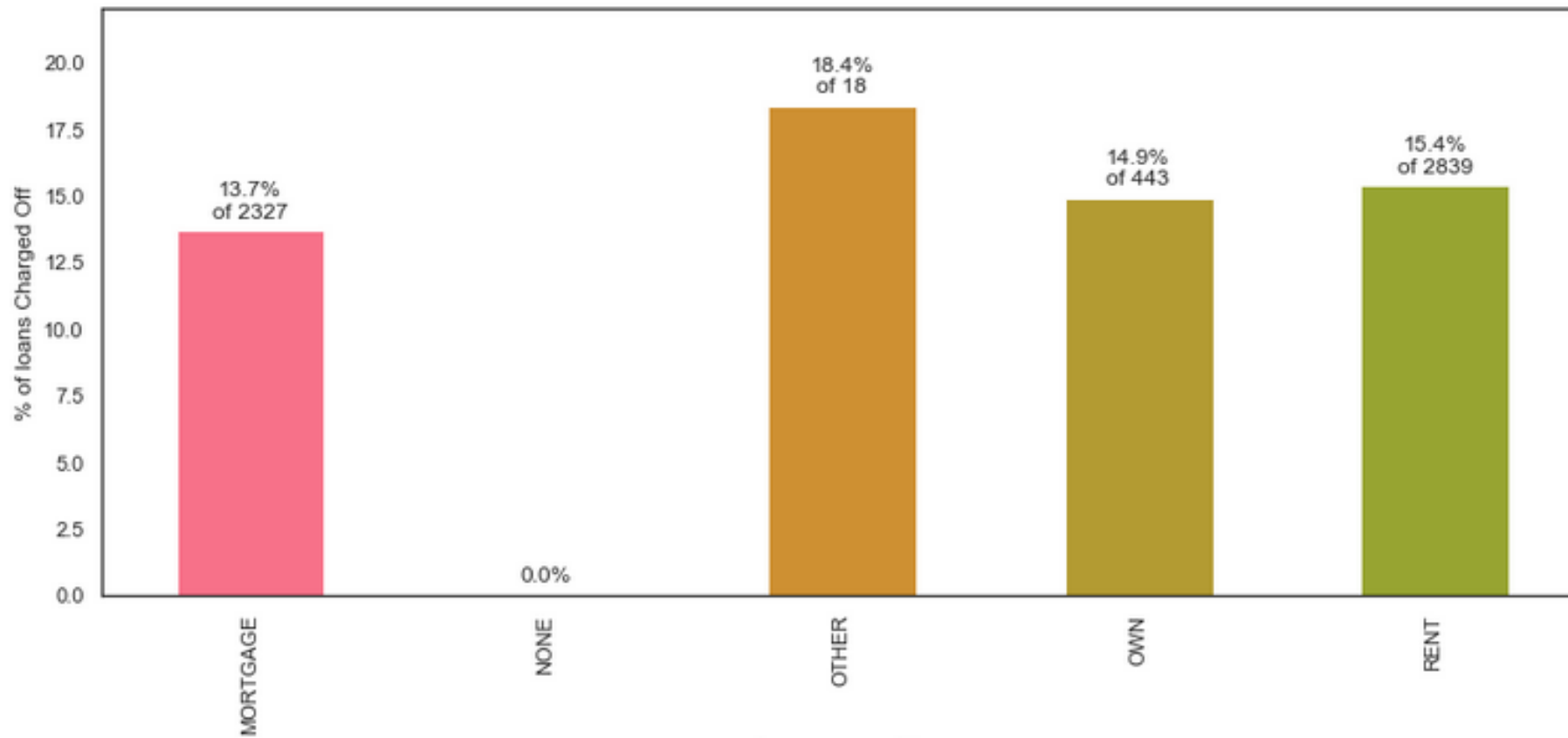
Observations
1)Most default people are under Grade 'B'.
2)The % default loans are under 'G' grade.
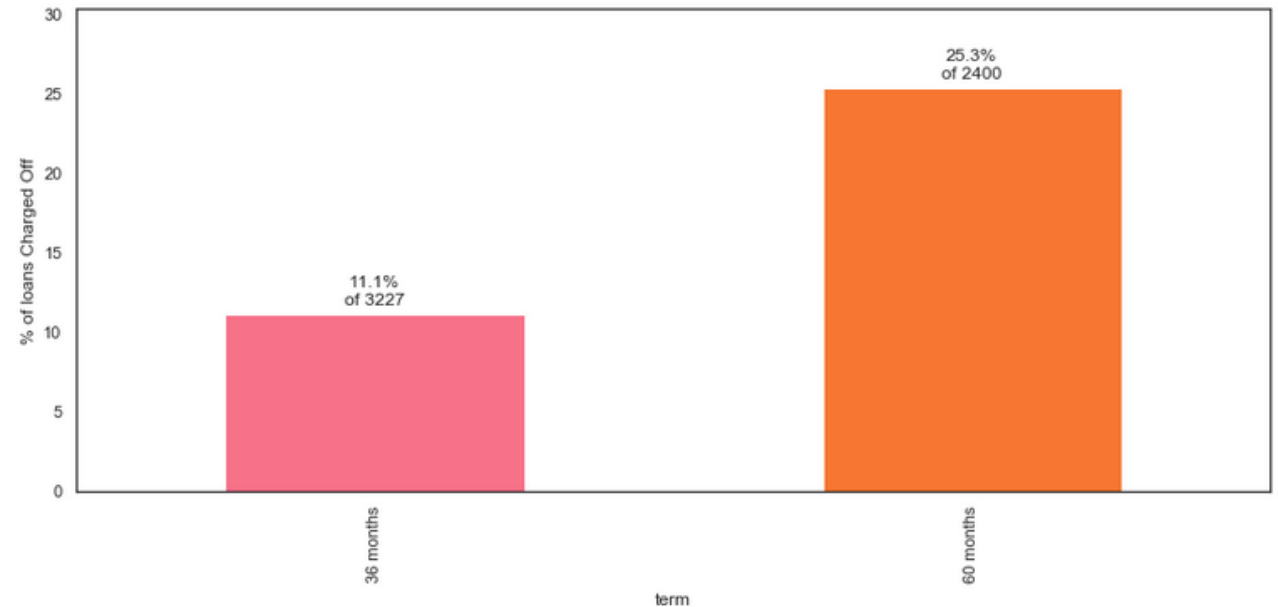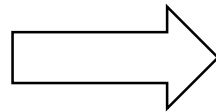3)Subgrade B3-B5 have more no risky loans.

Impact of Loan Tenure

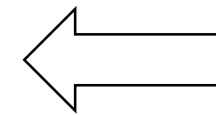**Observations:**
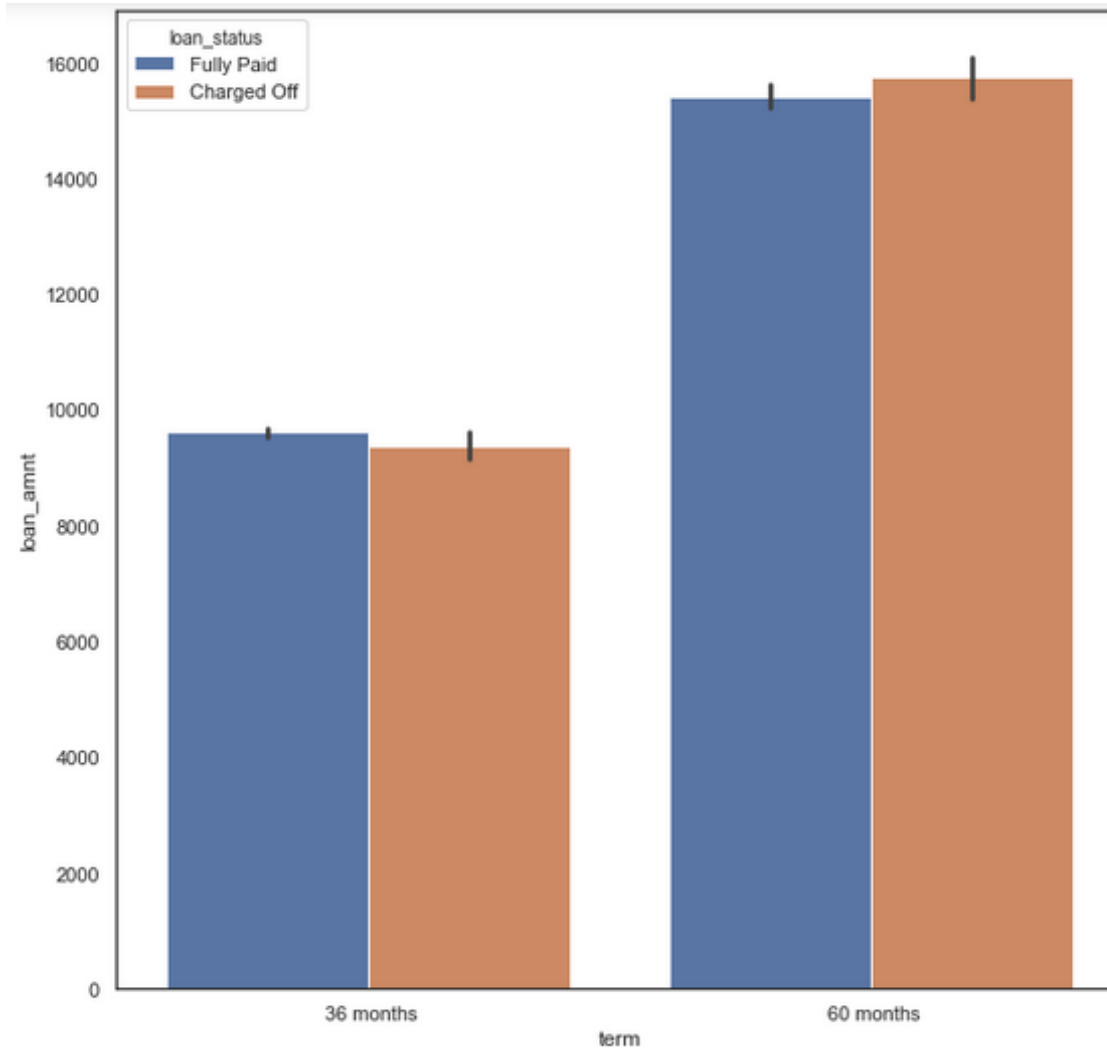Total no of defaulters are under term 36 month.
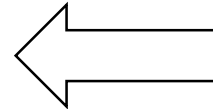
Observations:
% defaulter more are under 60month term

Impact of Loan Term and Loan Amount

If the person is given huge amount for short term basis, there is probability of person defaulting on loan

If company give the amount between 8000-10000 with 36 months of tenure, there is very less risk of people defaulting on loan
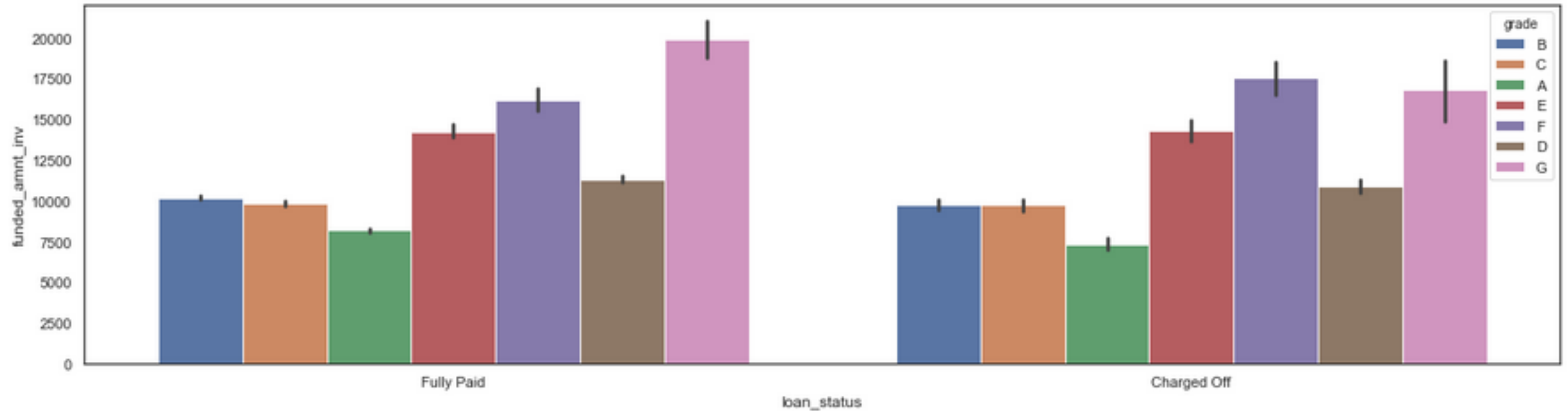
Impact of Delinquency and Interest rate

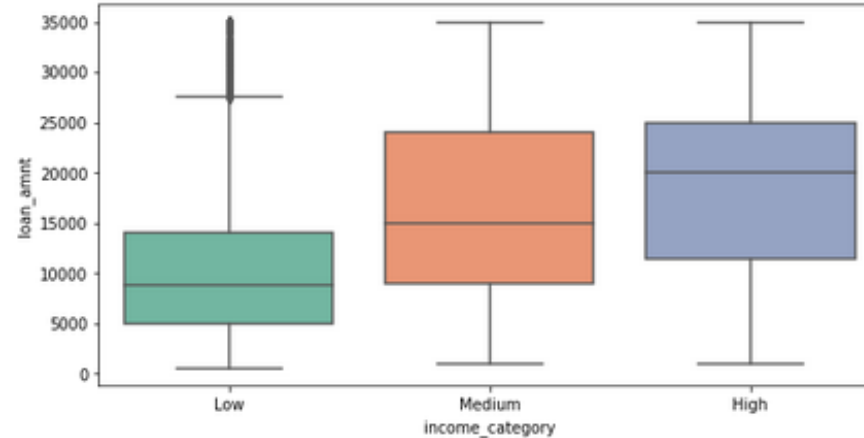**A loan** is considered "**delinquent**" **when a** borrower doesn't make **a loan** payment on time.
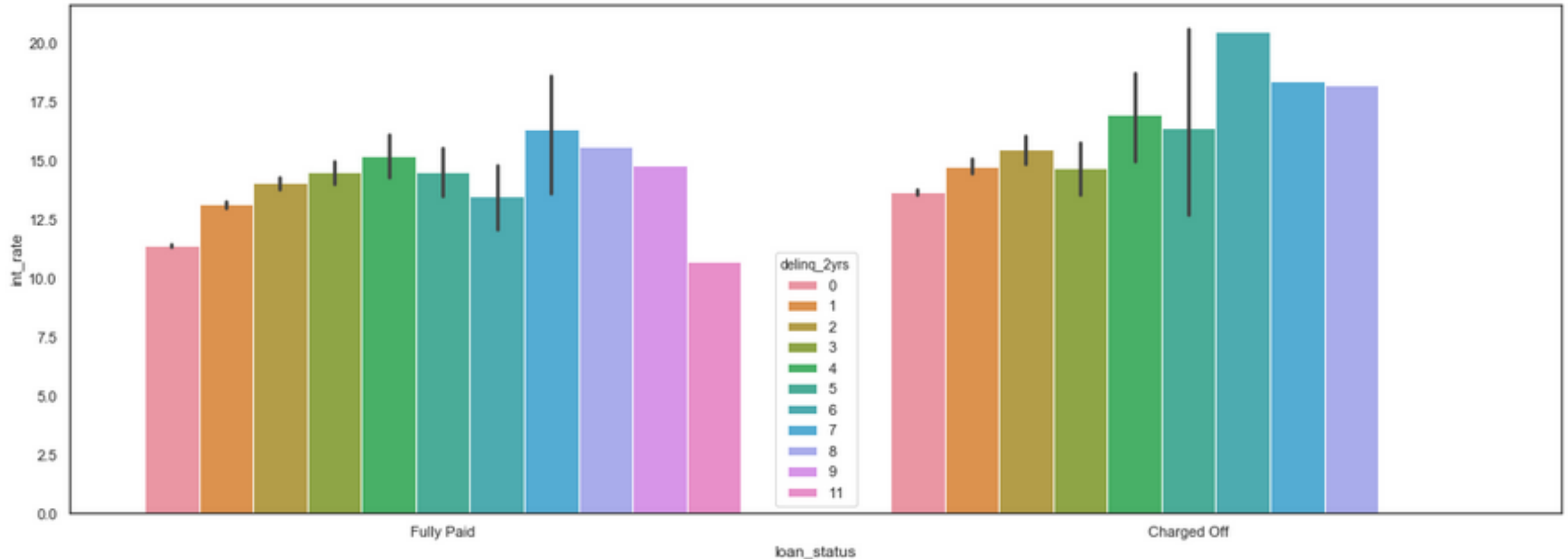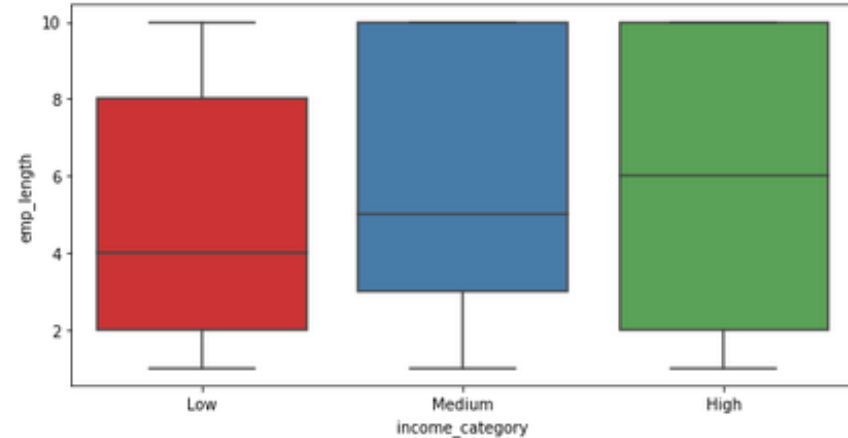

If there are more than 6 **delinquency and we give the loan with interest rate, people is likely to default on loan**
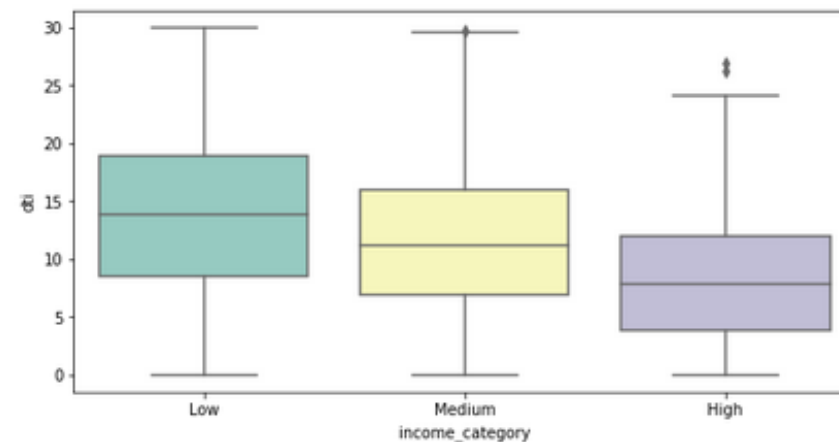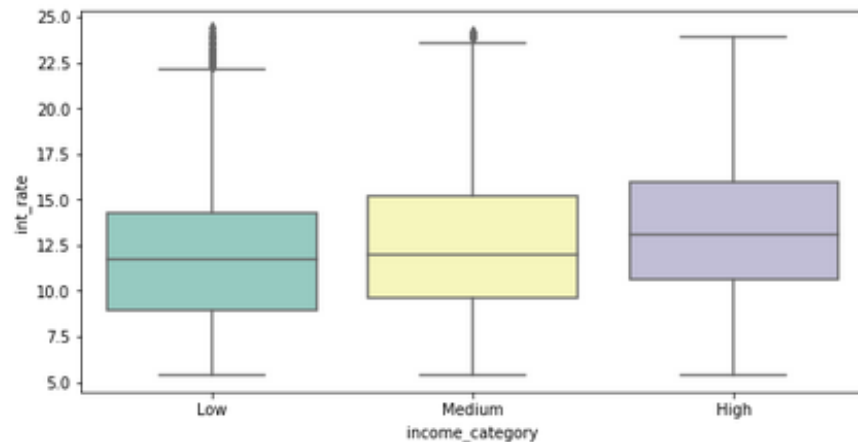
Impact of Funded Amount and Grade

Observation: The loans from G are likely to default on loan

1)income<= 100000= 'Low'
2)income > 100000 and<= 200000='medium'
3)income >200000='High'

Observations

1)since employment length of low level income is less, they are not capable to repay and have more risk.

2)the interest rate of low income category is not low compared each other.

3)DTI is more for low income category.

Observation:

1)Funded amount and loan amount has 0.98 correlation factor we more. We know that as loan amount increases the % risky loan increases hence it is true for funded amount and funded amount by inv.

2)Dti has negative correlation factor with annual income .

3)Deliqe_2year has not significant impact on the other parameters.

4) Int_rate is correlated to revol_util with 0.46.it states that defaulters have more interest rate.

5) loan_amnt revol_bal are correlated with 0.35 i.e. Higher loan amount approved to defaulters.

Conclusion

1. If the person apply for the purpose of small business and has less Revolving Balance less than 10 percent , there is a safe chance of loan getting not defaulted

2. If the employement tenure is less of a specific person we should not give the loan with higher interest rate

3. All the documents and sources should be verified, to decrease the chance of loan getting default

4. If there are more than 6 delinquency and we give the loan with interest rate, people is likely to default on loan

5. If company give the amount between 8000-10000 with 36 months of tenure, there is very less risk of people defaulting on loan

6. If People from state Newyork or Califiornia is given loan of Grade B there is more chance of people defaulting on loan, where has people from Florida has more risk of defaulting the loan