

Lending Club Case Study

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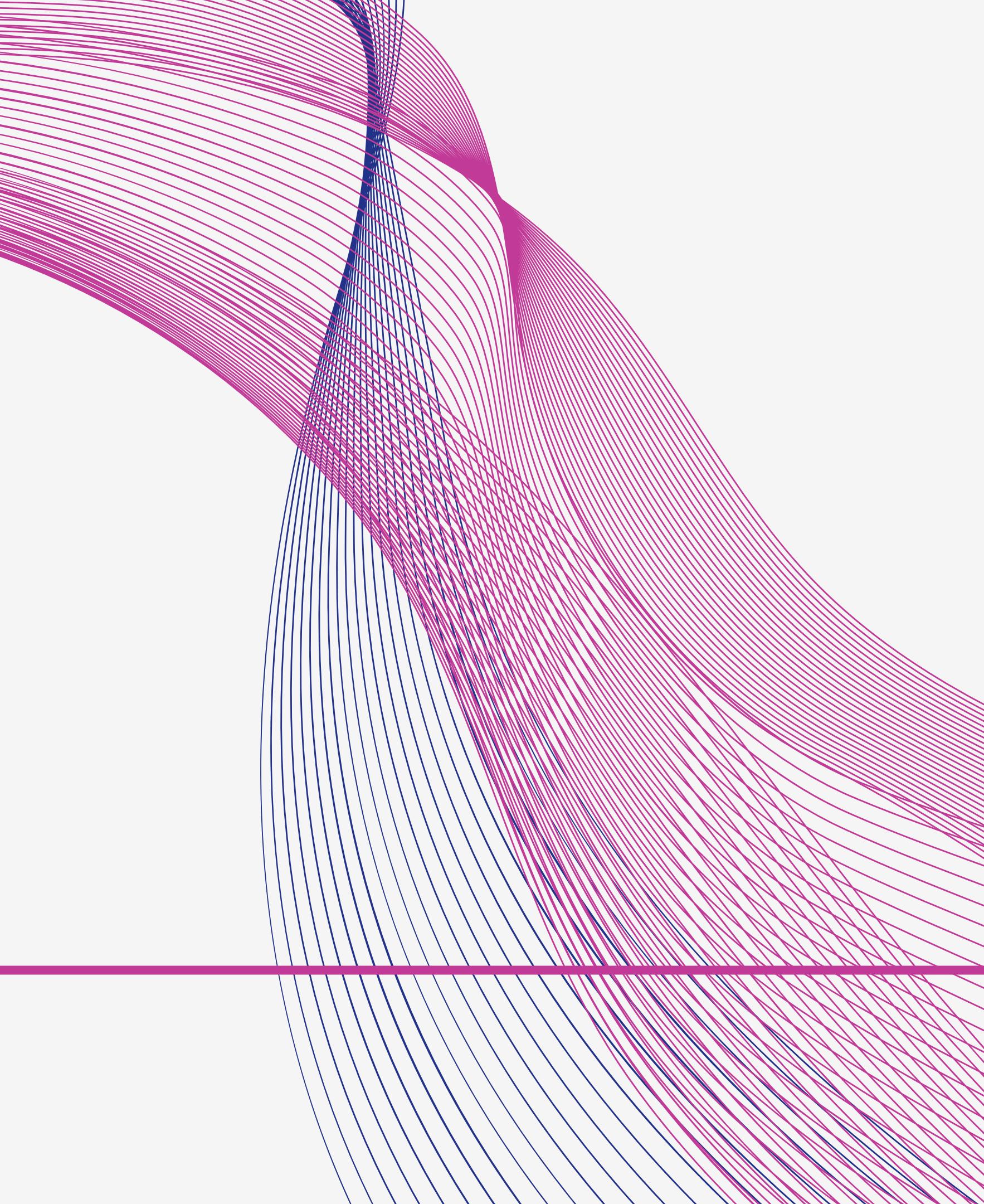
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INTRODUCTION

Loan default is a significant challenge for lenders, impacting profitability and financial stability. This case study examines key factors influencing defaults, such as interest rates, debt-to-income ratios, and grade.

By analysing these variables, we aim to uncover patterns that can help lenders improve risk management and optimize loan decisions.

Key Business Metrics

During analysis we found below key business metrics which helps understand customer better:

Average Loan Amount: \$11,101.75

Default Rate: 14.17%

Average Interest Rate: 0.12%

Key Factors Impacting Default Rate

Top factors impacting loan default in consumers:

`int_rate: 0.1963`

`revol_util: 0.0966`

`inq_last_6mths: 0.0717`

`annual_inc: 0.0685`

`loan_amnt: 0.0470`

`dti: 0.0417`

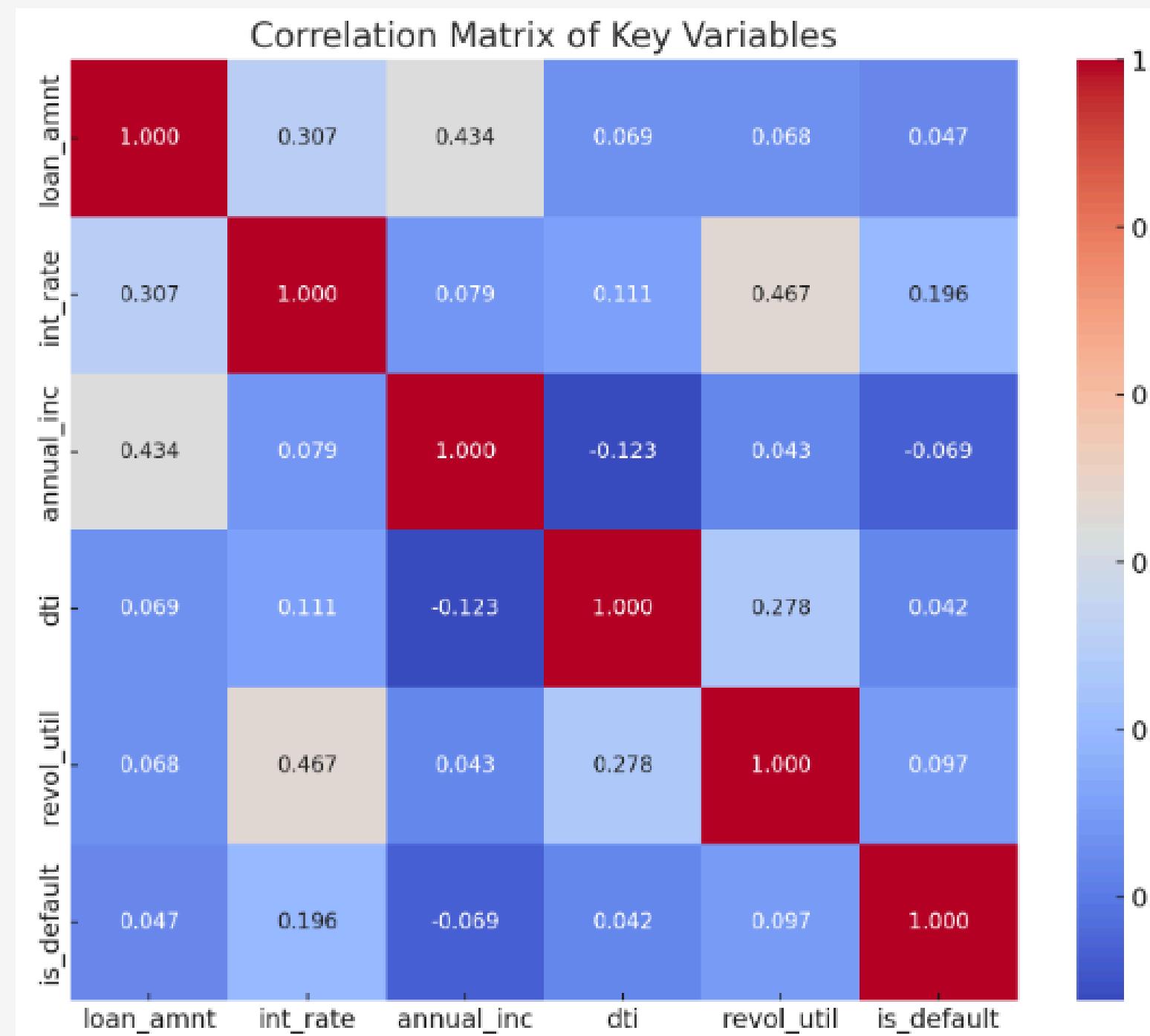
`total_acc: 0.0236`

`delinq_2yrs: 0.0199`

`open_acc: 0.0107`

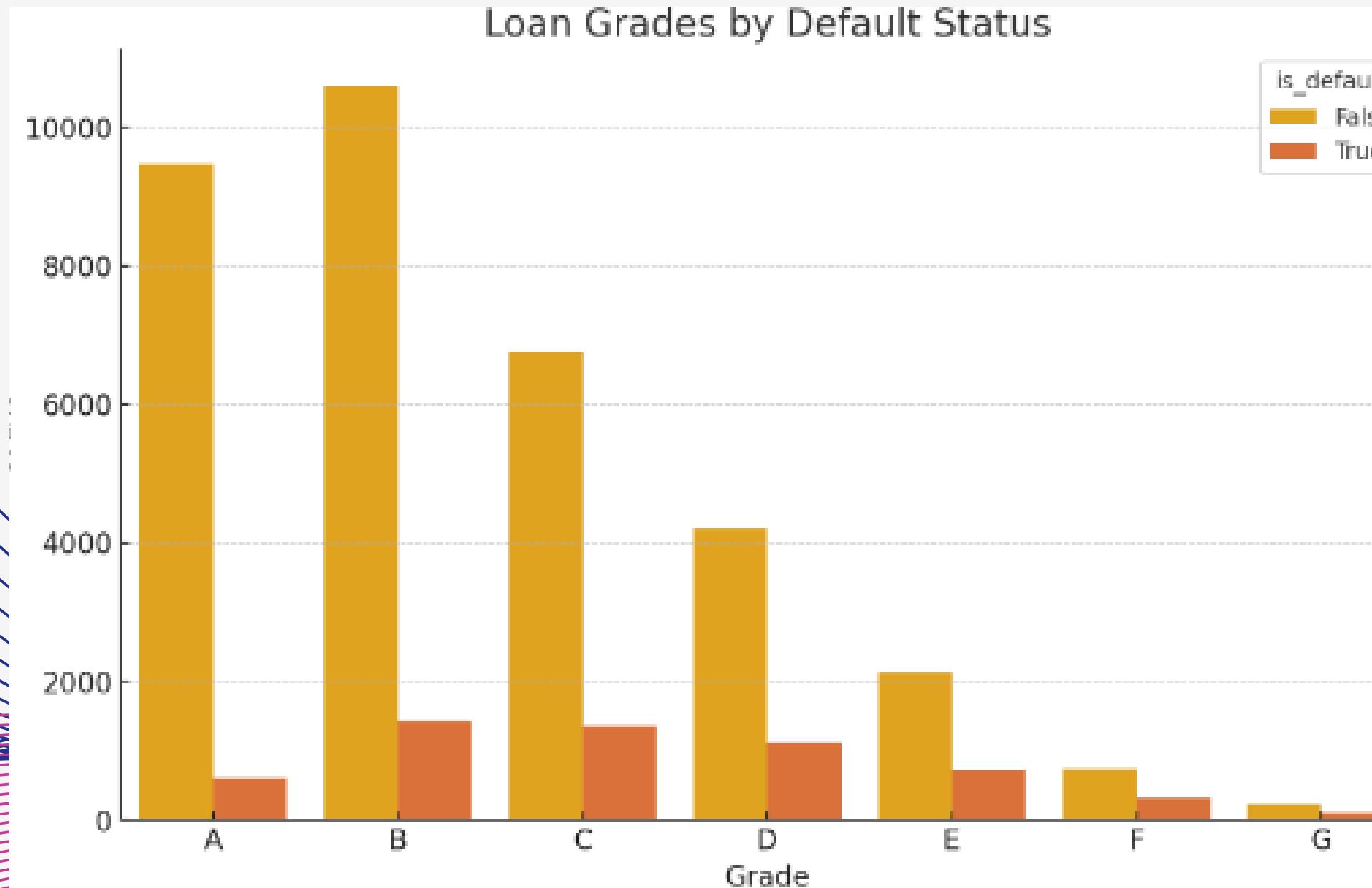
- **int_rate (Interest Rate):** The strongest factor influencing loan default. Higher interest rates often indicate higher-risk borrowers, leading to a greater likelihood of default as borrowers may struggle to manage the additional financial burden.
- **revol_util (Revolving Utilization Rate):** Reflects the percentage of credit card limits being used. A higher revolving utilization rate indicates over-leverage, which increases the risk of default as borrowers might have less capacity to meet additional obligations.
- **inq_last_6mths (Inquiries in the Last 6 Months):** A higher number of recent credit inquiries suggests a borrower is actively seeking credit, which could indicate financial distress and a higher risk of default.
- **annual_inc (Annual Income):** Borrowers with lower annual income may find it harder to repay loans, especially when their income is insufficient relative to their financial obligations.
- **loan_amnt (Loan Amount):** Larger loans often result in higher monthly payments, which can strain a borrower's financial resources and increase the likelihood of default.

This matrix show how key variables/factors impact the default rate



Default Rates by Grade

Default rates vary significantly by loan grade, with Grade G showing a default rate of 31.96% and Grade A showing only 5.97%. This highlights the importance of loan grading in assessing risk, as higher grades (A-C) exhibit lower default percentages compared to lower grades (D-G).



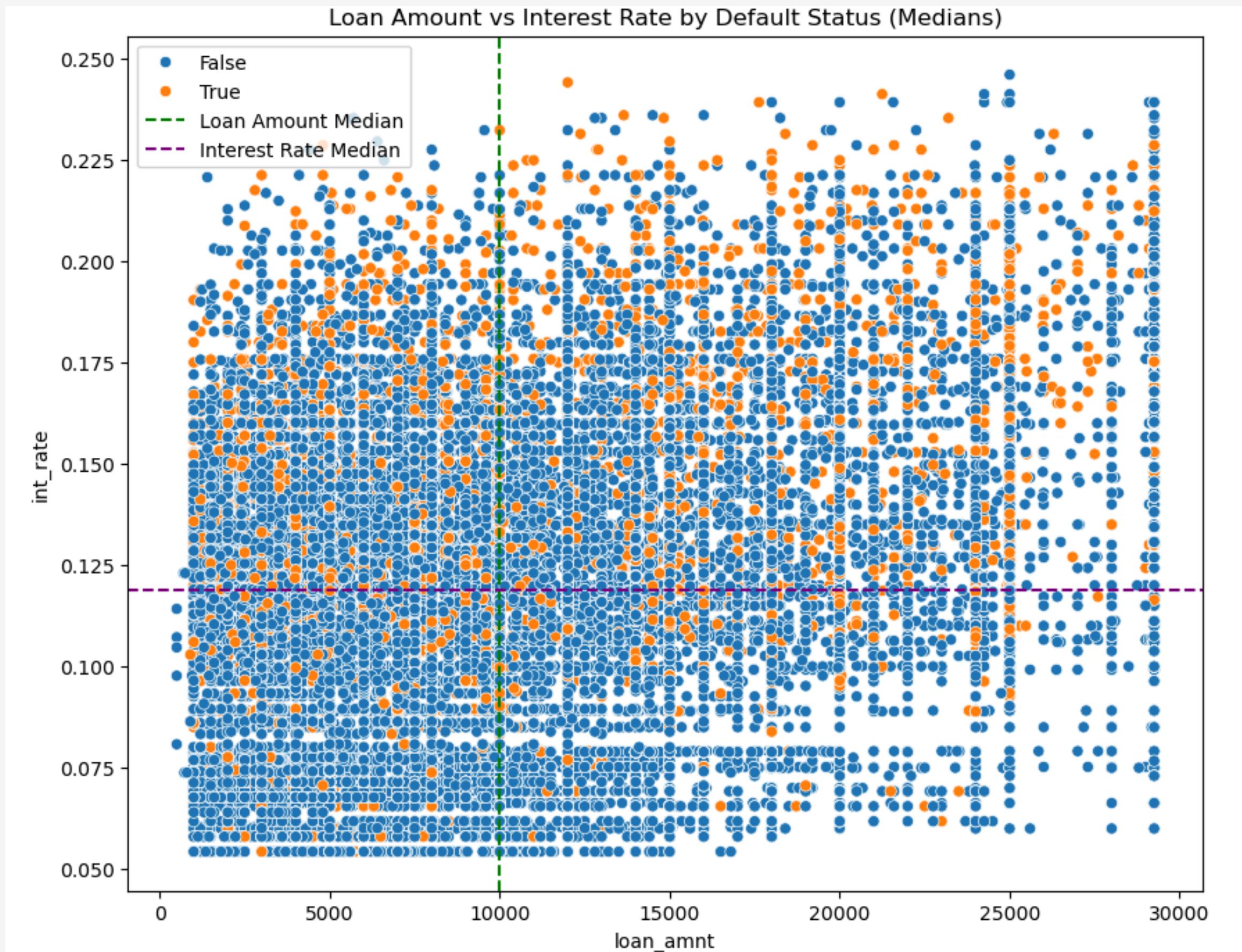
Default Rates by Purpose and Grade

Default Rates by Purpose and Grade:

grade	A	B	C	D	E	F	G
purpose							
car	0.053	0.110	0.148	0.192	0.125	0.364	0.500
credit_card	0.045	0.091	0.134	0.162	0.222	0.235	0.103
debt_consolidation	0.063	0.113	0.161	0.208	0.256	0.334	0.324
educational	0.062	0.196	0.152	0.323	0.429	0.250	0.000
home_improvement	0.043	0.110	0.175	0.197	0.196	0.222	0.125
house	0.030	0.093	0.186	0.235	0.400	0.467	0.333
major_purchase	0.044	0.086	0.151	0.219	0.192	0.143	0.167
medical	0.057	0.152	0.221	0.226	0.190	0.286	0.667
moving	0.099	0.195	0.137	0.206	0.250	0.111	0.200
other	0.076	0.134	0.198	0.246	0.291	0.238	0.409
renewable_energy	0.167	0.162	0.294	0.000	0.000	0.333	1.000
small_business	0.115	0.254	0.273	0.312	0.324	0.371	0.447
vacation	0.097	0.167	0.121	0.097	0.381	0.000	0.000
wedding	0.033	0.092	0.129	0.146	0.185	0.190	0.333

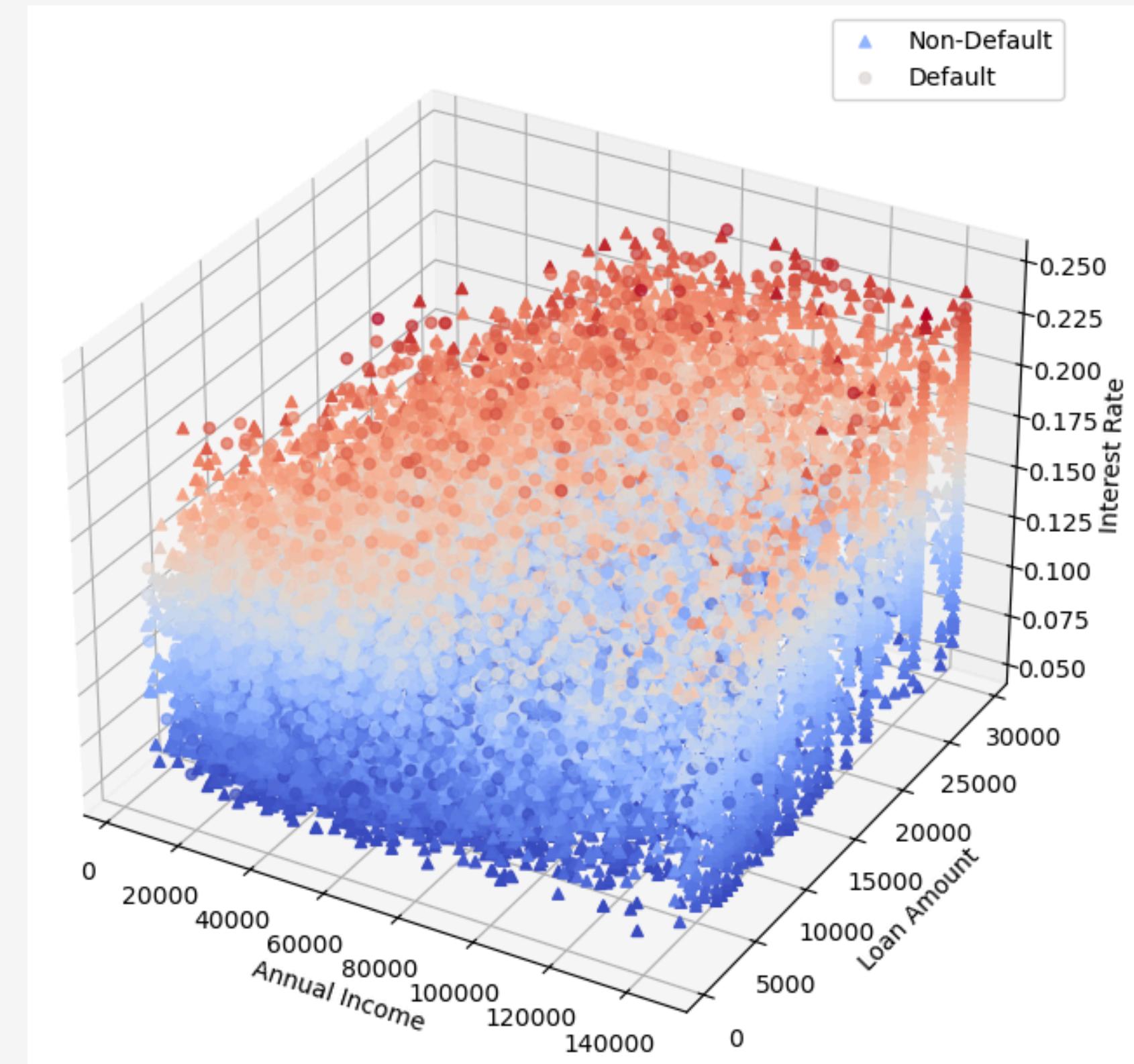
- Default Rates Increase with Riskier Grades
- Loan Purpose Influences Default Rates:
 - Wedding loans have relatively low default rates across grades, with a maximum of 0.333 in grade G.
 - House loans maintain relatively lower default rates up to grade D.
- Variability Between Purposes: Some loan purposes (e.g. debt consolidation and home improvement) show a smoother progression in default rates across grades, while others (e.g. renewable energy) display sharp jumps.

This scatter plot shows a clear indication when loan amount and interest is high. Chances of Default is higher



3D Scatter Plot

This scatter plot shows how default rate changes based on income, loan amount and interest



Trends in borrower behaviour

Graph 1:

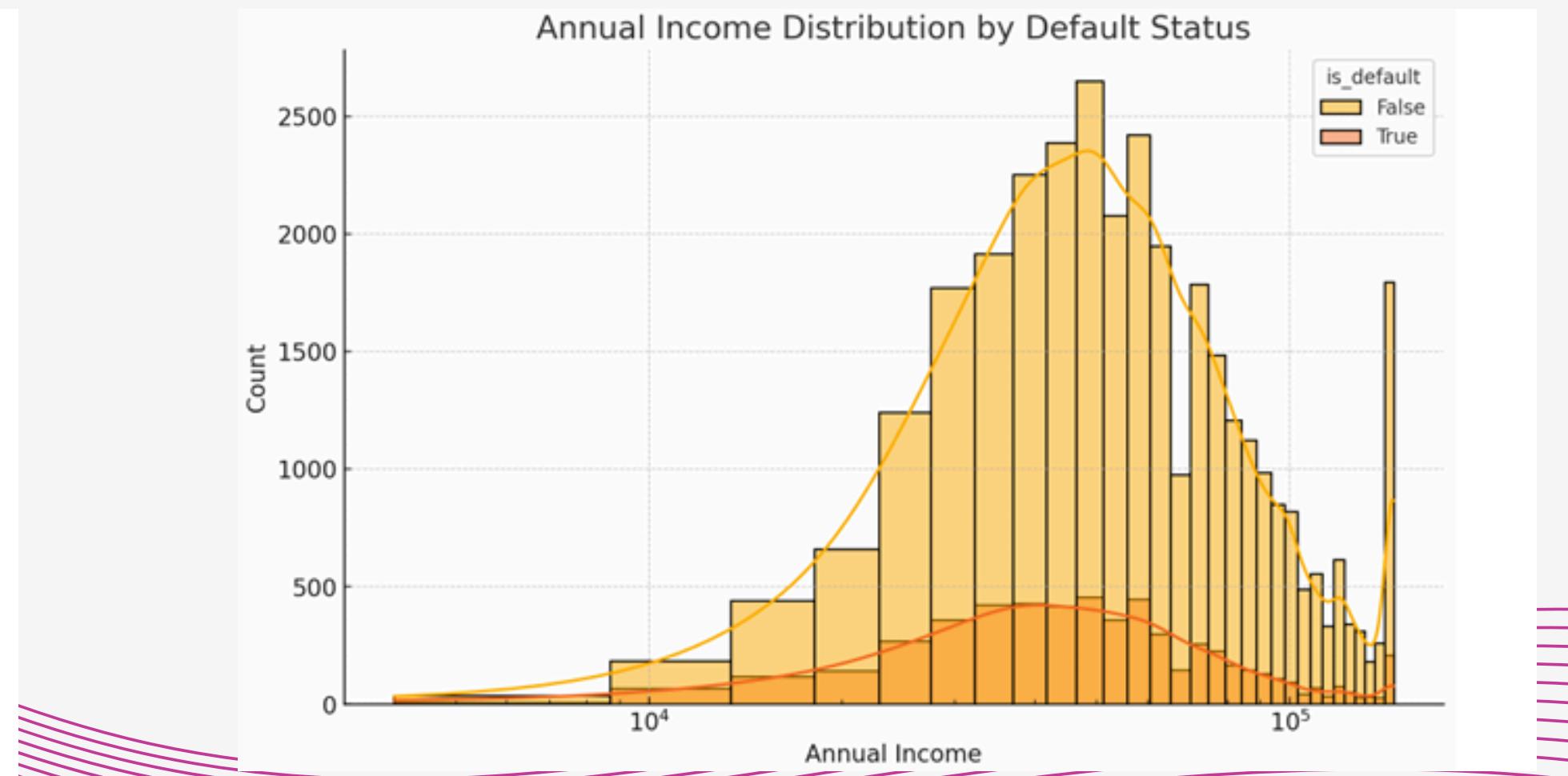
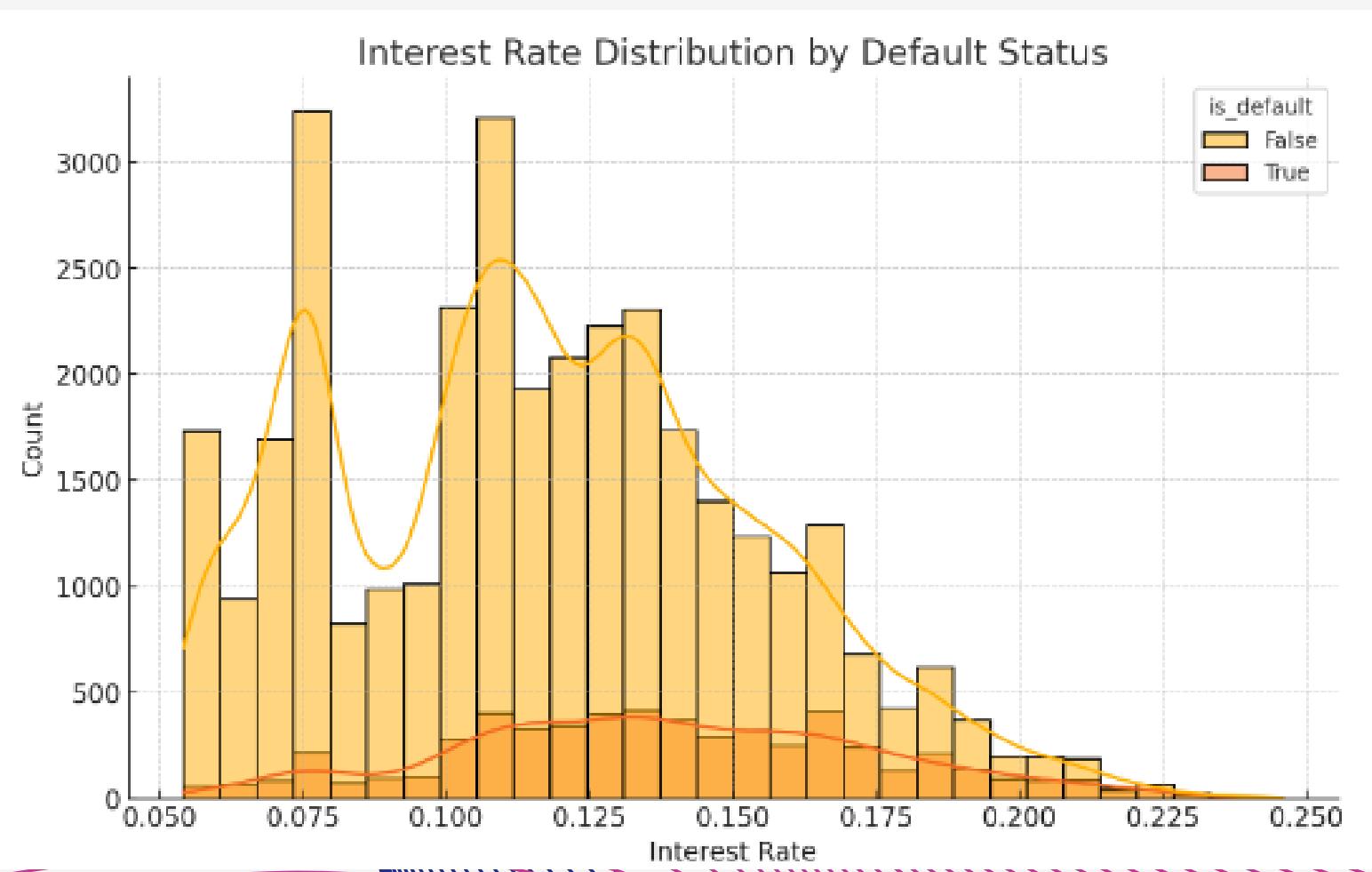
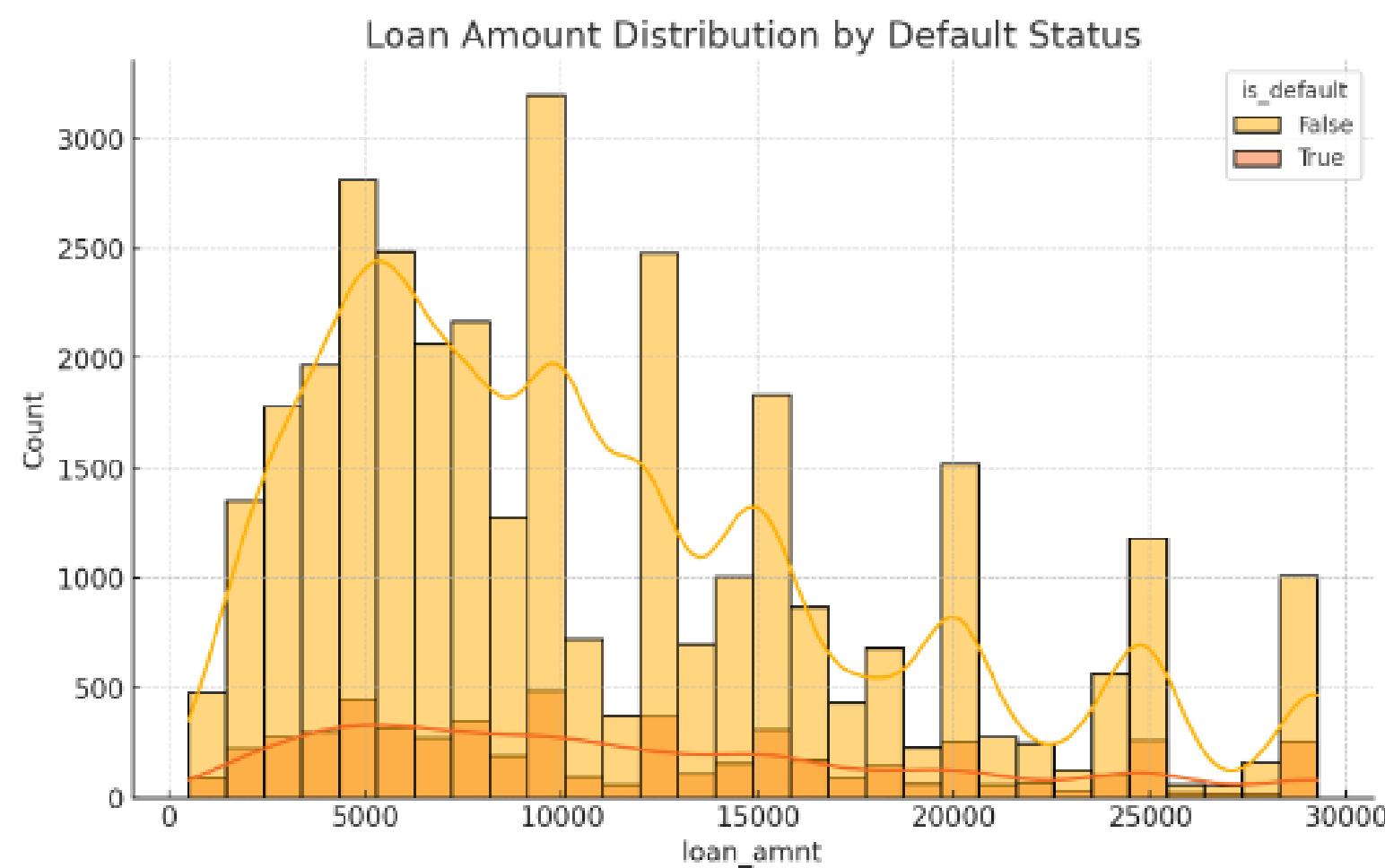
- Higher loan amounts show slightly higher default rates

Graph 2:

- Default rates increase significantly with higher interest rates

Graph 3:

- Lower income borrowers tend to default more frequently



GRADE-WISE METRICS

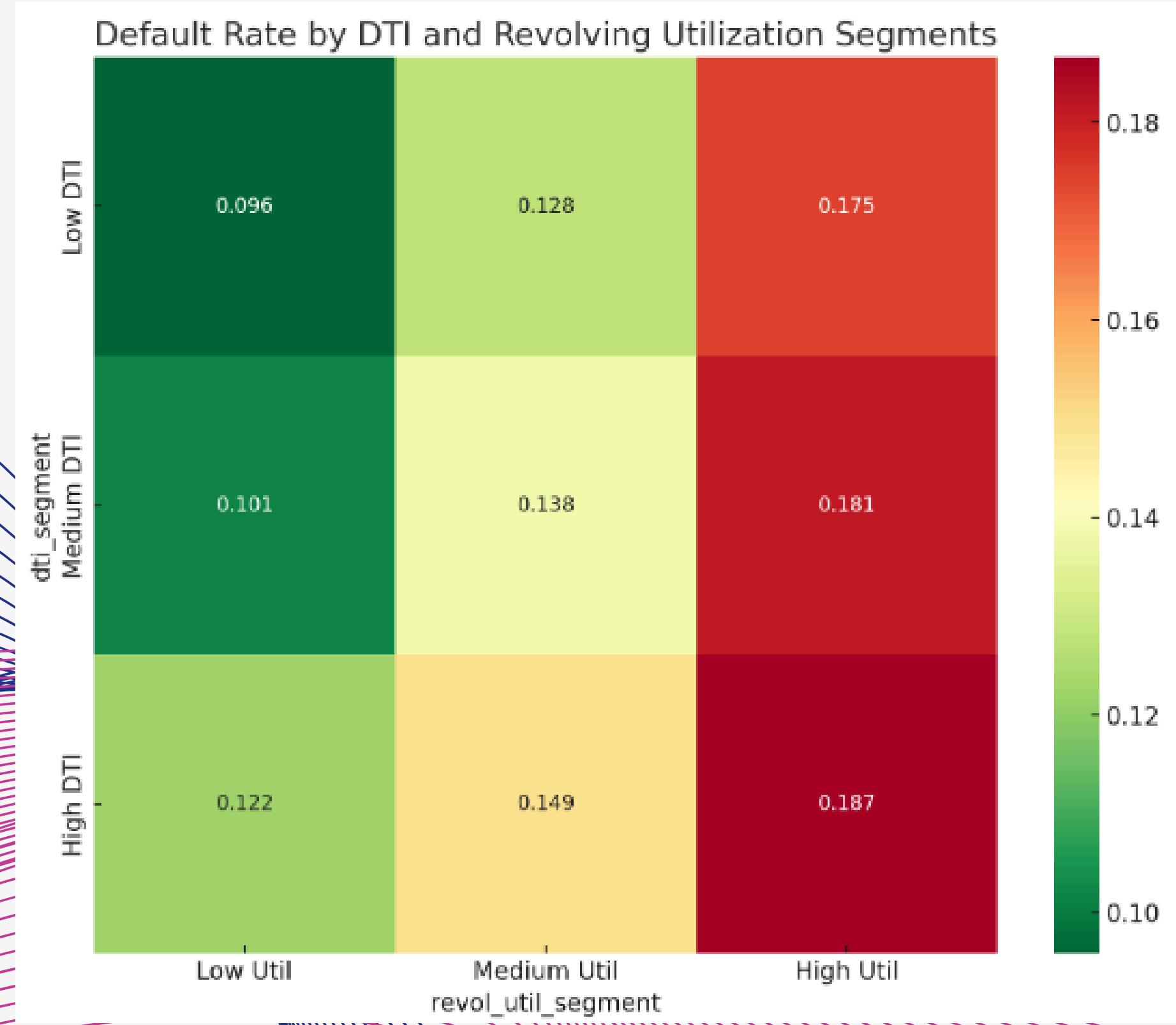
GRADE	is_default	int_rate	loan_amnt
A	0.0597	0.0734	8595.6544
B	0.1186	0.1102	11038.1364
C	0.1663	0.1355	10906.9122
D	0.2107	0.1572	12149.6655
E	0.2516	0.1771	15444.2030
F	0.3041	0.1975	17796.4252
G	0.3196	0.2140	19617.7215

Risk Matrix

The risk matrix categorizes default rates based on Debt-to-Income (DTI) ratios and revolving utilization, indicating that higher DTI and utilization correlate with increased default rates. This analysis is crucial for lenders to assess risk more effectively.

Risk Matrix - Default Rates:

revol_util_segment	Low Util	Medium Util	High Util
dti_segment			
Low DTI	0.095846	0.128049	0.174545
Medium DTI	0.101364	0.138106	0.181130
High DTI	0.122135	0.149377	0.186578



Key Findings and Recommendations

Key Risk Factors:

- Higher loan grades (E-G) show significantly higher default rates.
- Higher rates indicate higher risk profiles
- Combined high DTI and high revolving utilization indicate increased risk.
- Larger loans show slightly higher default tendency

Recommendations:

- Focus on Grade A-C loans for lower risk portfolio.
- Implement stricter criteria for high DTI + high utilization combinations.
- Consider loan amount caps for higher risk grades.

