

# LENDING CLUB

## CASE STUDY SUBMISSION

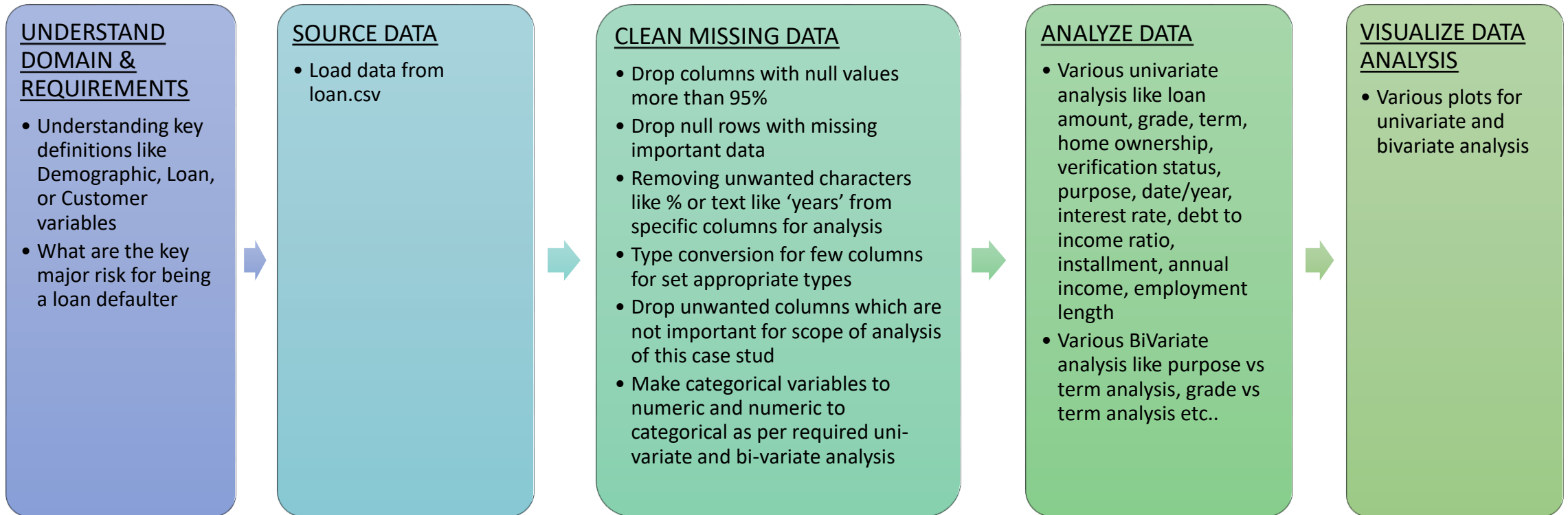
Group [Arunava Bhattacharya, Aditya Yadav]  
Batch: PGDML JULY 2020

## What is a Lending Club

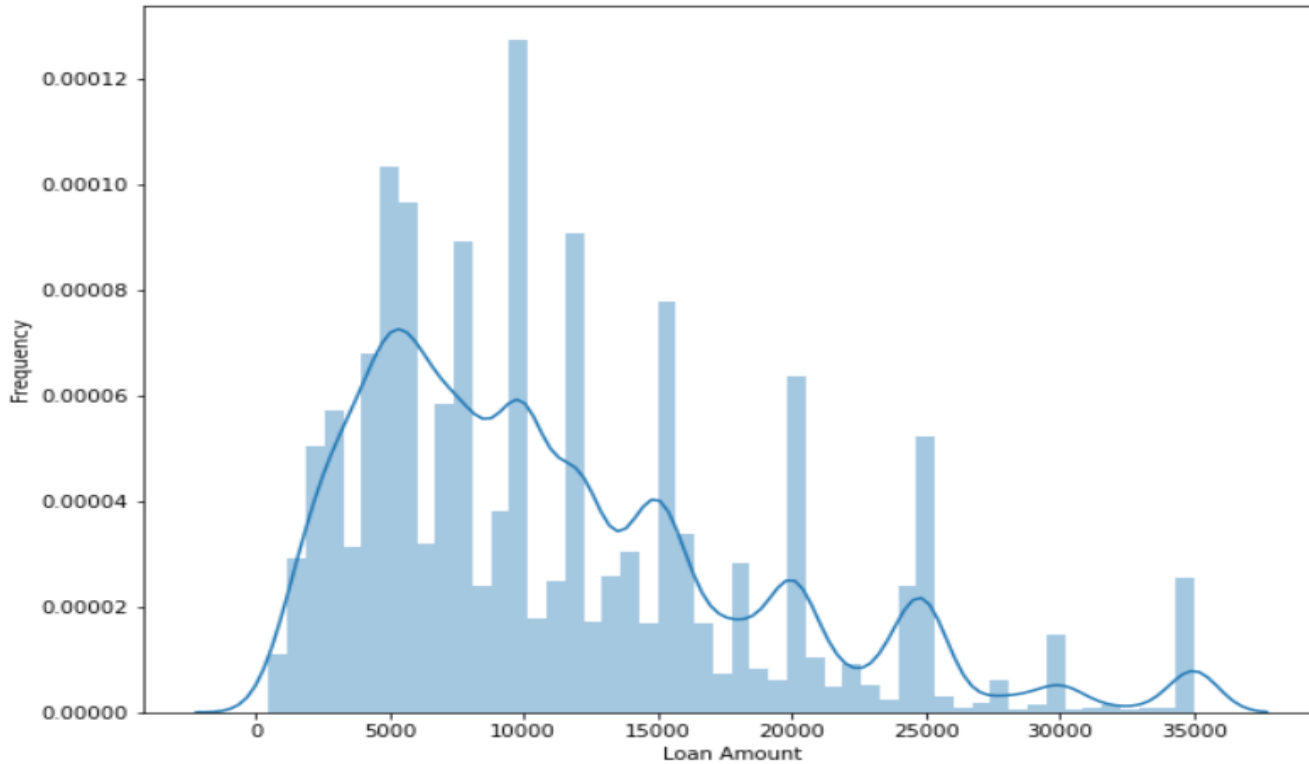
*Lending Club is an American peer-to-peer lending company, headquartered in San Francisco, California. It was the first peer-to-peer lender to register its offerings as securities with the Securities and Exchange Commission (SEC), and to offer loan trading on a secondary market. Lending Club is the world's largest peer-to-peer lending platform. The company claims that \$15.98 billion in loans had been originated through its platform up to December 31, 2015. [[Reference Link](#)]*

## User Story:

*As a CEO of a Lending Club, I want to understand the key risk factors which trends to be a defaulter, so that I can further take additional risk assessment before approving a loan*



P1: Loan amount distribution

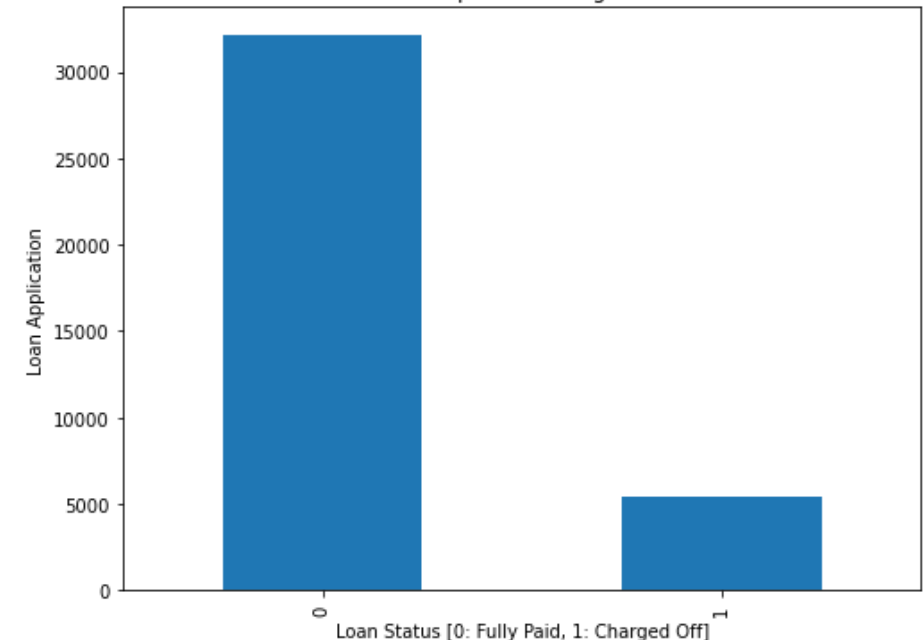


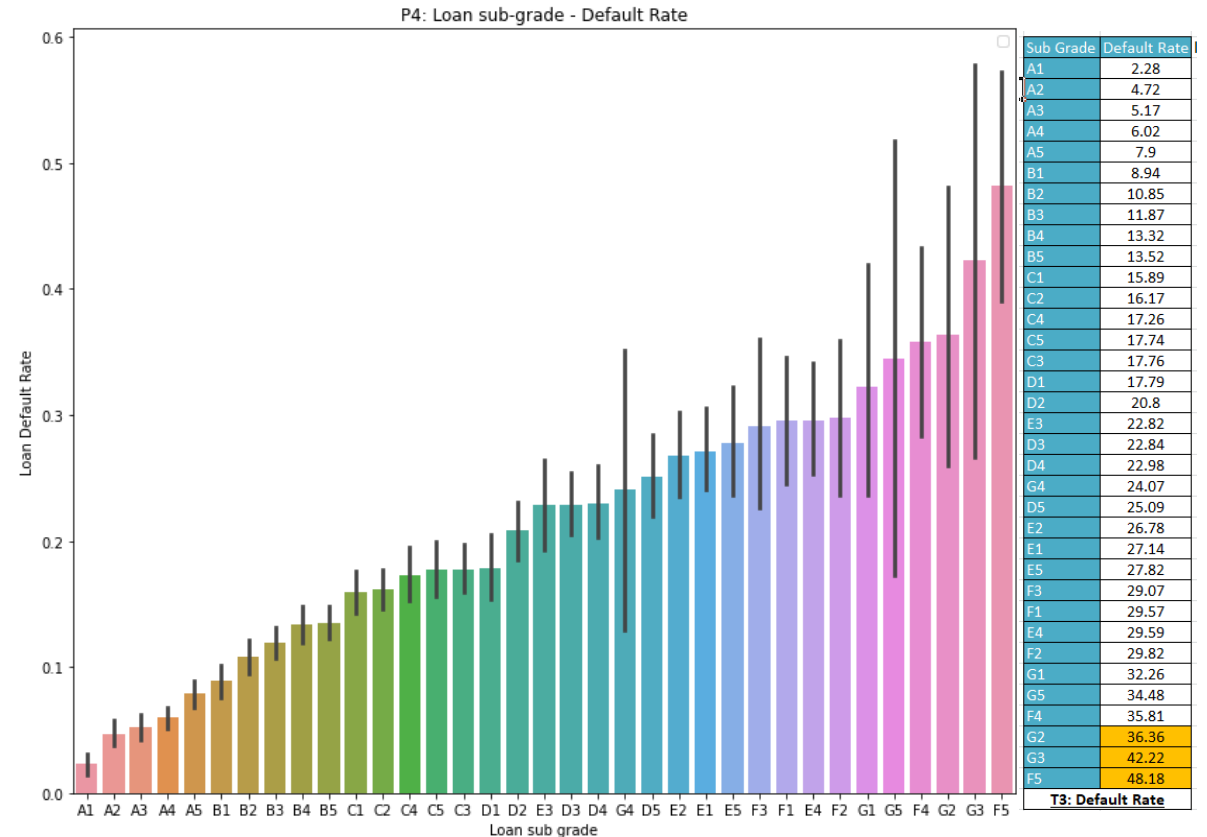
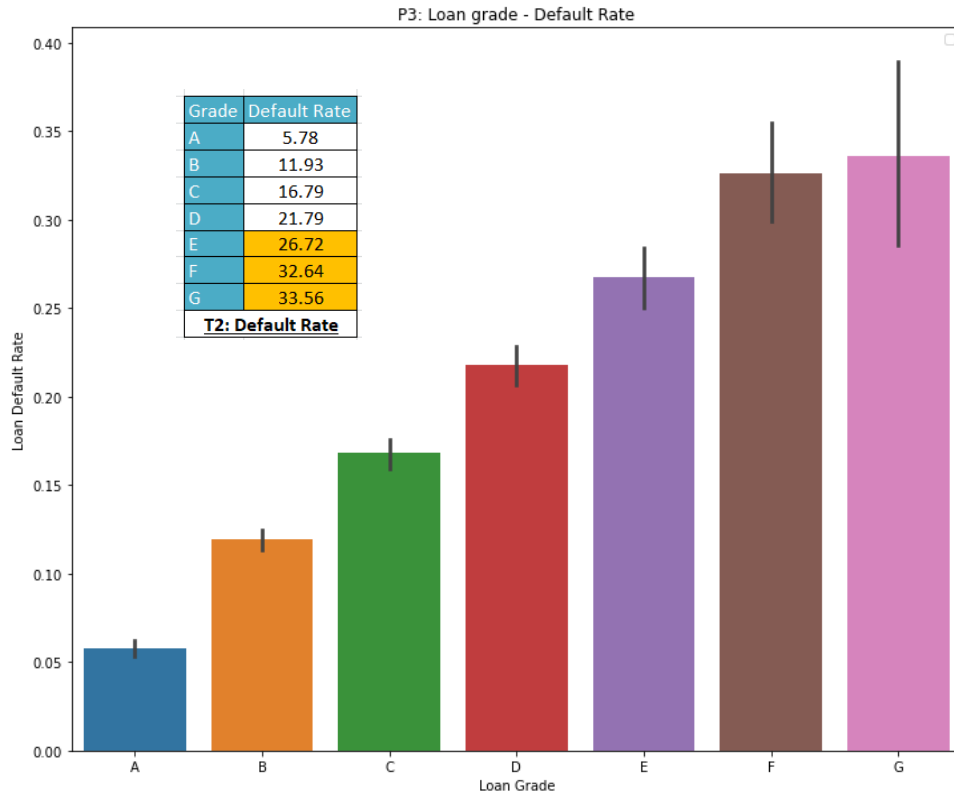
Column	count	mean	std	min	25%	50%	75%	max
loan_amnt	37544	11119.32999	7354.098954	500	5500	10000	15000	35000
int_rate		11.963319	3.683012	5.42	8.94	11.83	14.42	24.4
installment		324.650164	208.901055	15.69	167.37	280	428.9425	1305.19
emp_length		5.061048	3.40175	1	2	4	9	10
annual_inc		69407.08023	64676.98449	4000	41000	60000	83000	6000000
loan_status		0.143805	0.350896	0	0	0	0	1
dti		13.284186	6.660551	0	8.16	13.38	18.55	29.99

T1: Column Describe

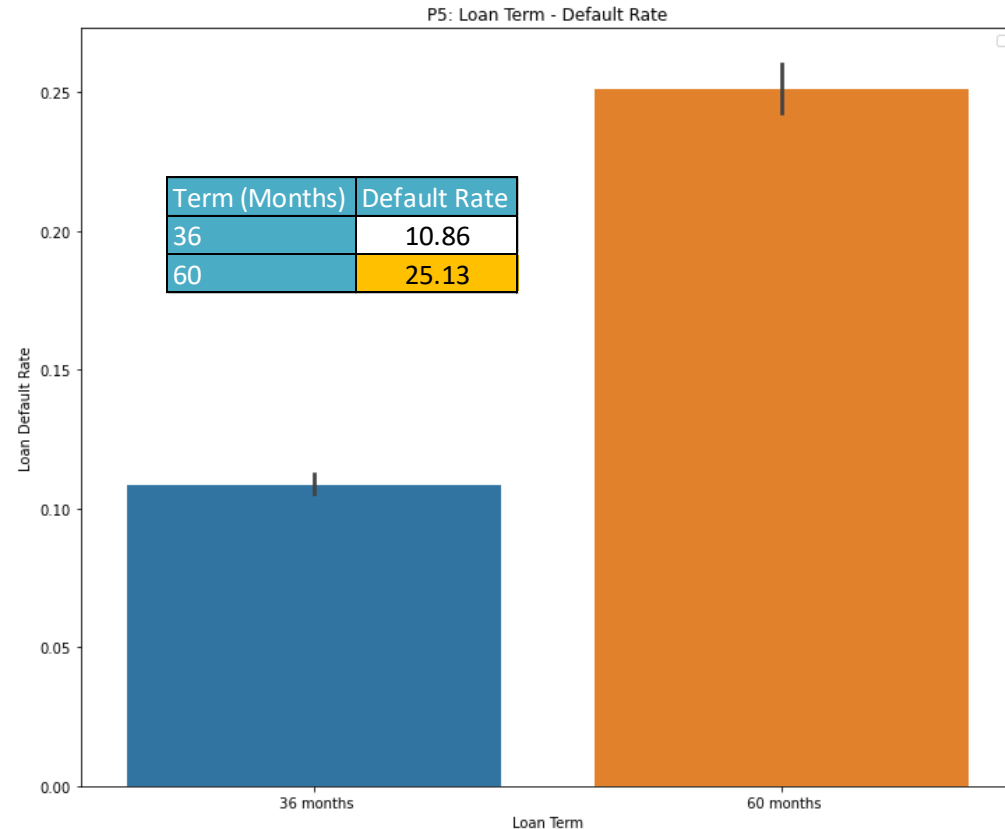
- It is depicted that the loan amount distribution tends to a **normal distribution** where the peak is at ~5k. Additionally few spikes observed at loan amount ~10k, ~15k, ~20k etc which depicts the loan applied most cases are at round figure. It is also observed that there are very few loans accepted at high loan amount by the lending club [\[refer P1\]](#)
- Overall **default rate** w.r.t total no. of approved loans is ~14.4%. This excludes current ongoing loan applications data and includes only the approved loans with status either 'Fully Paid' or 'Charged Off'. [\[refer T1/P2\]](#)

P2: Full paid vs Charged Off

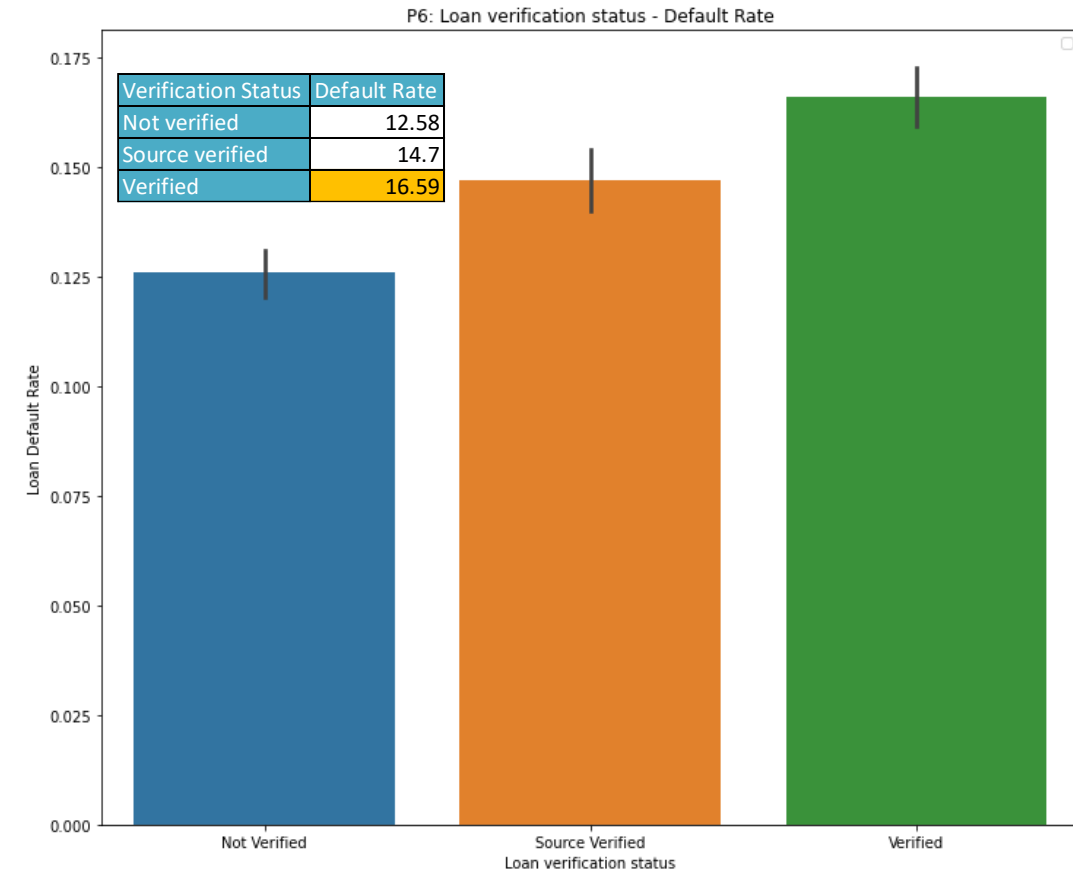




- ❑ There is a clear **increase** of default rate, as the grade of loan goes from **A to G**. [\[Refer P3\]](#)
- ❑ Top 3 grade **G, F, E** are more likely to get defaulted with **~33.6%, ~32.6%** and **~26.7%** respectively, than other grades. This is as expected because the grade is decided by Lending Club based on the riskiness of the loan. [\[Refer T2\]](#)
- ❑ Also default rate increases across sub grade from A1 to A4 (and likewise ex: G1 to G5). Top 3 sub grade with highest loan default rate are **F5(~48.1%), G3(~42.2%)** and **G2(~36.3%)**. [\[Refer P4/T3\]](#)

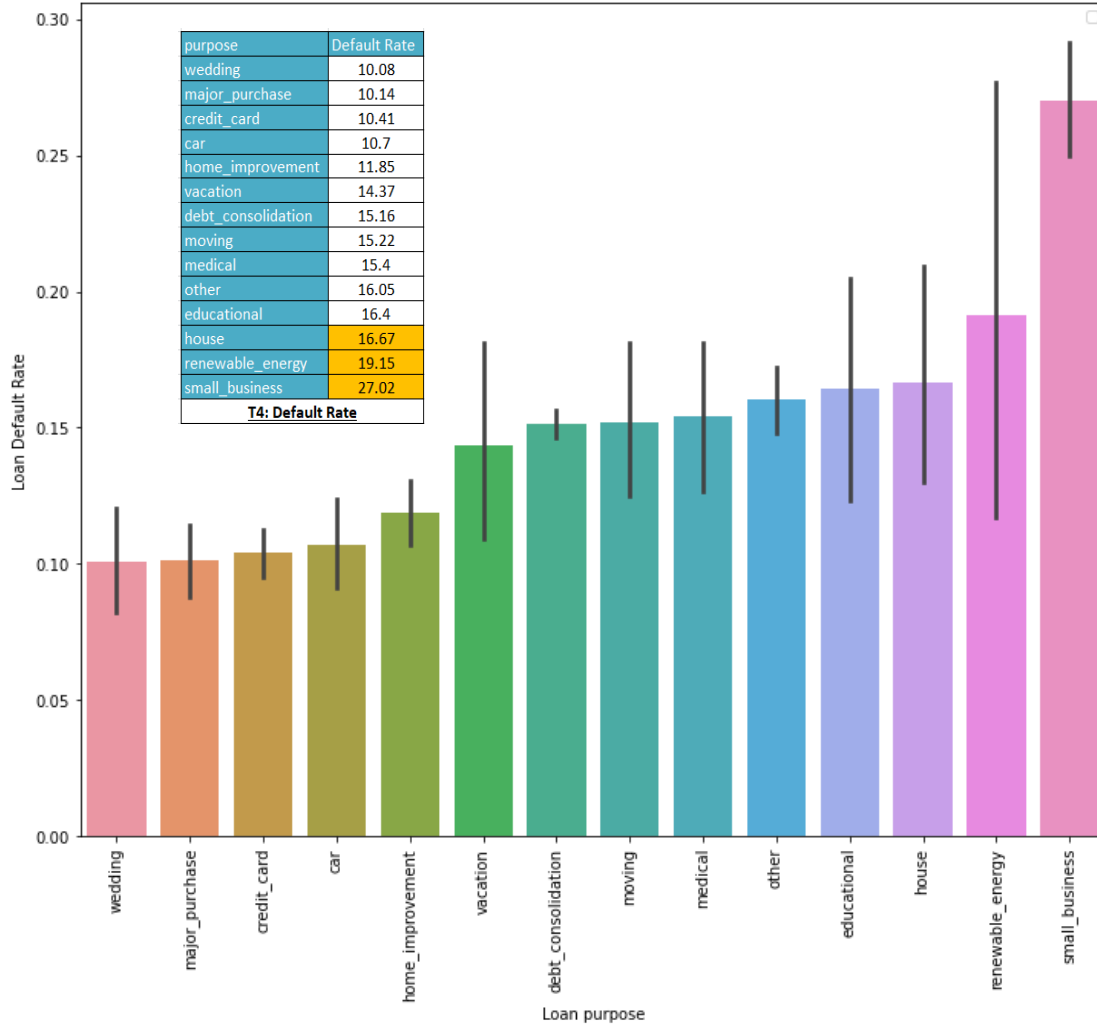


- ❑ Loan default rate is higher in case of loan **with higher term**.
- ❑ About **~25.1%** default rate for loan with **5 years** term which is way higher than **3 years** term loan where default rate **~10.8%** [\[Refer P5\]](#)



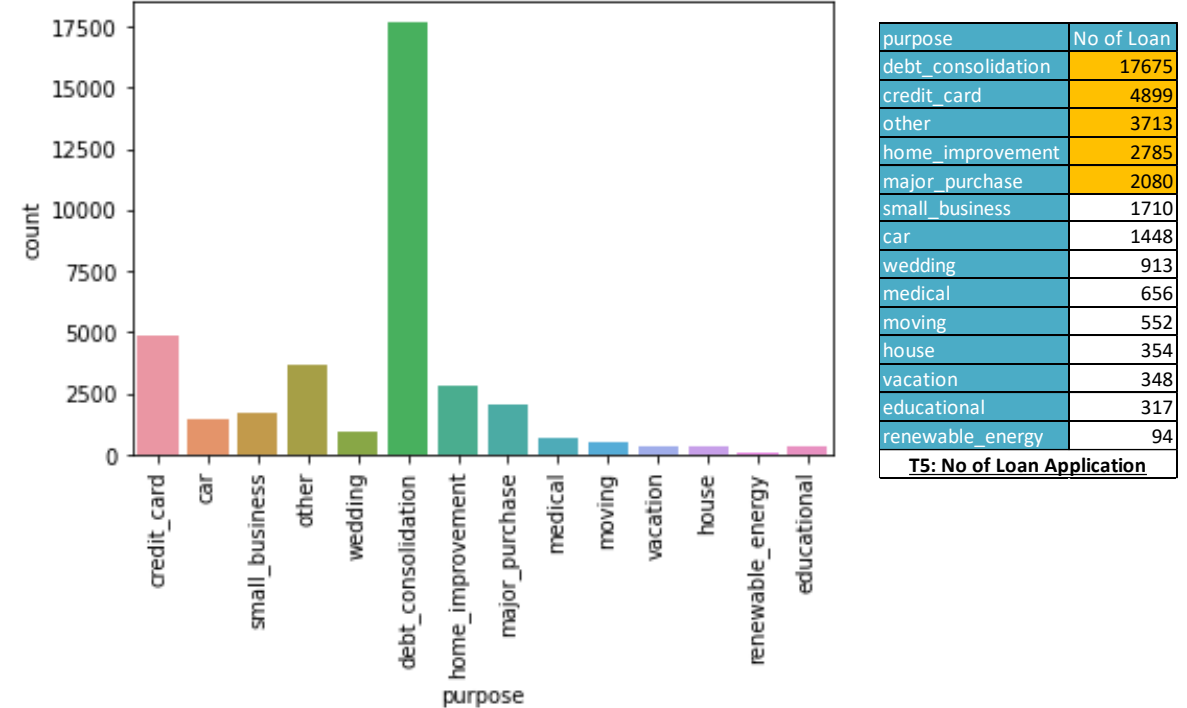
- ❑ **Verified** loan are likely to default more with **~16.5%** [\[Refer P6\]](#)

P7: Loan purpose - Default Rate

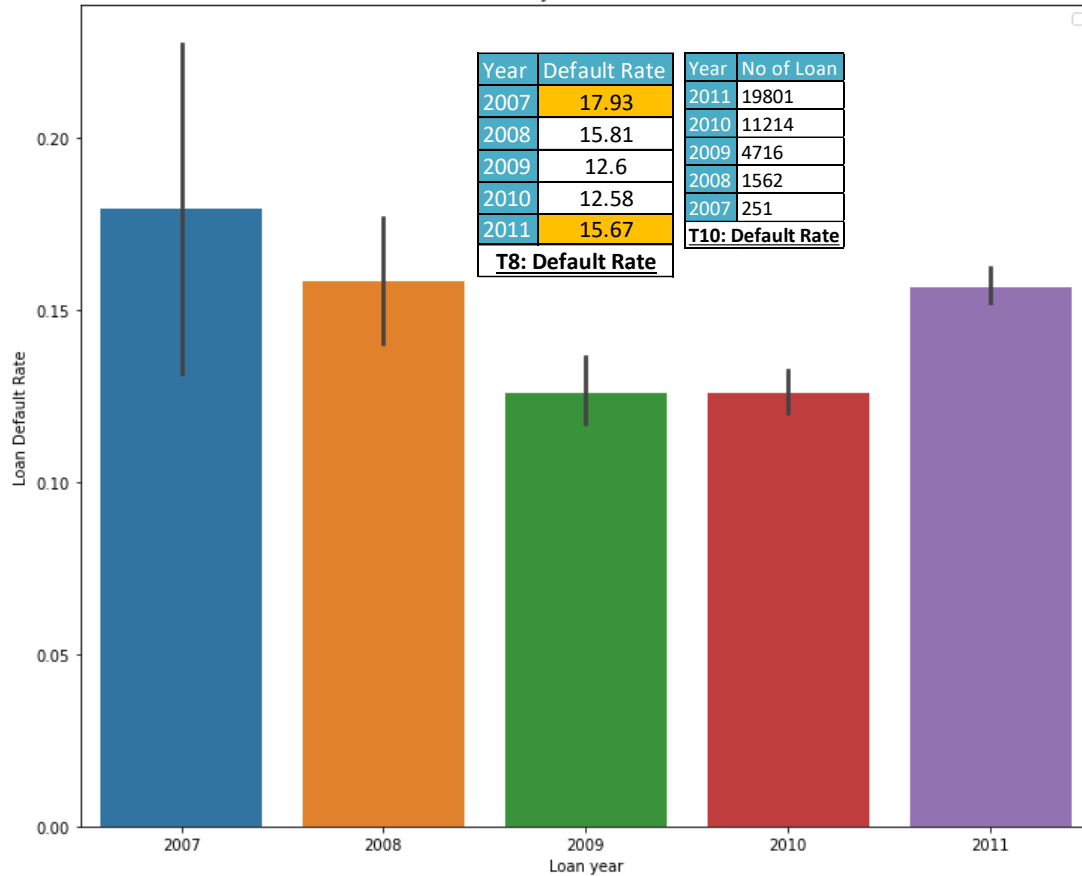


- Top 3 purpose with highest default rate **small\_business** (~27.0%), **renewable\_energy** (~19.1%) and **house** (~16.7%). [\[Refer P7/T4\]](#)
- Top5 purpose based on no of loan application are, **debt\_consolidation**, **credit\_card**, **other**, **home\_improvement**, and **major\_purchase** [\[Refer P8/T5\]](#)

P8: No. of Loans for 5 Major Purpose

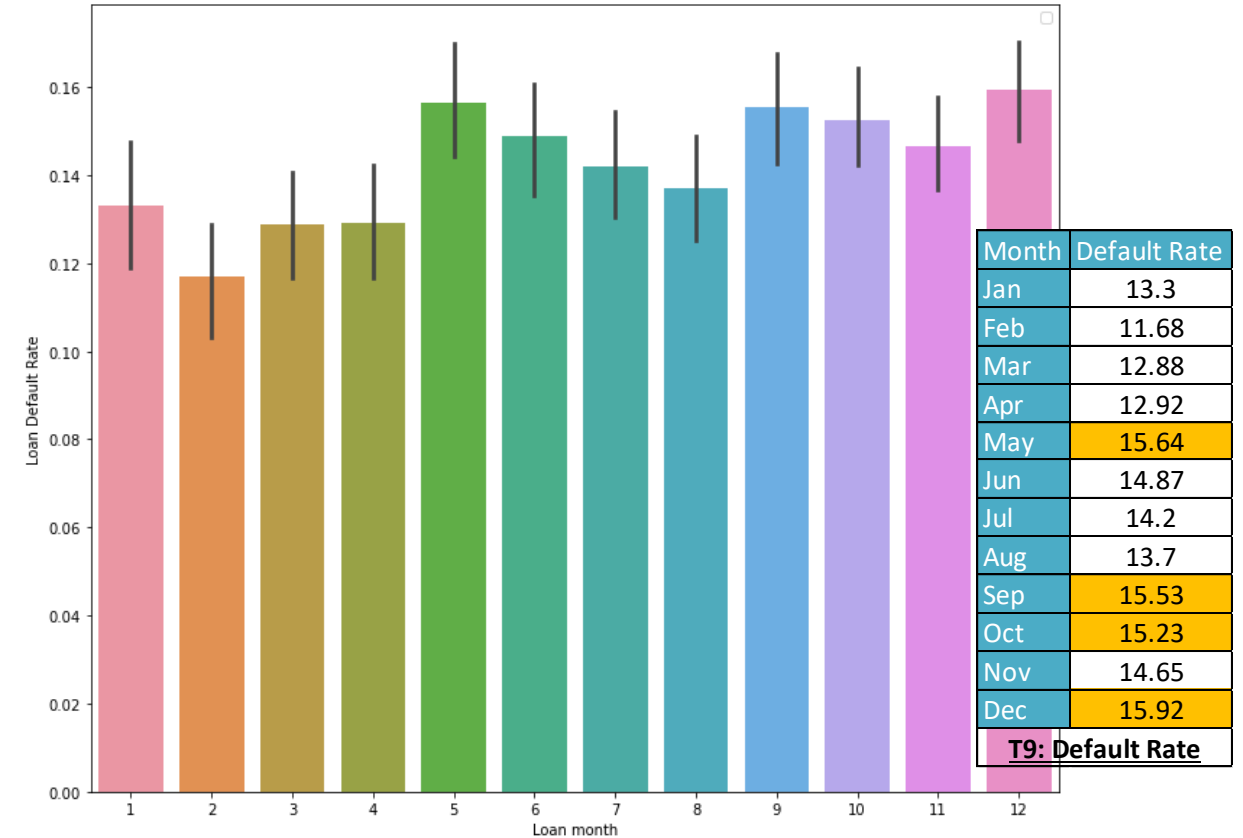


P9: Loan year - Default Rate



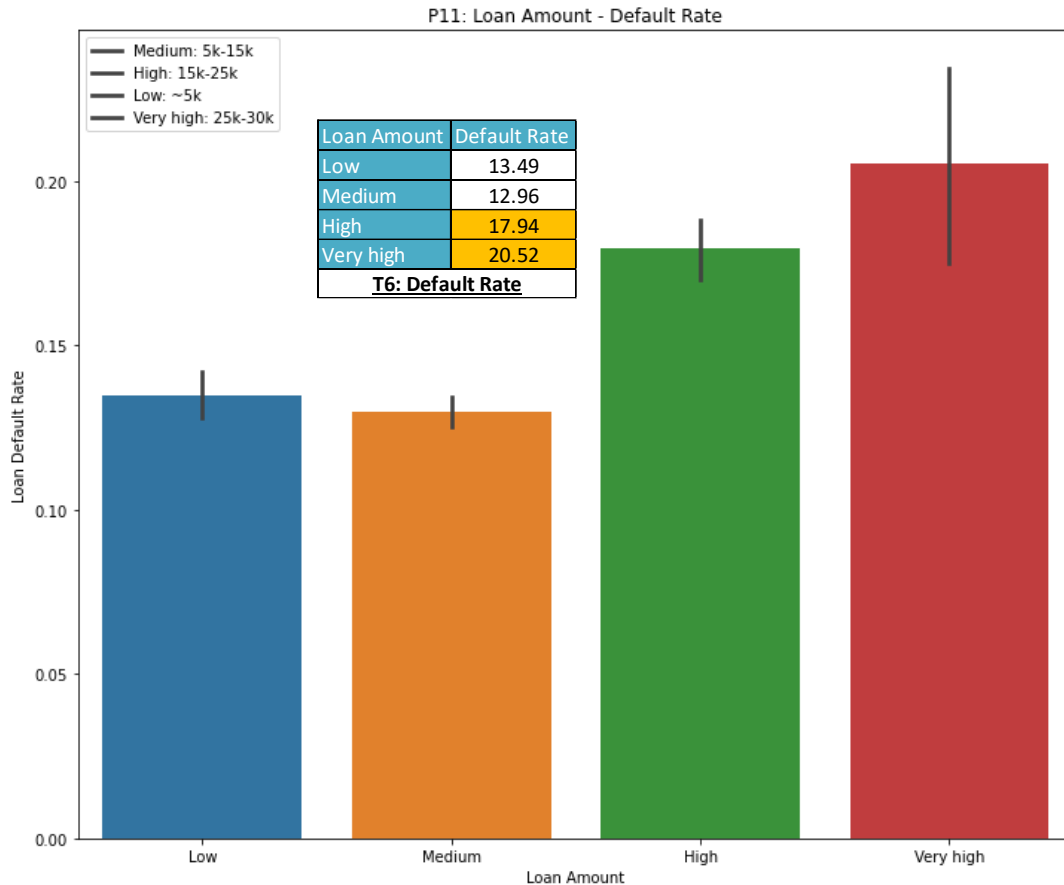
- ❑ The default rate was higher (~17.9%) in 2007 which then reduced significantly from 2008 till 2010. However, The default rate had suddenly increased in 2011 (~15.6%). [Refer P9/T8]
- ❑ Also its observed that number of loan also increased quite significantly with years [Refer T10]

P10: Loan month - Default Rate

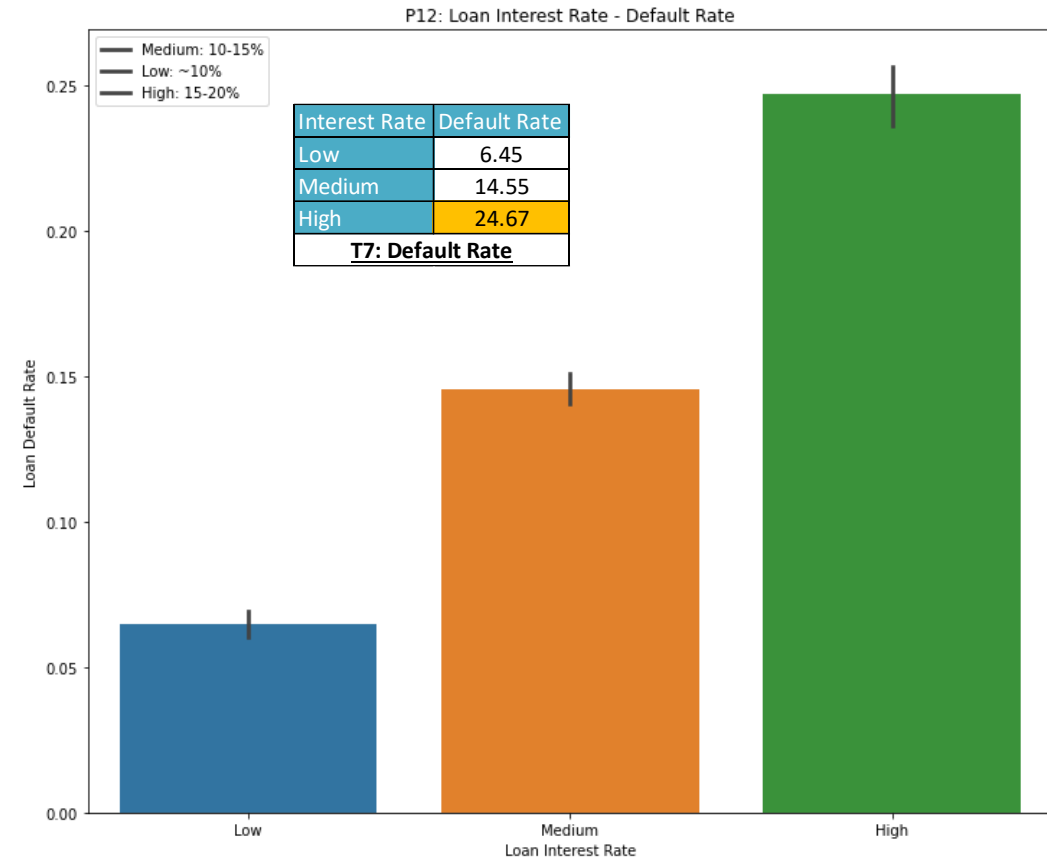


- ❑ The default rate is not showing much variation across months though its observed that month of **December** is having higher default rate ~15.9%. This may be effect due to vacation time or x-mas [Refer P10/T9]
- ❑ Also there are months where default rate are > 15% like May, Sept, Oct

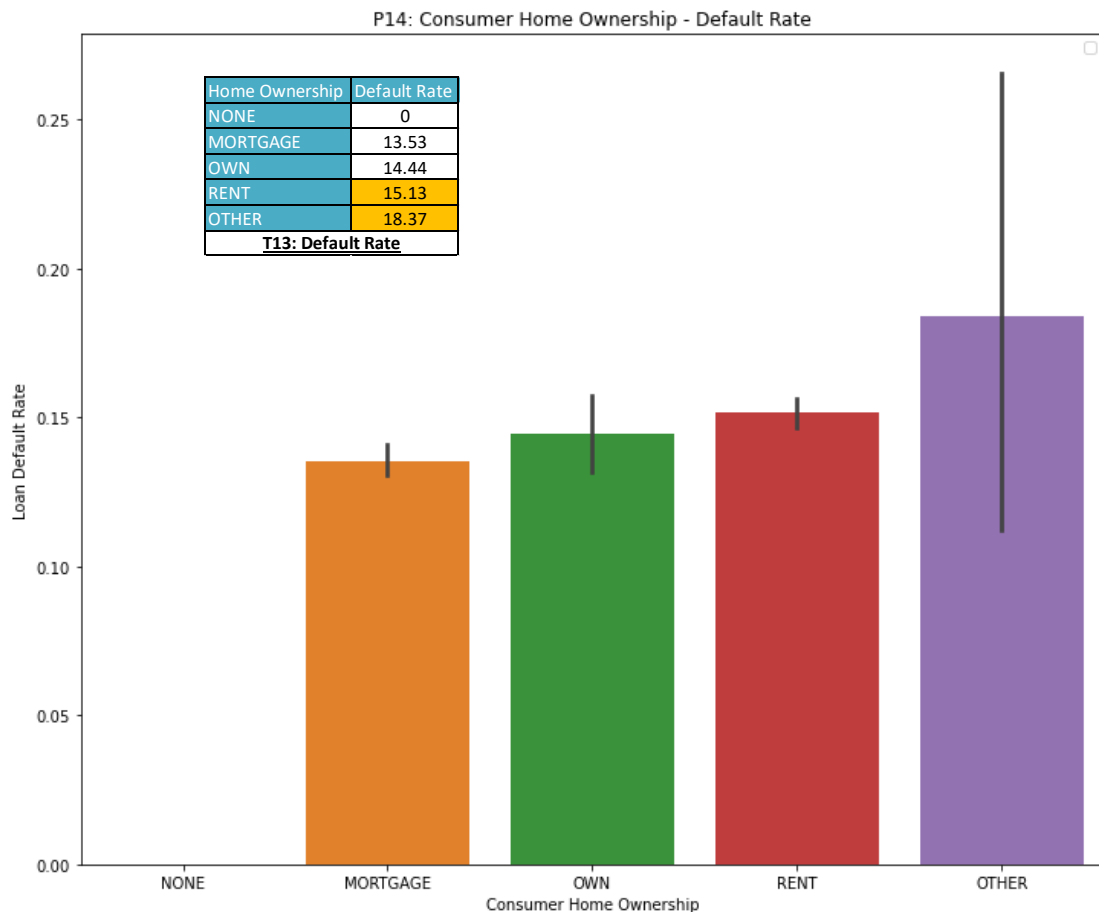




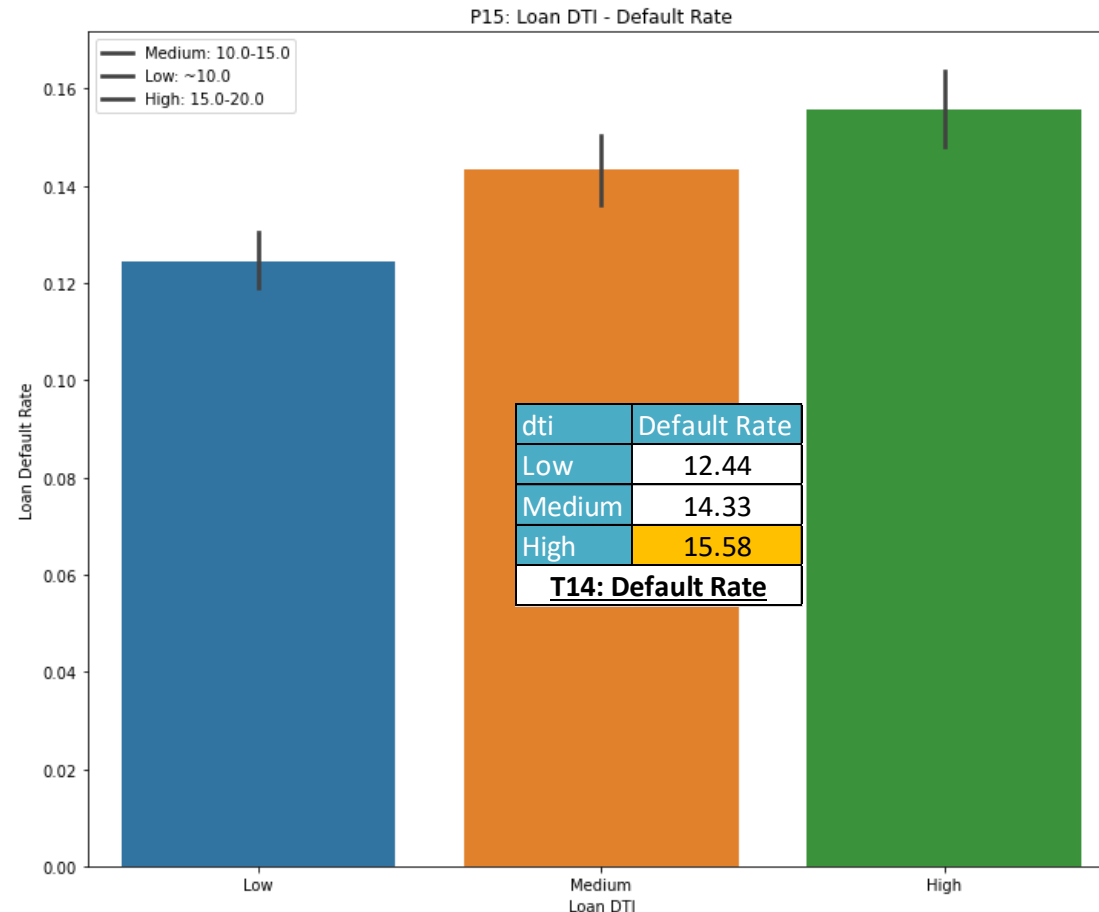
- It is observed that when loan amount **increases** to high or very high, loan default rate is increased. While loan default rate is **~12.9%** for medium range loan amount, it **jumps** approx ~20.5% for very high range loan amount [\[Refer P11/T6\]](#)



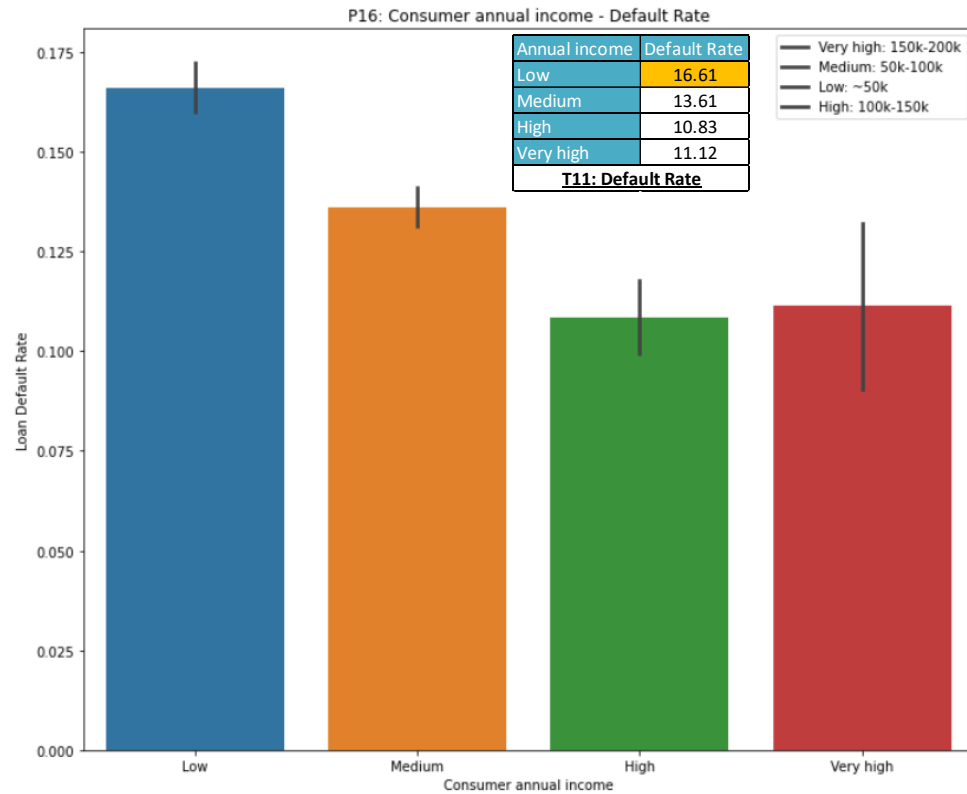
- As per observations, Loan default rate **increases proportionately** with increase in Interest Rate
- For **high** interest rate, loan default rate **~24.6%** which is quite high w.r.t **low** interest rate **~6.5%** [\[Refer P12/T7\]](#)



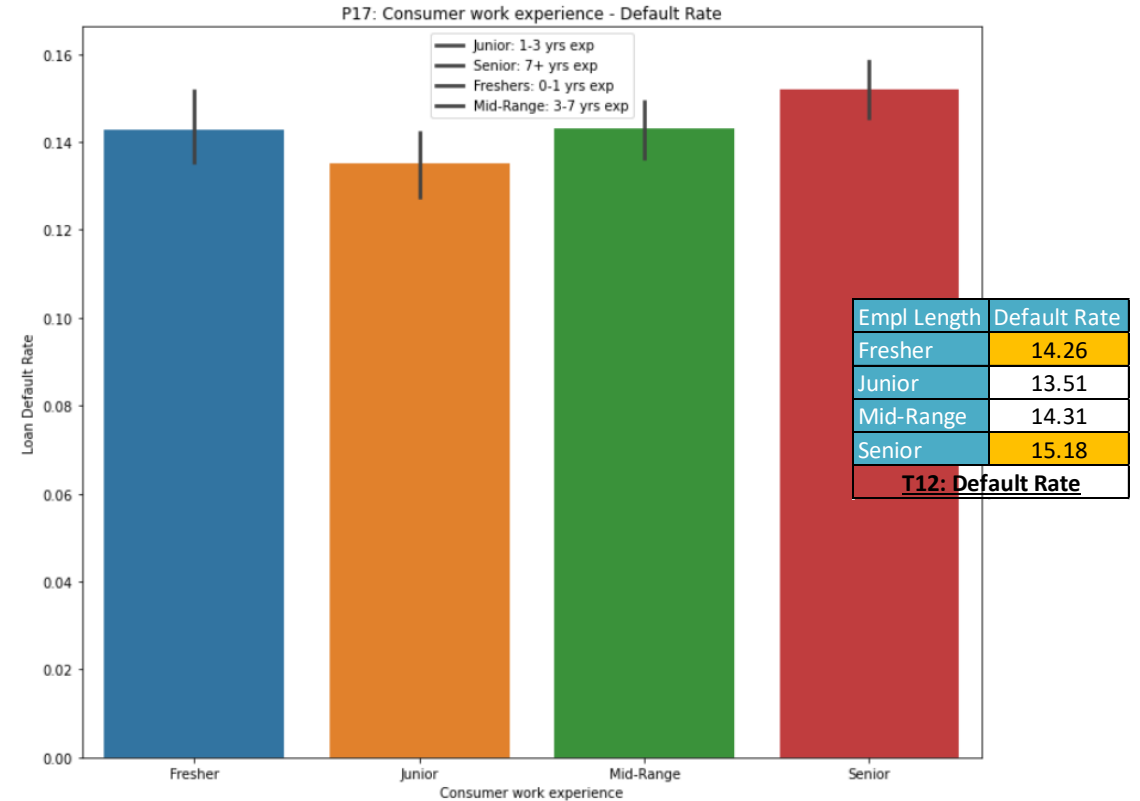
- ❑ Its observed that a person **with own home is slightly less likely** to be defaulter than a person with rented house or any other arrangements [\[Refer P14\]](#)
- ❑ ~15.1% in case with **rented** house and ~18.3% with **other** arrangements [\[Refer T13\]](#)



- ❑ High **DTI** translates into **higher default** rates [\[Refer P15/T14\]](#)
- ❑ ~15.5% loan default rate in case of **high DTI**

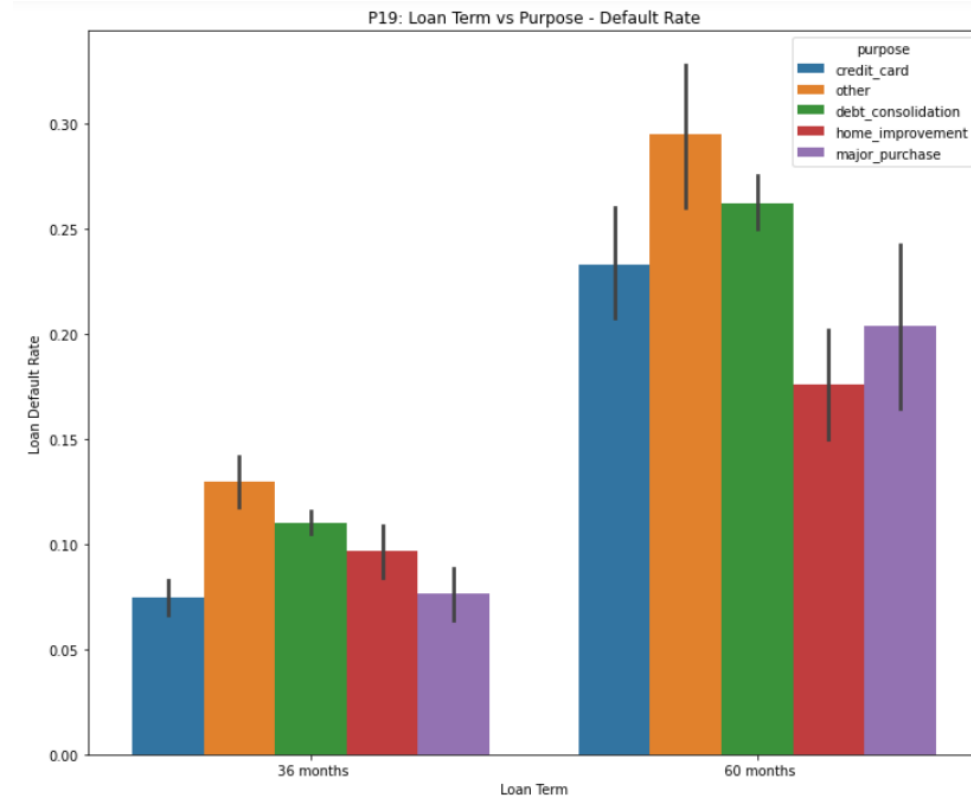
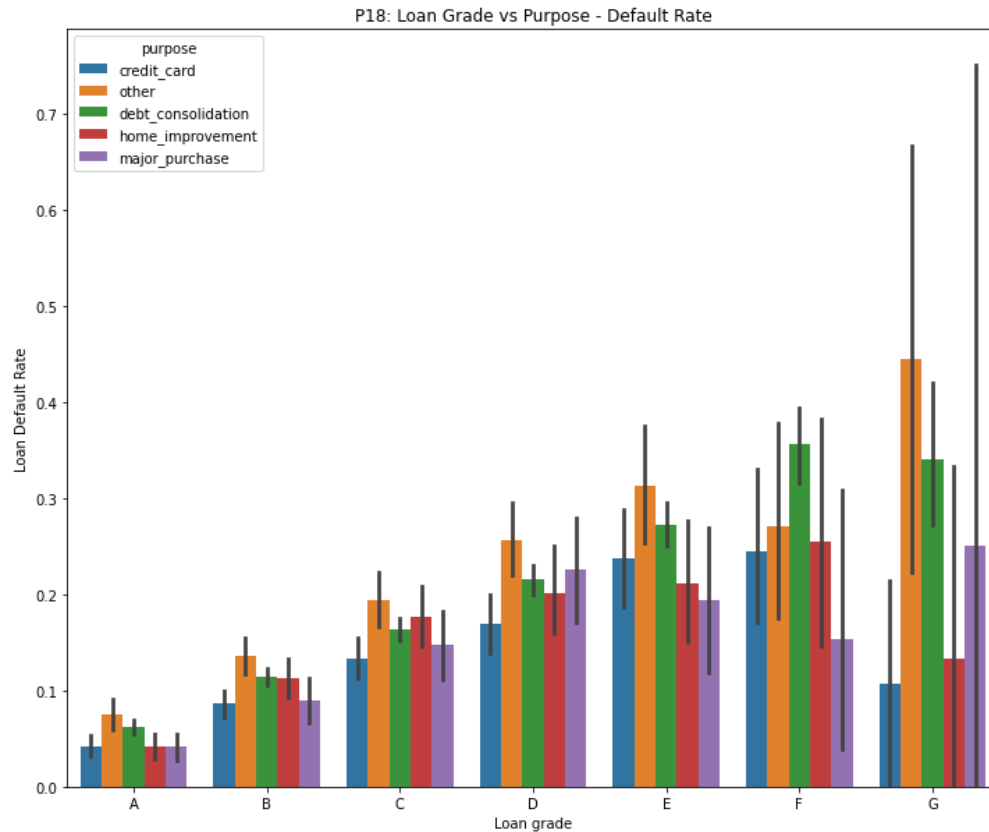


- It is observed that people with **low income <5k p.a.** are more **likely** to default of **~16.6%** which depicts loan default rate is **inversely proportional** w.r.t income. [\[Refer P16/T11\]](#)



- Freshers(0-1 yrs)** and **Senior (7+ yrs)** are more likely to **default** more with around **~14-15%** rate [\[Refer P17/T12\]](#)

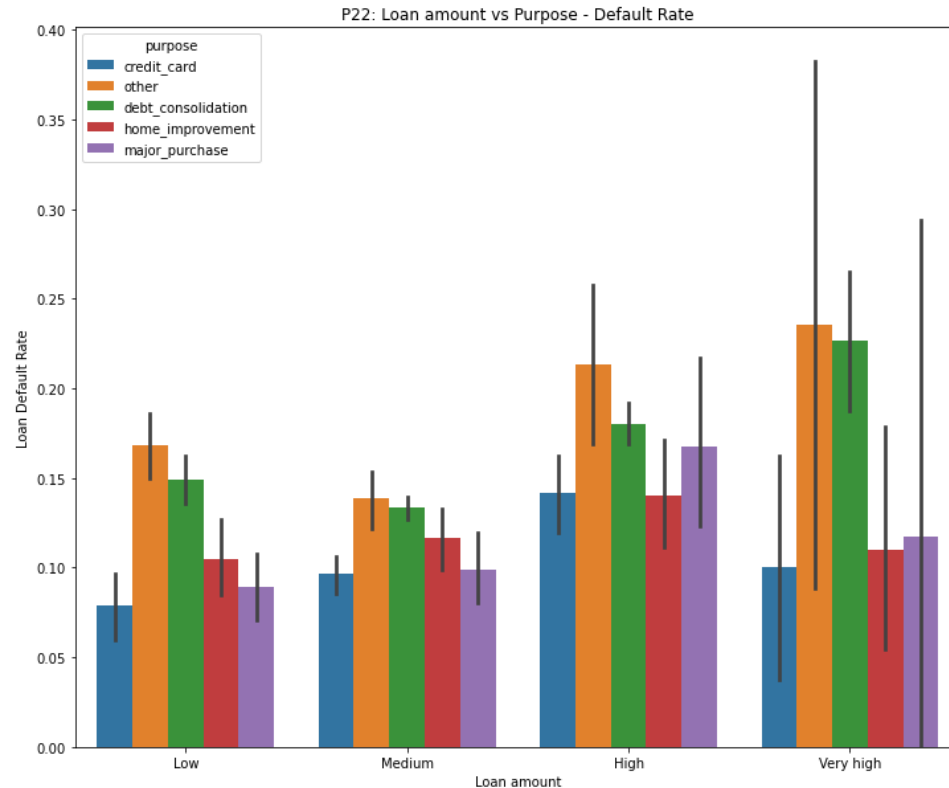
Bi-variate analysis has been performed considering top five loan purpose *debt\_consolidation, credit\_card, other, home\_improvement, and major\_purchase*



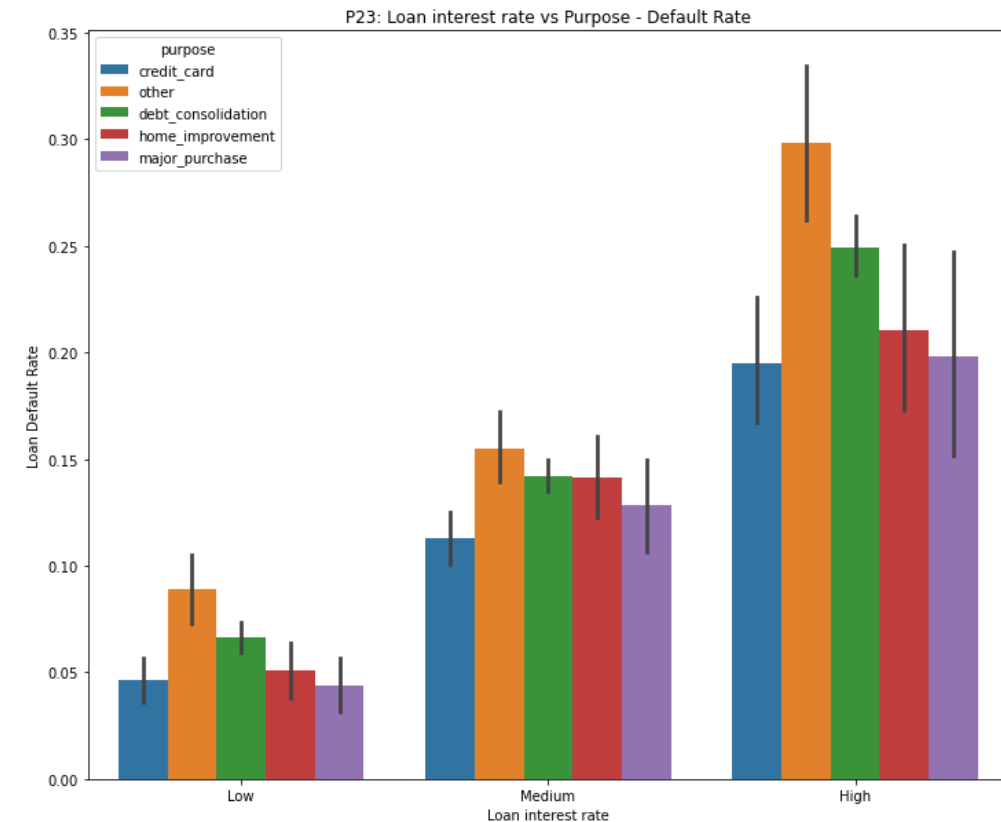
- ☐ Loan default rate for 'debt consolidation' significantly increased with loan grade from A -> G is increased
- ☐ For credit card and home improvement its observed that while default rate increase from A->F but in a decrease from F->G [\[Refer P18\]](#)

- ☐ The default rate of the Loan increases significantly for all top 5 purpose for loan term 60 months [\[Refer P19\]](#)

Bi-variate analysis has been performed considering top five loan purpose *debt\_consolidation, credit\_card, other, home\_improvement, and major\_purchase*

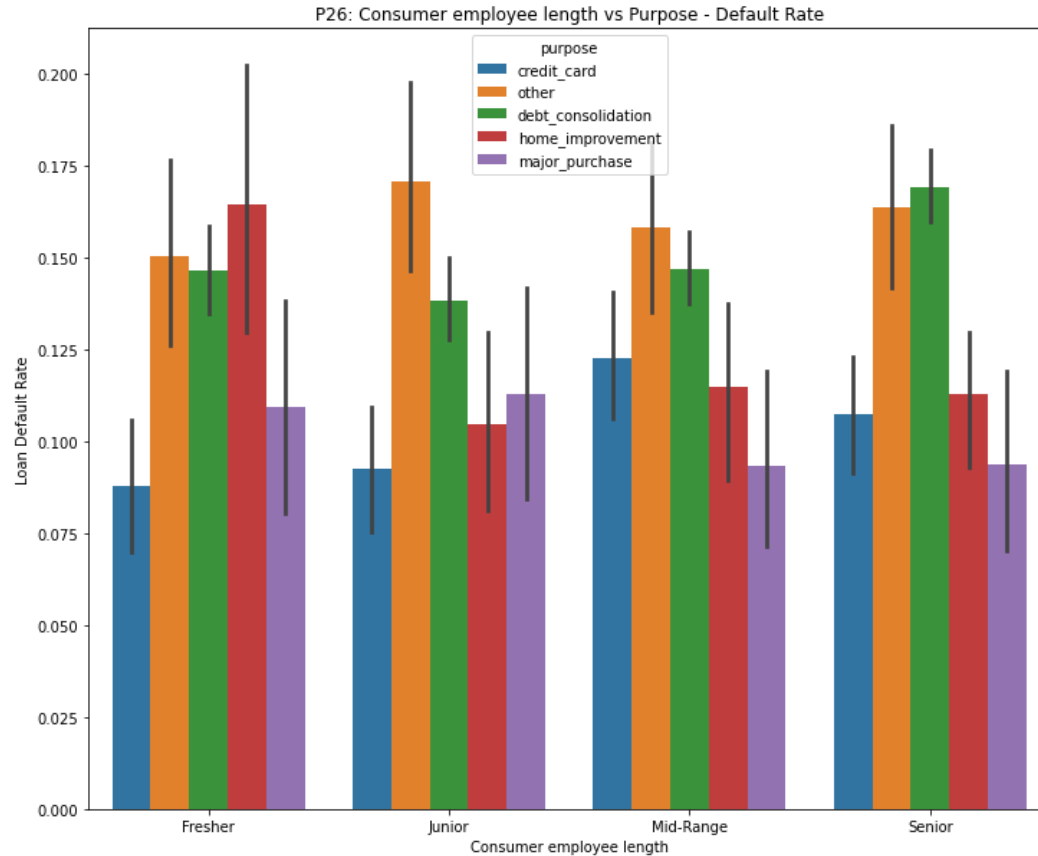


- ❑ Loan default rate for 'debt consolidation' and 'other' significantly increased with higher loan amount
- ❑ For credit card and home improvement its observed that while default rate increase from low to high but in a decrease in case very high loan amount
- ❑ Also we can infer that high amount of loan amount involves more in defaulted for 'debt consolidation' and 'other' [\[Refer P22\]](#)

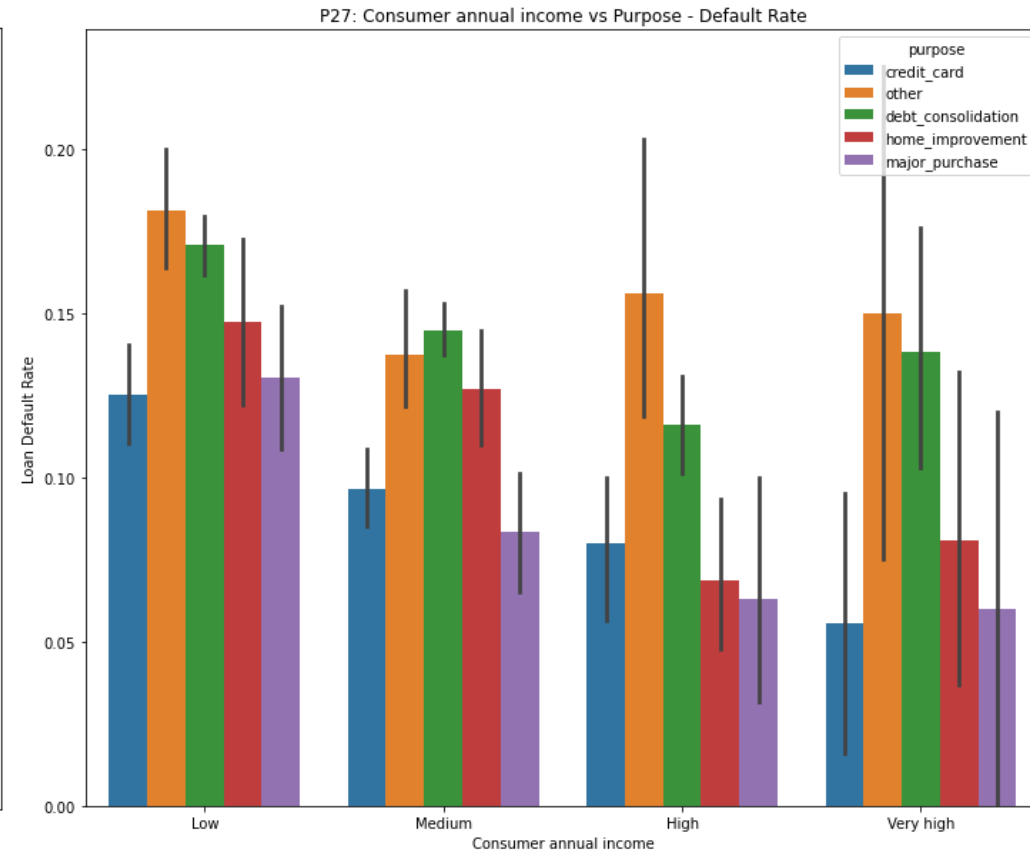


- ❑ As the interest rate increases, default rate increases. Additionally, default rate for debt consolidation increases significantly with higher interest rate [\[Refer P23\]](#)

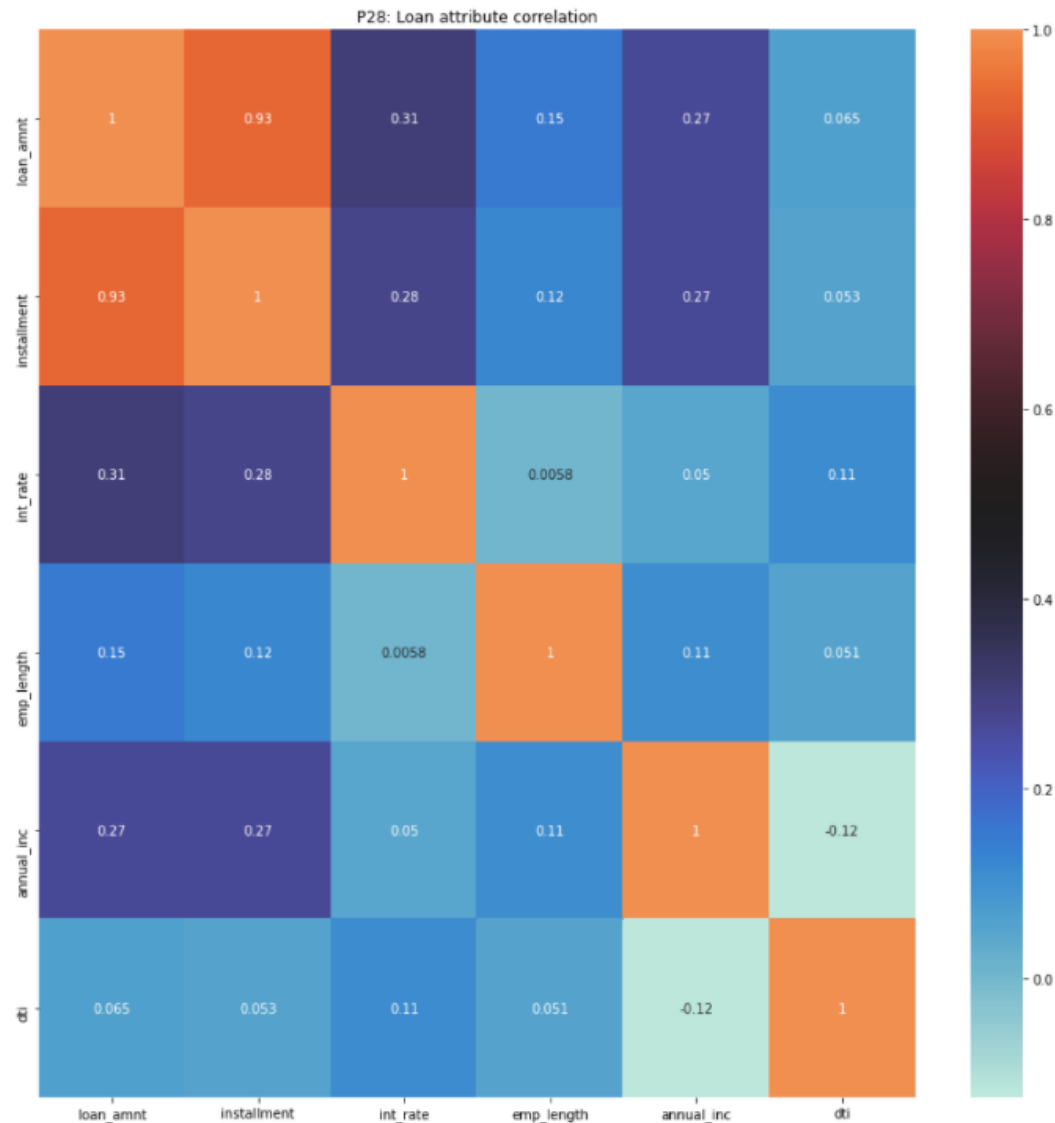
Bi-variate analysis has been performed considering top five loan purpose *debt\_consolidation, credit\_card, other, home\_improvement, and major\_purchase*



- ❑ The default rate of the 'Other' and 'debt consolidation' is not significant changes across employee length
- ❑ Its observed that Mid-range experienced employee a more likely to be credit card defaulters while major purchase cases in this range employees are less likely to be defaulted [\[Refer P26\]](#)



- ❑ Its observed that loan default rates are significantly decreases with increase in annual income
- ❑ Its also clear that with very high income people are more likely to default in other and debt consolidation rather than credit card and major purchase [\[Refer P27\]](#)



- ❑ loan\_amnt is highly correlated to installment with factor .93, as expected
- ❑ int\_rate is correlated with loan\_amount with factor .31
- ❑ annual\_inc is correlated with loan\_amnt with factor .27
- ❑ dti is negatively correlated to annual\_inc with factor -0.12

# Recommendation

## Recommendations

Stop giving loan for Small business, as its more likely to default.

High interest rates default more. so it is advisable to give few loan at High interest to minimize the loss in case of default.

The higher the installment amount, the higher the default rate, so it is advisable give few loans with higher the installment amount to minimize the loss in case of default.

Default rate is high for 60 months loan term, so it is good to not give many loans for long term or look in to the process to minimize the loss.

Debt consolidation loans have the highest default rates.

Start Charging the higher interest rate for loans where dti is more, as People with high debt to income ratio defaults the most.

Verified customers default more, so it is advisable to look in to the process to minimize the loss.



# Thank You