Detecting the Driving Factors Behind Loan Default

Problem Statement

- Identify risky loan applicants who are likely to default, thus the company can reduce credit loss.

- Use exploratory data analysis to understand the driving variables behind loan default.

Analysis Approach

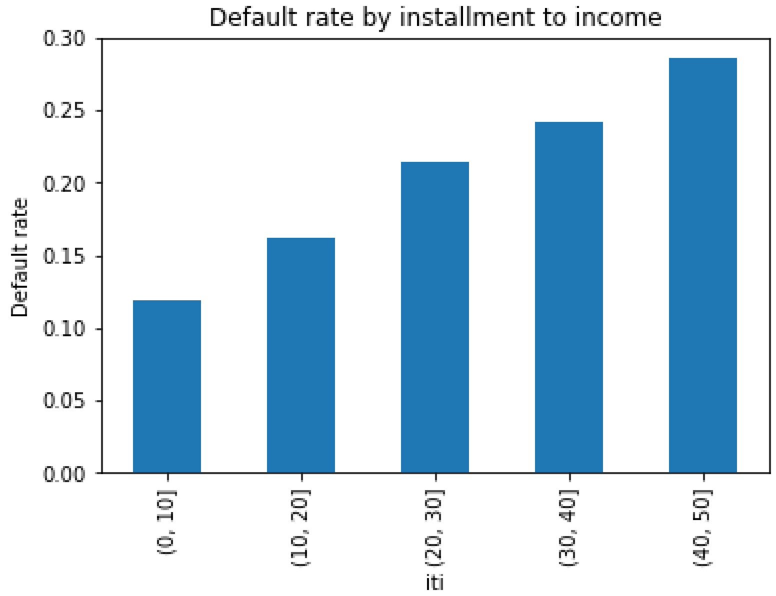
- Calculated a business driven metric- iti (installment to income)
- Univariate analysis: check the default rate across various categorical features. For continuous features, perform binning and then univariate analysis.
- Bivariate analysis: Utilize two or more features to understand the Default variable.

Driving Variables Behind Loan Default

1. Iti (installment to income)

- Equation: $iti = \frac{\frac{loan\ amount * interest\ rate\ per\ month}{term}}{monthly\ income} * 100$

- Iti reflects the pressure to repay on an individual base.



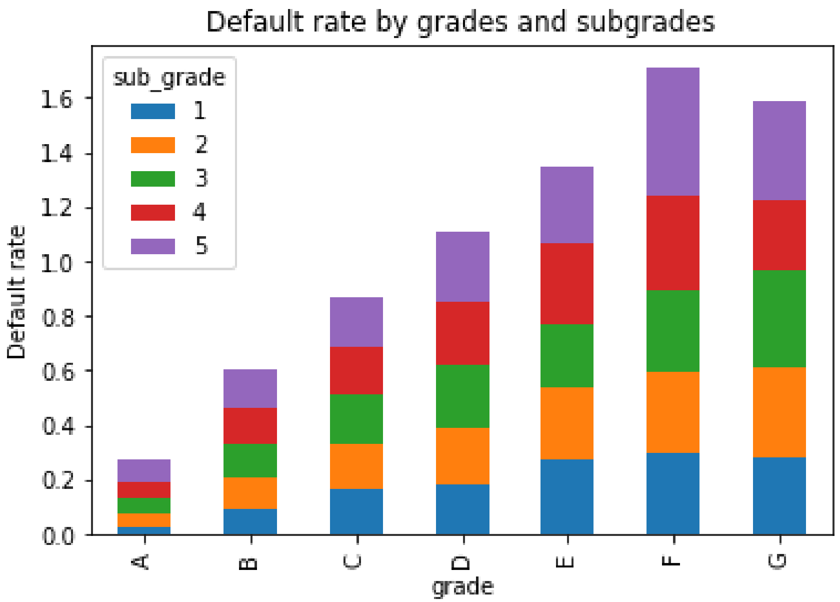
Insight:

- Default rate generally increases with the increased value of iti, which suggests that the increased pressure of loan installment relative to income are associated with the increased likelihood of default.

Recommendations:

- The company should set priority and approve loans with low installment to income ratio first.
- The company should try to lower installment to income when approving loans, via either lowering funded loan amount or extend loan term from 36 to 60 months.

2.Grade and subgrade



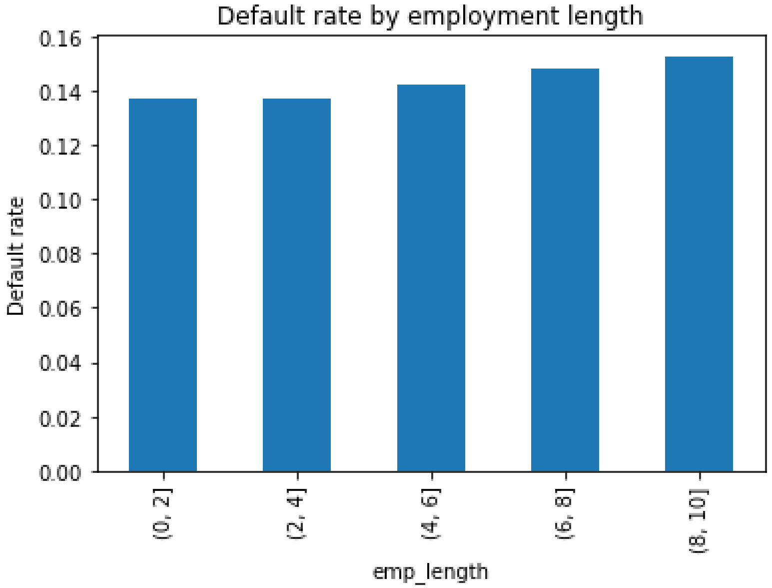
Insights:

- With grade becoming lower(A to G), default rate generally becomes higher
- In each grade, with subgrade becoming lower(1 to 5), default rate generally becomes higher

Recommendations:

- The company should prioritize loaner with higher grade. (Specific priority: A-B-C-D-E-G-F)
- For applicants within the same grade, the company should prioritize loaner with higher subgrade.(Specific priority: 1-2-3-4-5)

3. Employment length



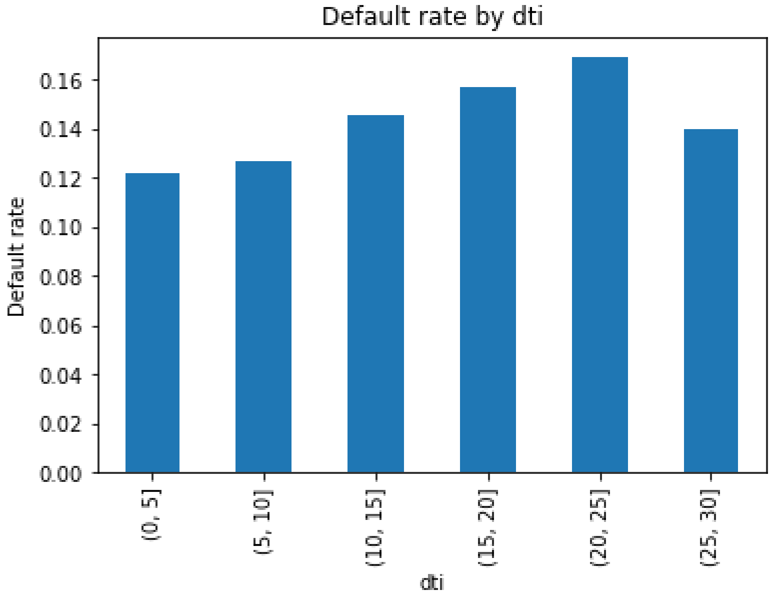
Insight:

- When the value of emp_length becomes larger, the default rate becomes higher accordingly

Recommendation:

- The company should prioritize when approving loans with applicants that have been working less years.

4. dti



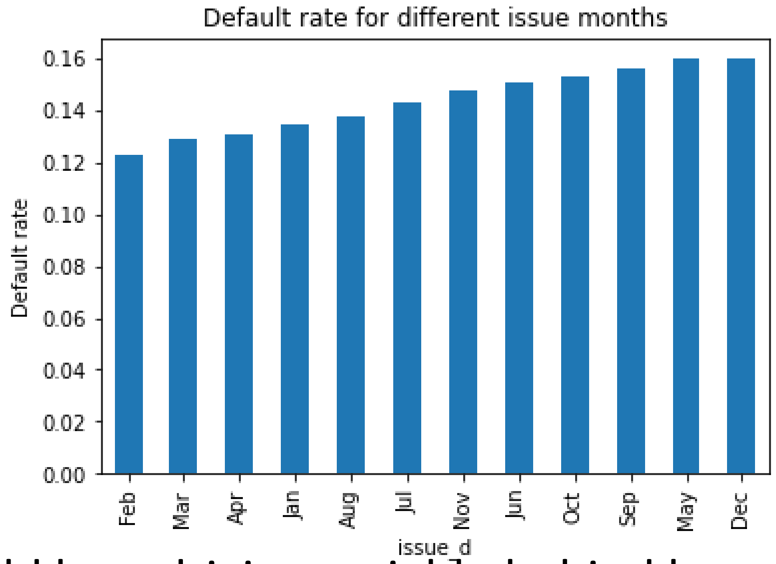
Insight:

- Default rate increases with higher value of dti
- The sudden drop of default rate in (25,30] may due to significantly fewer observations compared to other groups

Recommendation:

- When approving loans, the company should prioritize applicants with relatively lower dti.

5. Loan issue date



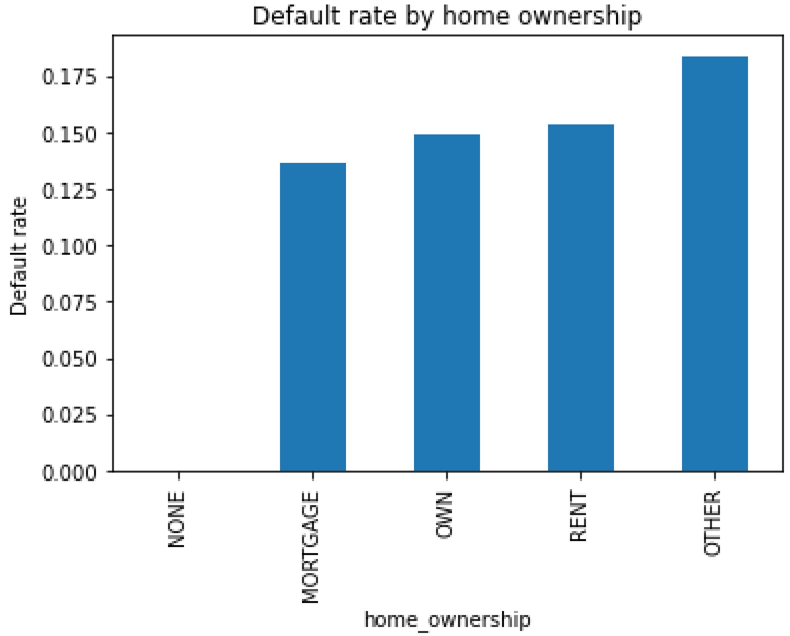
Insights:

- The variable 'issue_d' should be a driving variable behind loan default since the default rate varies with different issue months.
- Loan applicants will have a relative higher default rate when the issue date is in May and later than September.

Recommendations:

- The company can consider issue less times of loan/ decrease loan_amount when it is in May or reaching the 4th quarter of the year (later than September)
- The company can prioritize applicants based on Month orders presented in the chart.

6. Home ownership



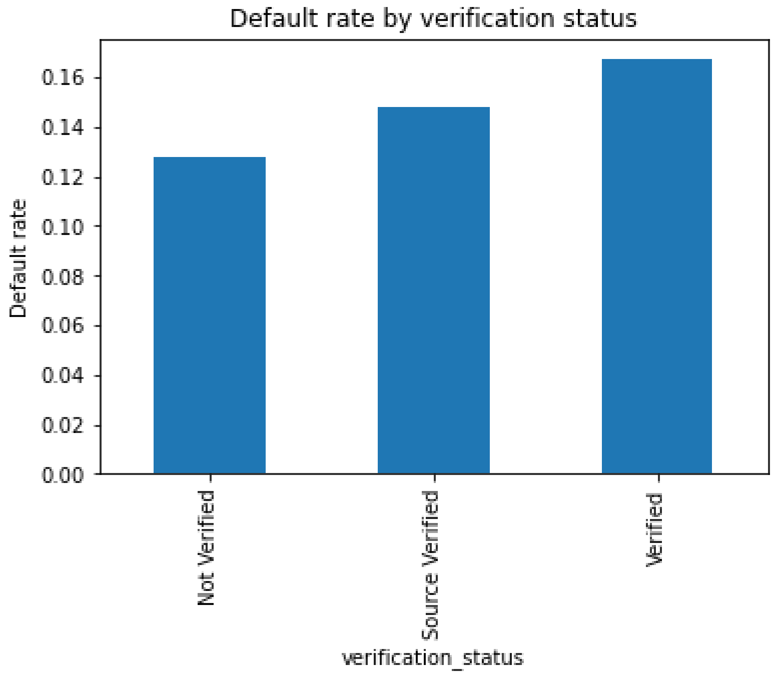
Insights:

- Default rate varies with different types of home ownership.
- The type 'OTHER' shows the highest default rate

Recommendations:

- Prioritize applicants based on type orders presented in the chart.
- For applicants with 'OTHER' type home ownership, check values of other driving variables

7. Verification Status



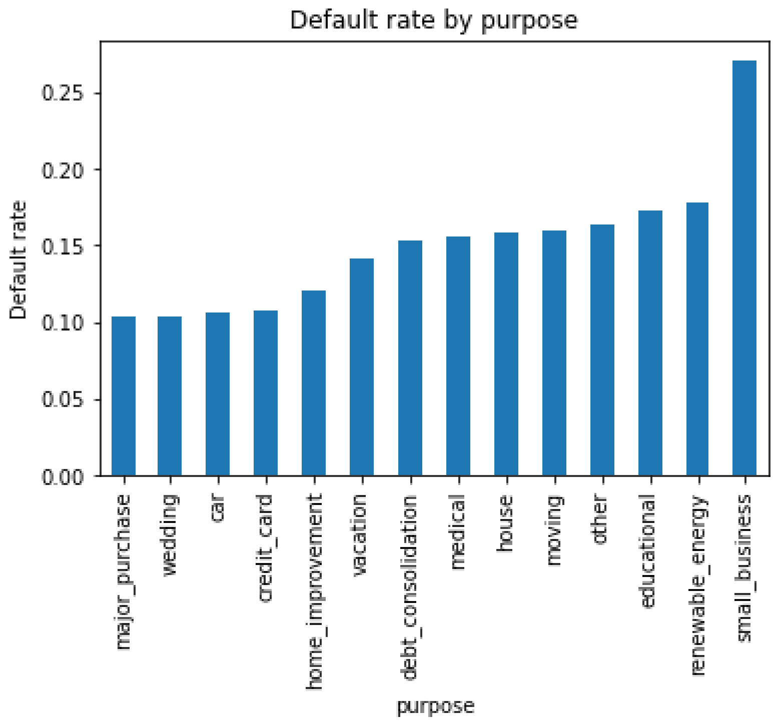
Insights:

- Default rate varies with different types of verification status
- Not verified scores lower default rate than source verified and verified.

Recommendations:

- Overhaul the current verification process. Conduct more thorough check.
- For verified applicants, refrain from approving large amount of loan or short loan term.

8. Purpose



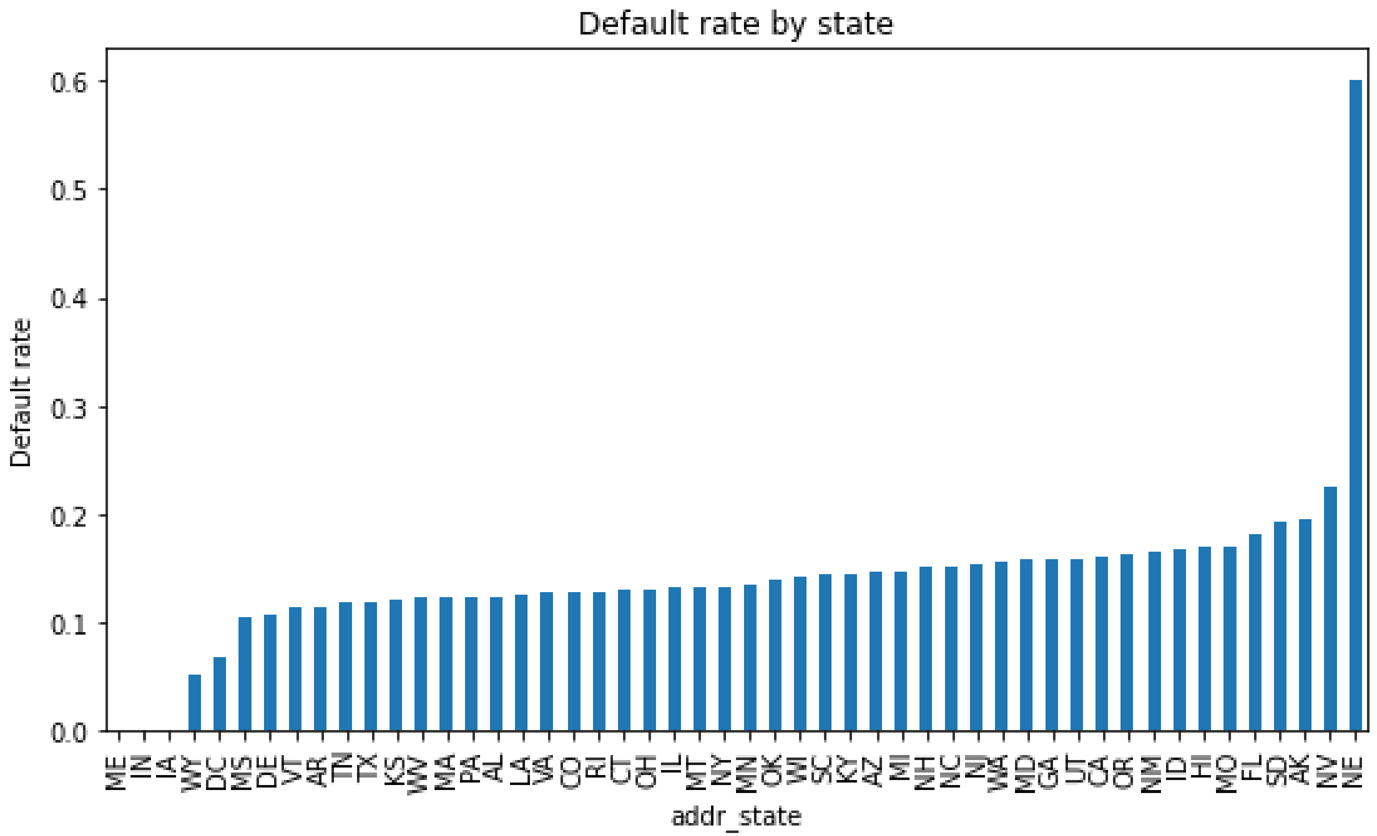
Insight:

- Default rate varies with different types of purpose.
- Loaning for starting small business has relatively high default rate compared to others

Recommendation:

- For applicants borrowing money to start small businesses, the company should be cautious when approving. It can also consider approve lower amount of loan, lower interest rate, and shorten loan terms

9. State



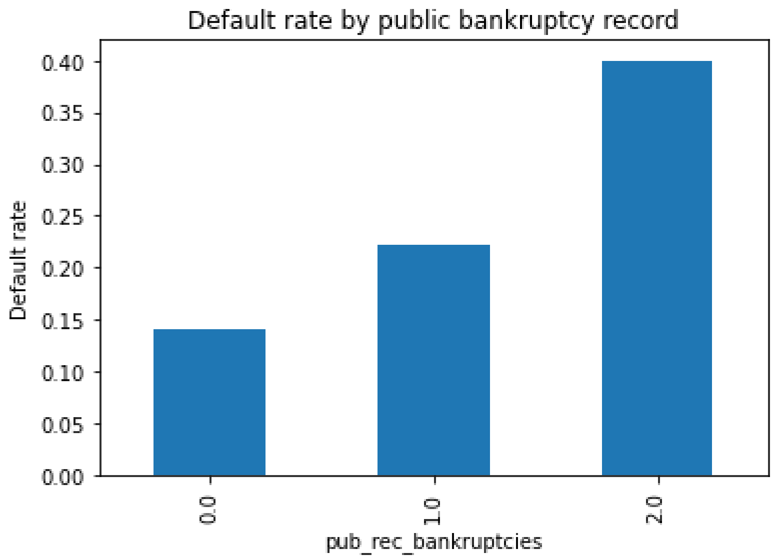
Insight:

- Applicants from Nebraska have exceptionally high default rate (above 0.5)

Recommendation:

- The company had better reject applicants from the state Nebraska

10. Public Bankruptcy Record



Insight:

- Default rate increases with the increased value of public bankruptcy record

Recommendation:

- The company should prioritize applicants without public bankruptcy record.
- For applicants with public bankruptcy record, the company should consider rejecting , increasing interest rate, lowering approved loan amount or shortening loan term.