IIT Madras
BS Degree

DECODING CREDIT RISK: UNDERSTANDING LOAN REPAYMENT BEHAVIOR

Credit Default Risk Analysis – Predicting Who Defaults & Why

PRESENTED BY:

DATA WIZARDS

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FIRST CITY BANK
LOAN
LOAN APPLICATIONS

RISK ASSESSMENT MODEL
APPROVED
REJECTED
REJECTED
REJECTED

FIRST CITY BANK
LOAN
LOAN APPLICATIONS

WHY DO SOME CUSTOMERS DEFAULT? — A BUSINESS CHALLENGE

- Loan cycle
- Customer
- Repayment
- Default risk

Total Applications: 307511
Default Rate: 8.07%

Class Imbalance Ratio
(Non-default:Default): 11.39:1

Total previous applications: 1670214
Average applications per client: 4.93

Why this project matters?

01

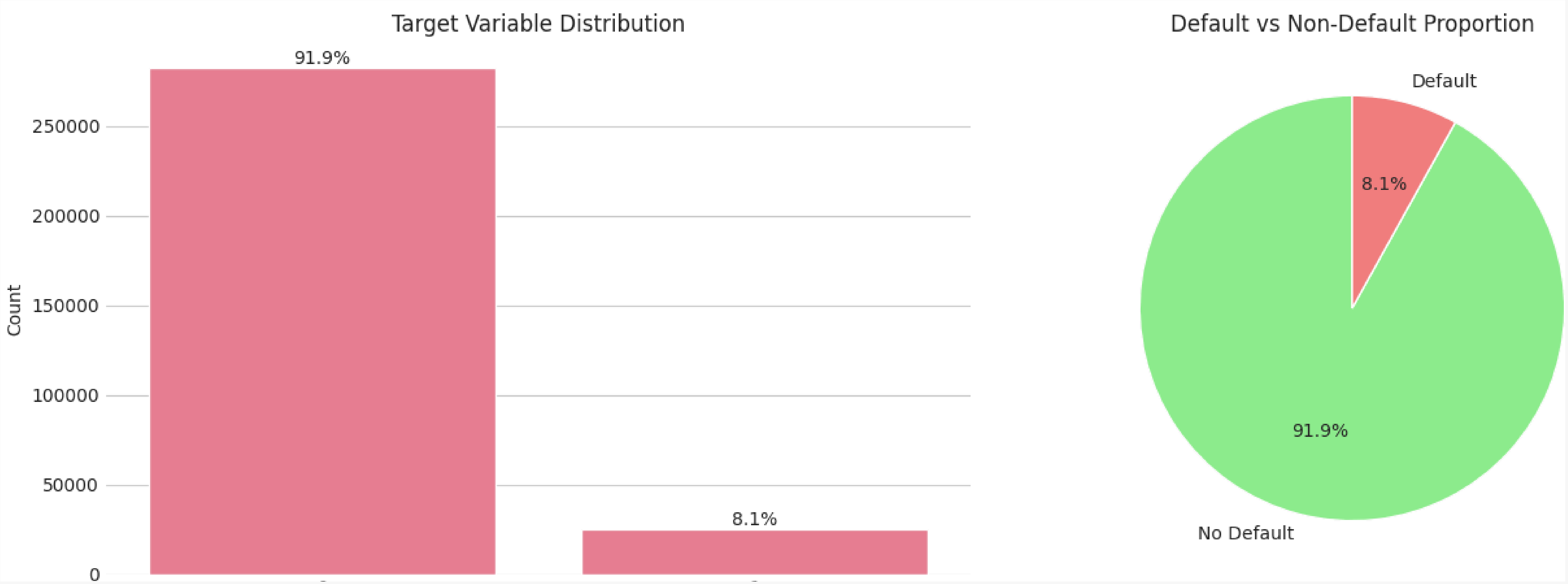
Lenders face two major risks:
- Approving high-risk borrowers → default losses
- Rejecting safe borrowers → revenue loss

02

Our goal:
Identify borrower patterns that predict default behaviour

03

Deliverables:
- Deep EDA
- Visual Insights
- Interactive Streamlit Dashboard



KEY KPI'S

01 Total Applicants: 307,511

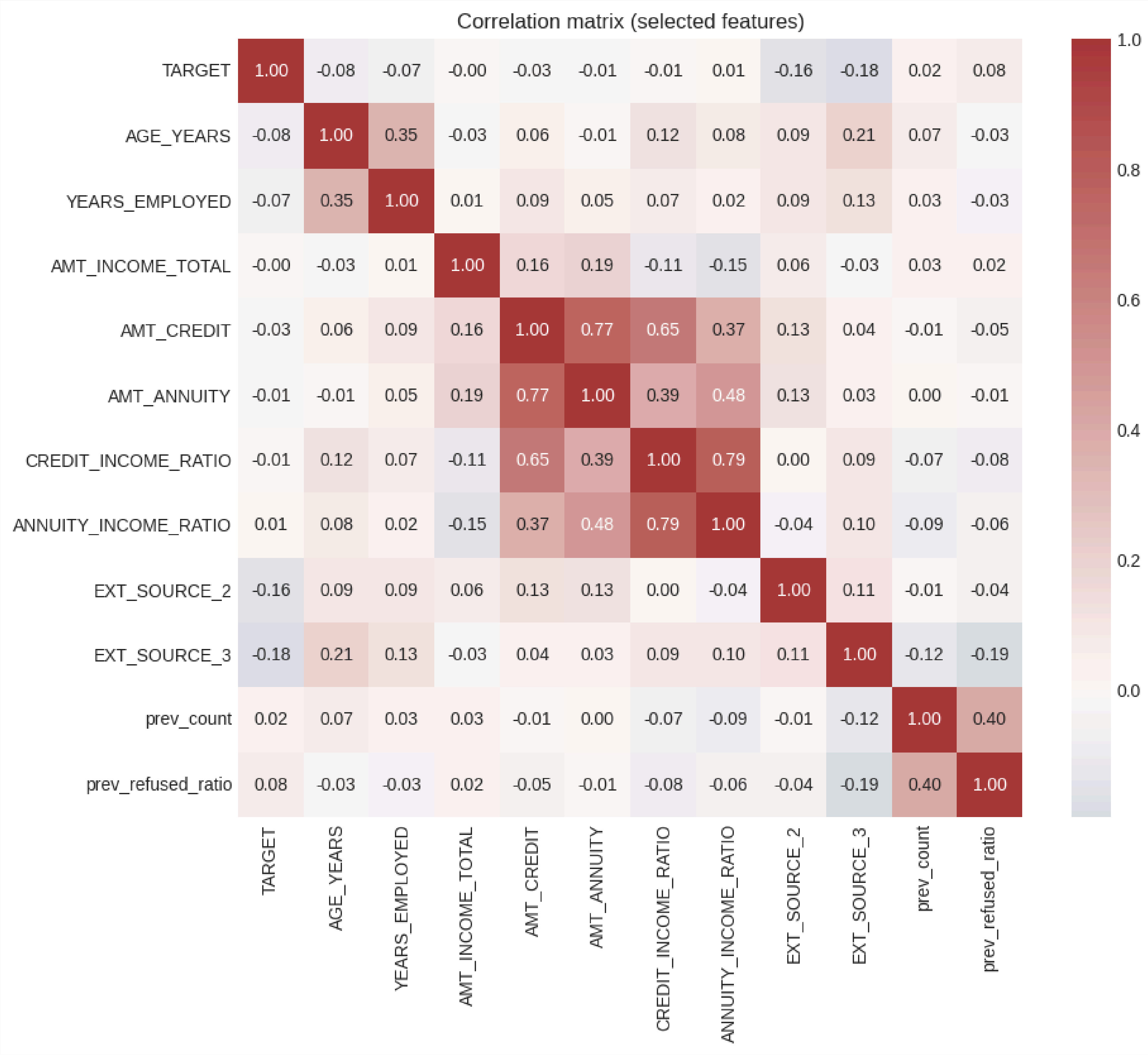
02 Default Rate: 8.07%

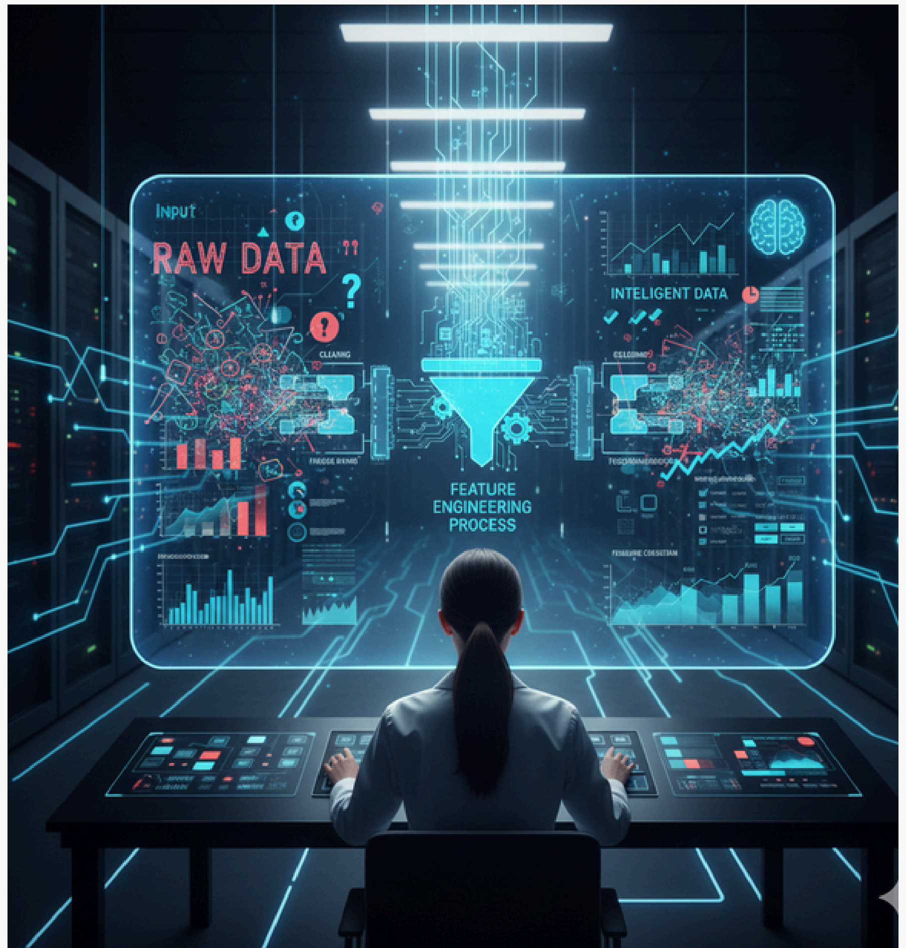
03 Avg Income: ~168K

04 Avg Credit Amount: ~600K

05 Avg Employment Tenure: 4.5 years

FEATURE ENGINEERING – TURNING DATA INTO INTELLIGENCE

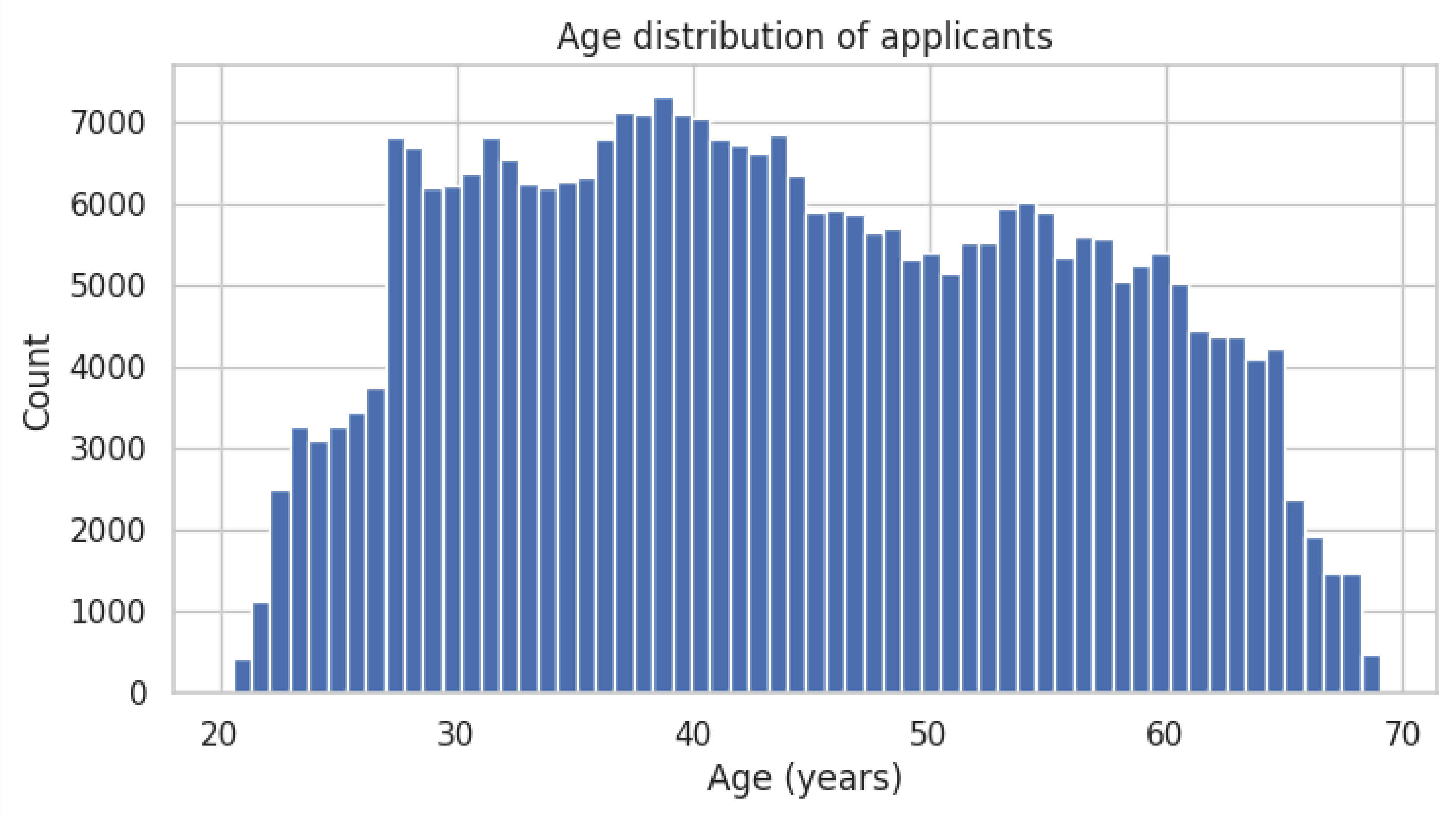


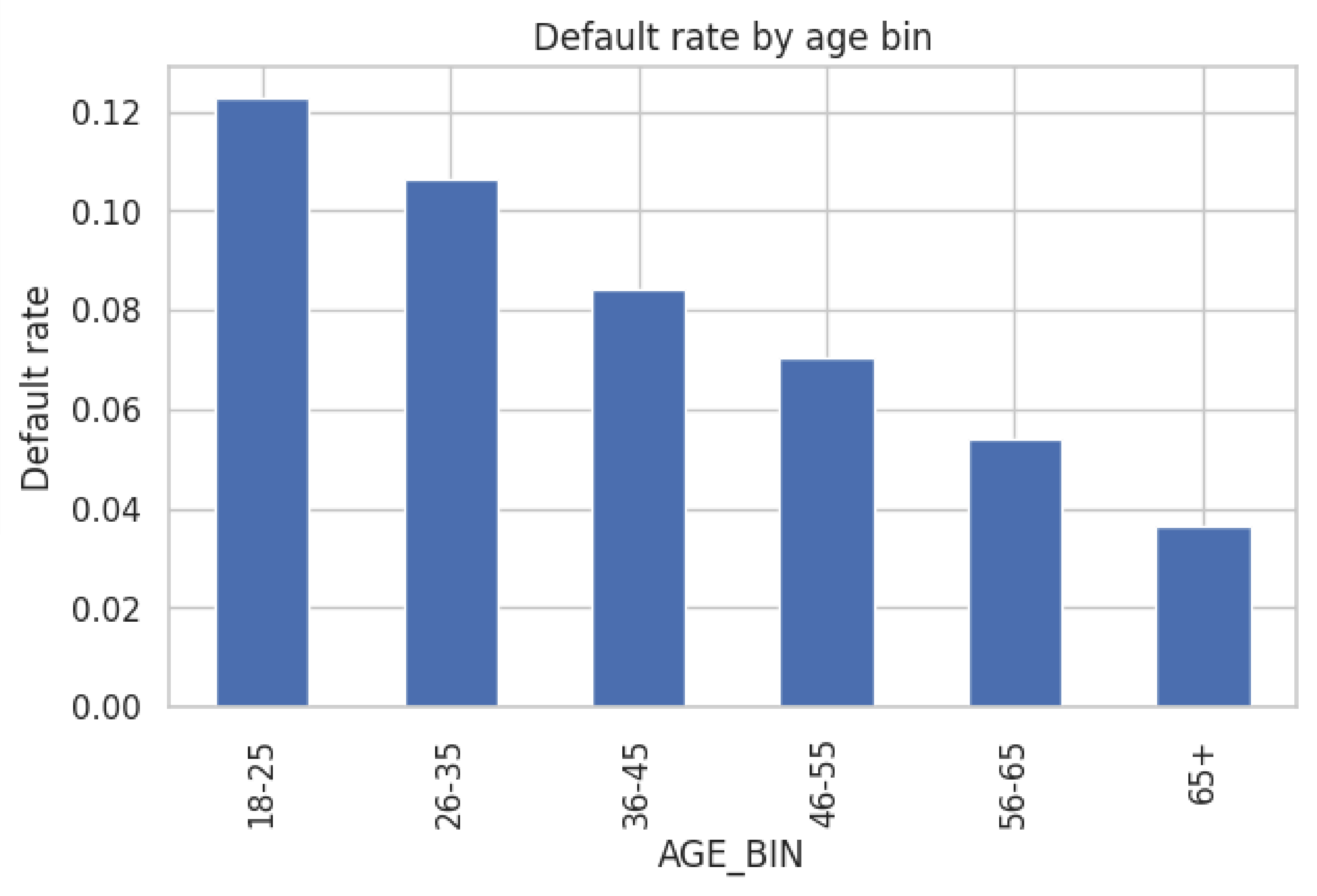


AGE & DEFAULT BEHAVIOUR

Younger applicants default more.

- Highest risk: 18–35 years
- Stability increases after 40
- Low default rate after 55





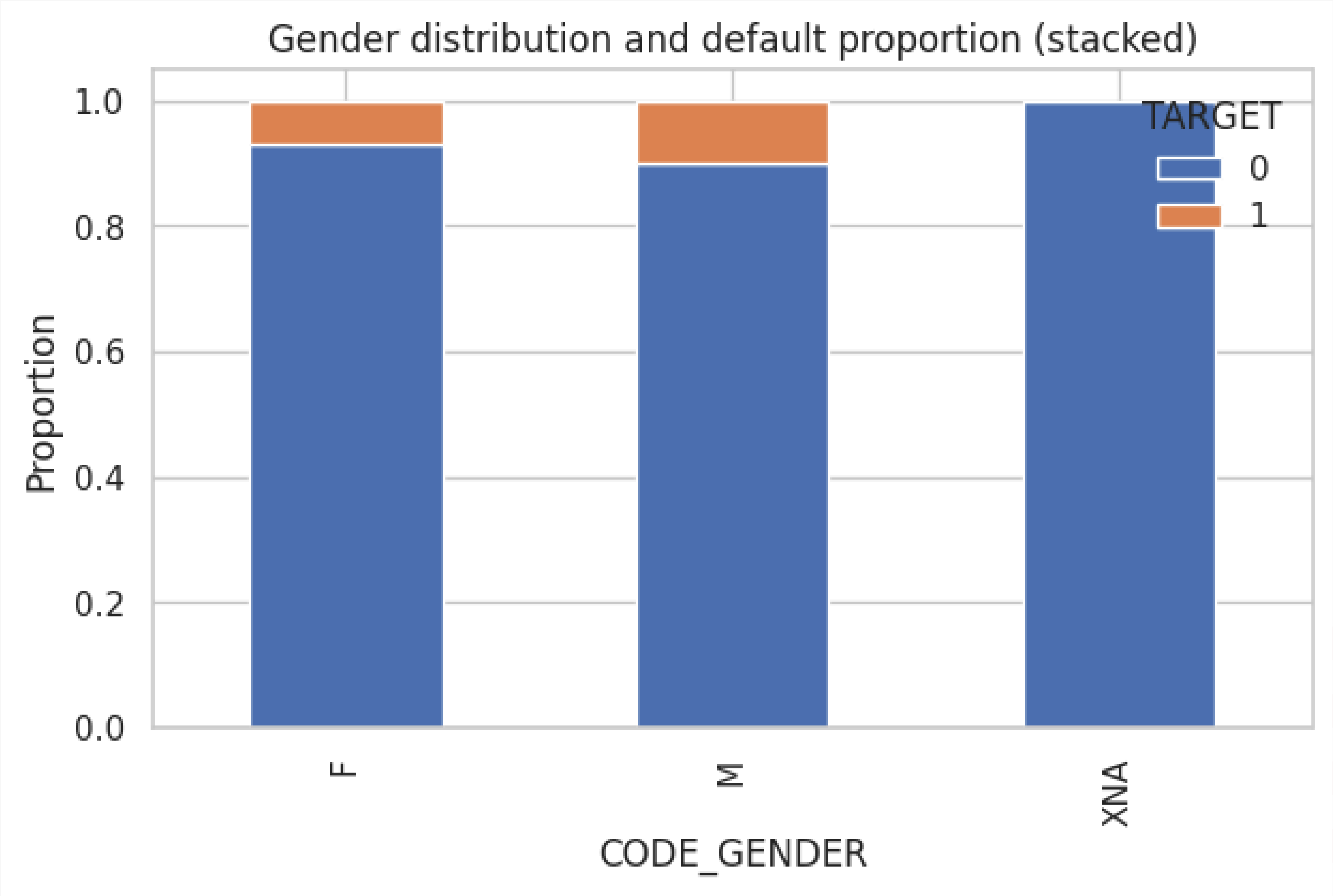
GENDER & FAMILY STRUCTURE

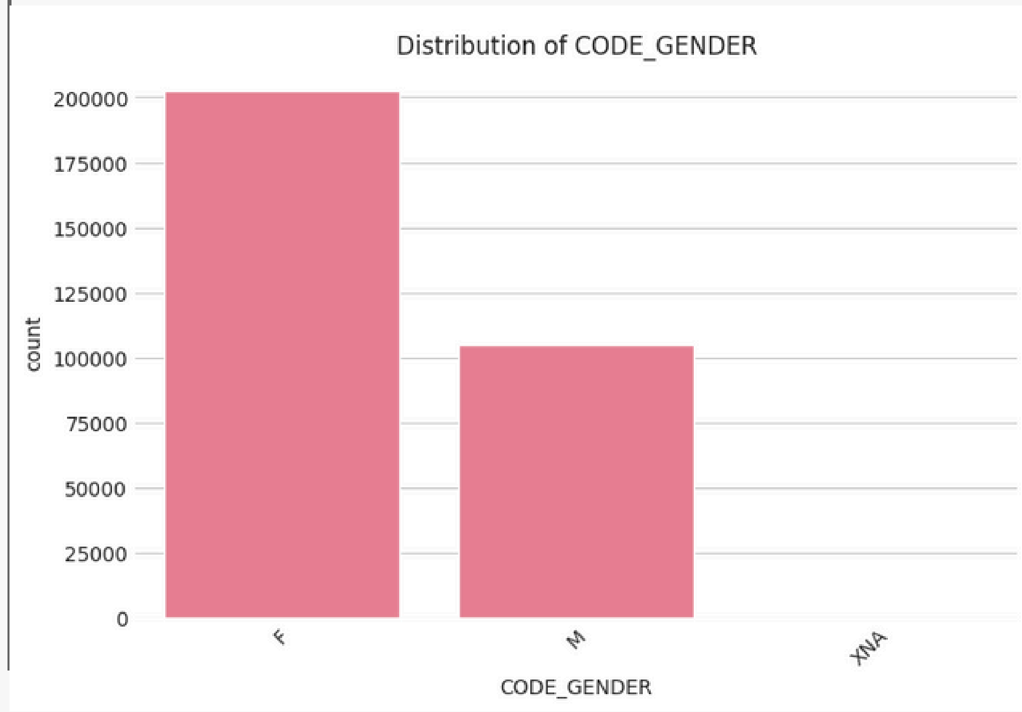
Gender:

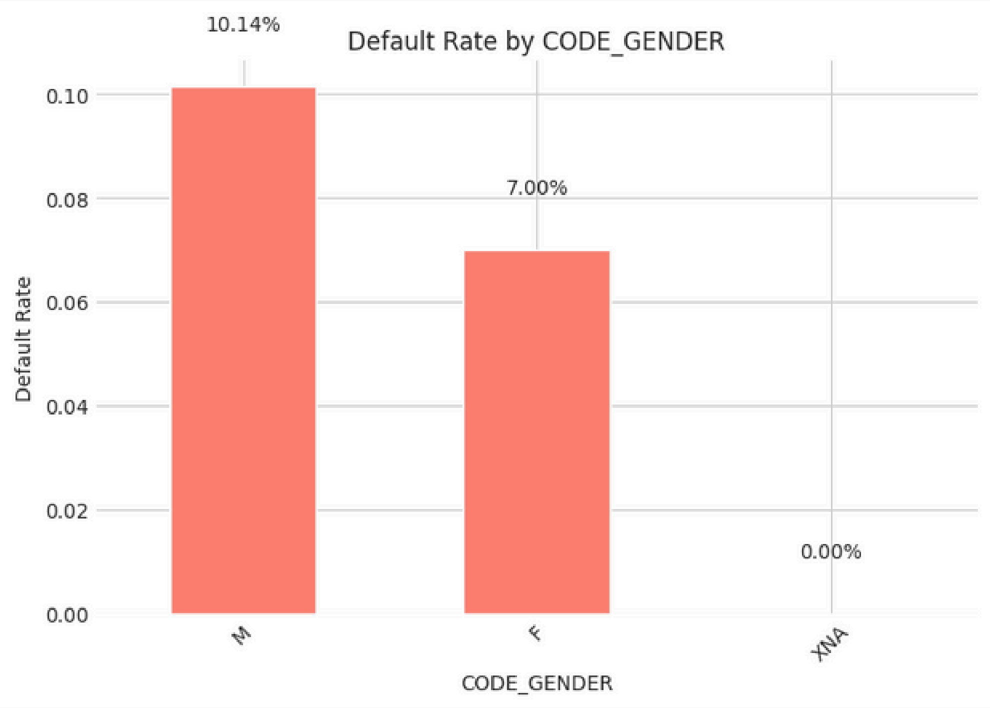
- Males show higher default proportion

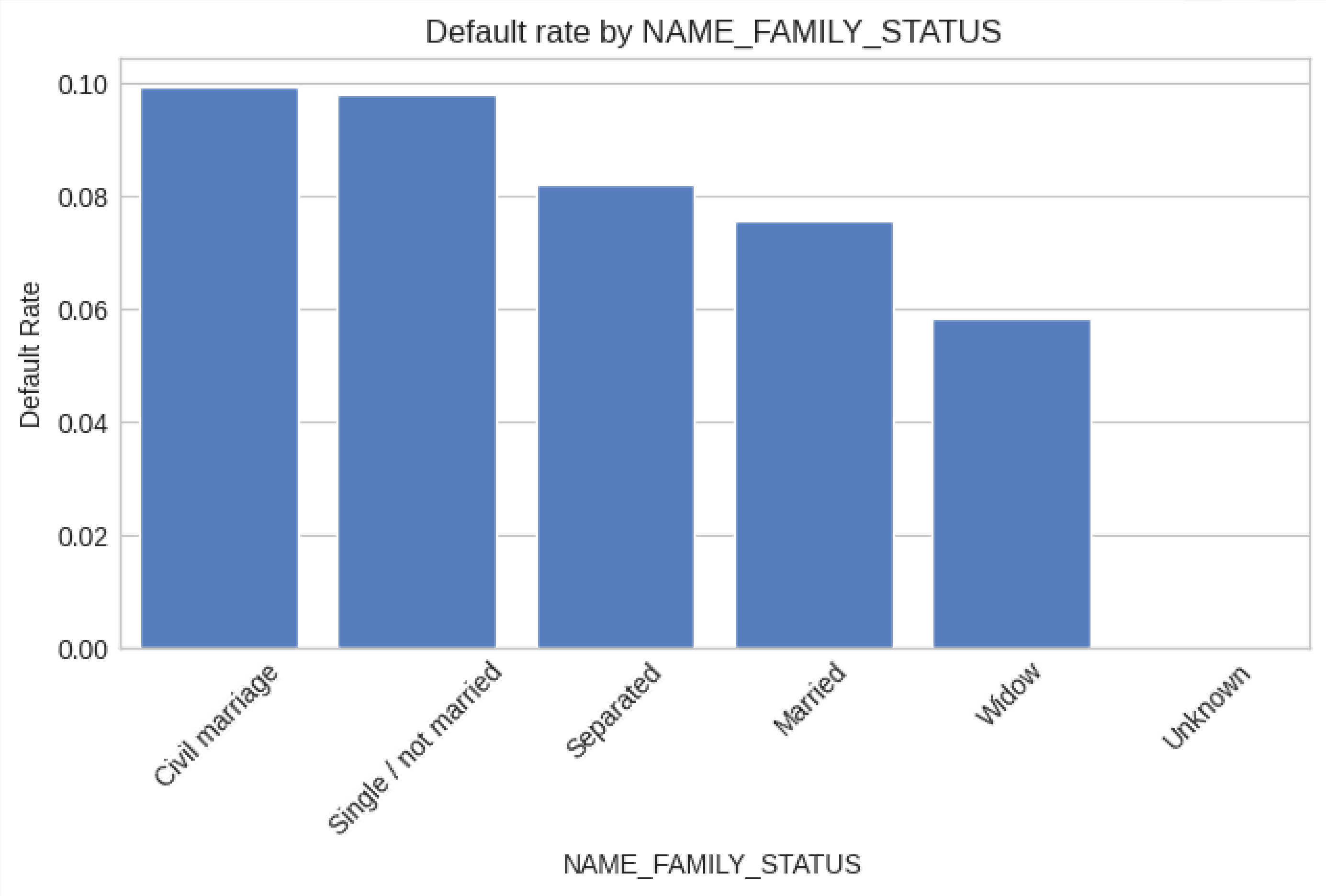
Family Structure:

- Married applicants show lower risk
- Single/Civil marriage groups → higher risk









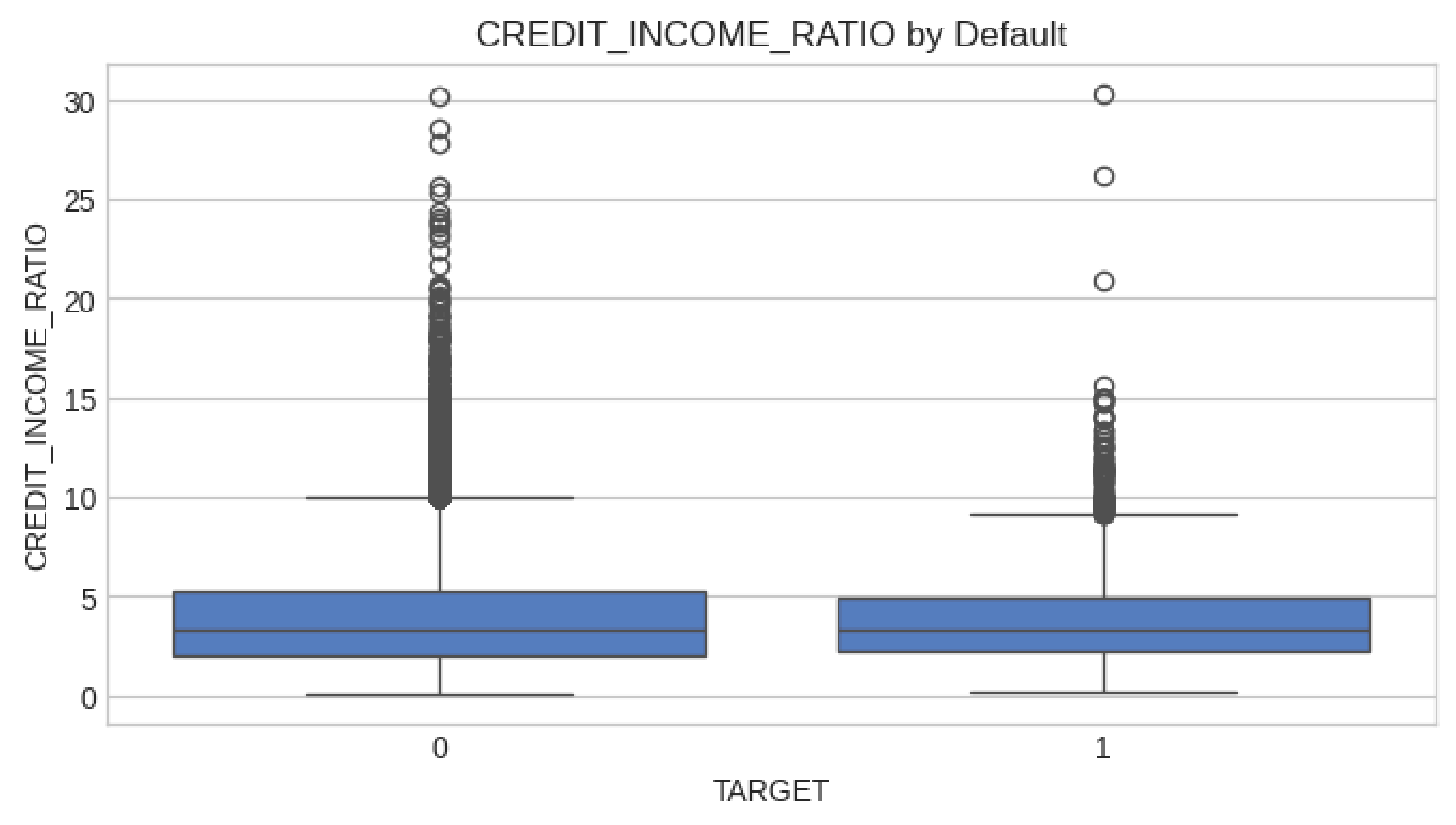
FINANCIAL CAPACITY OVERVIEW

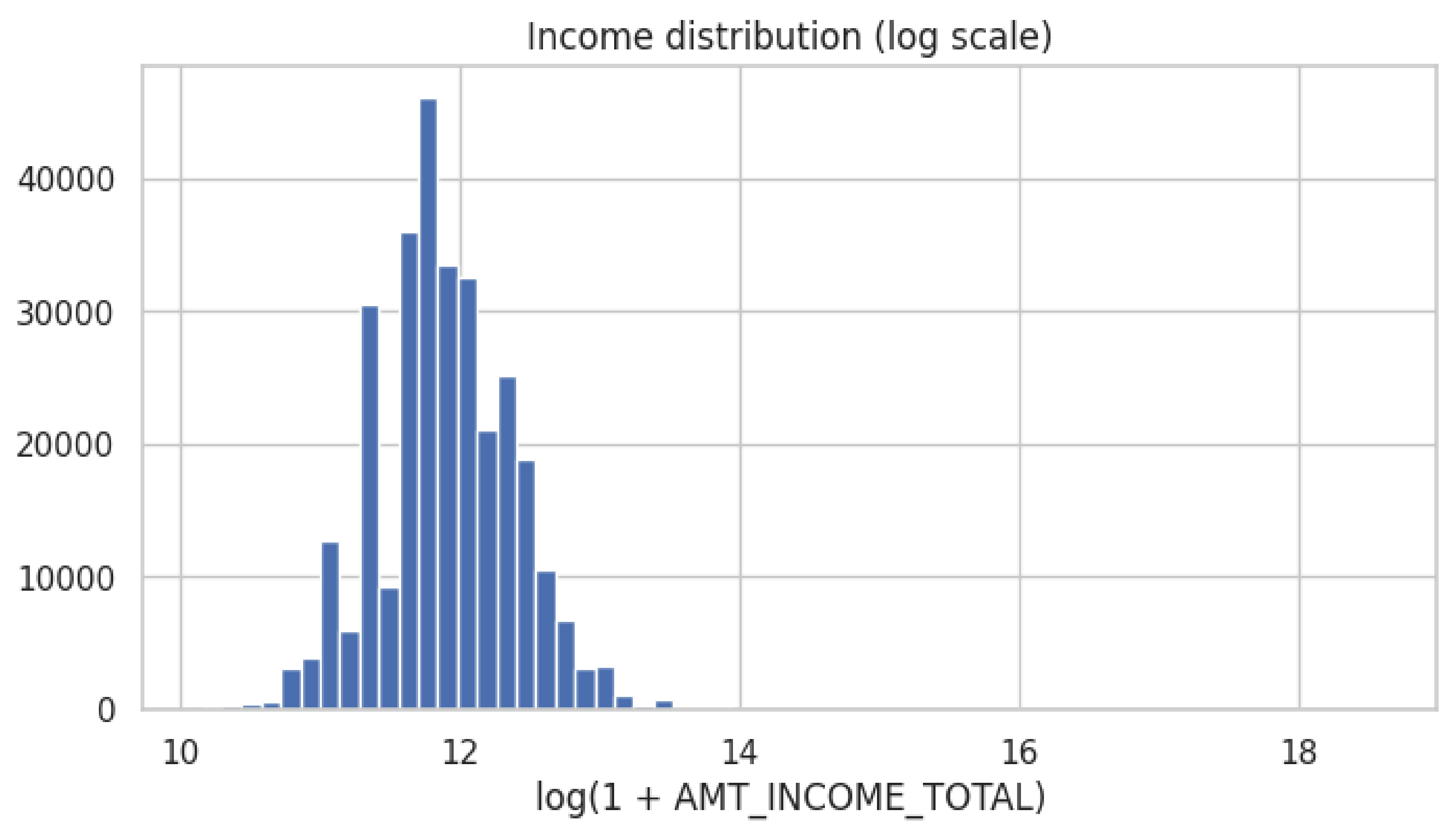
Income Insights:

- Income strongly skewed
- Higher income → lower default risk

Credit Burden:

- Larger credit → higher risk
- Defaulters typically take higher credit amounts





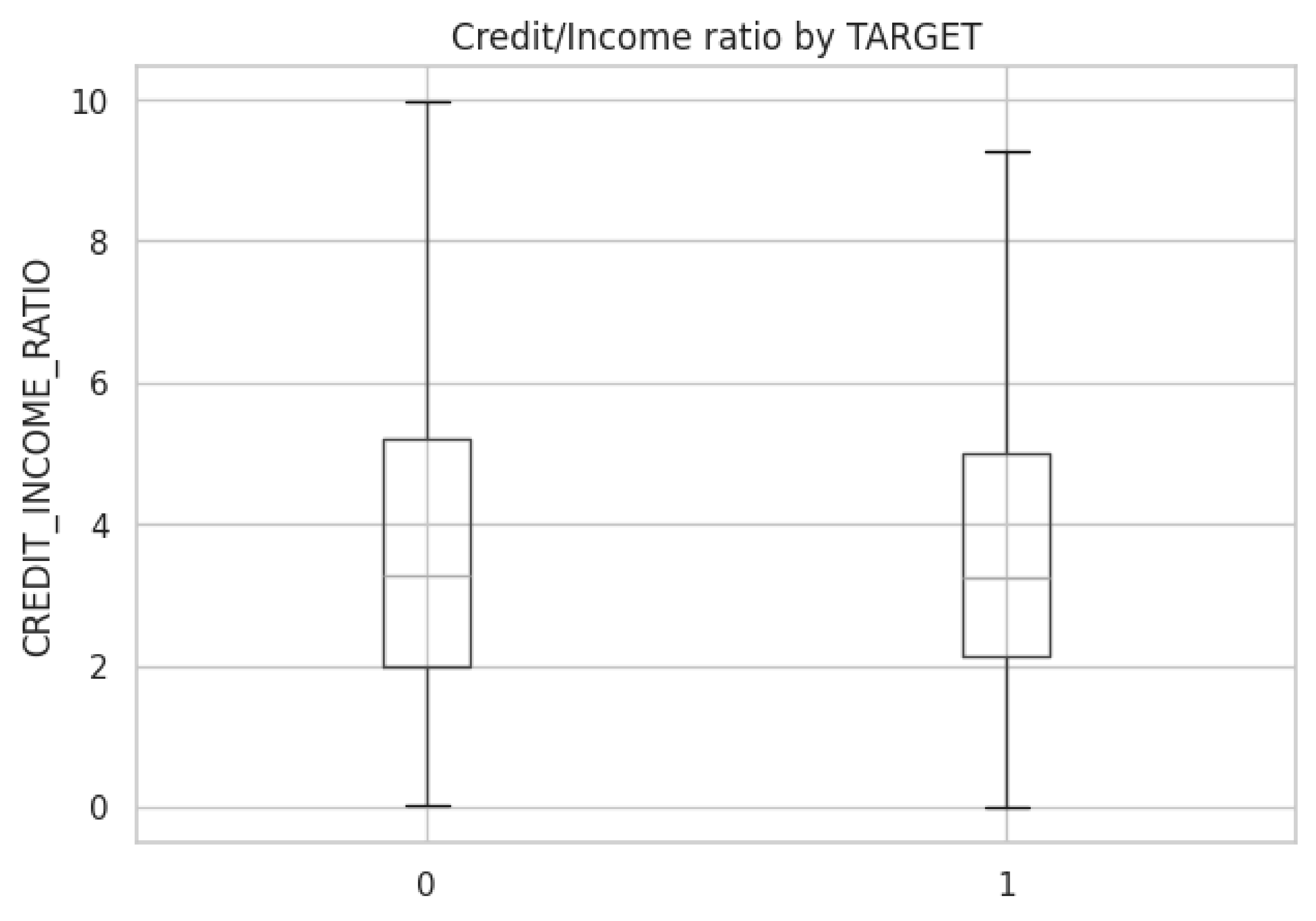
CREDIT–INCOME STRESS INDICATORS

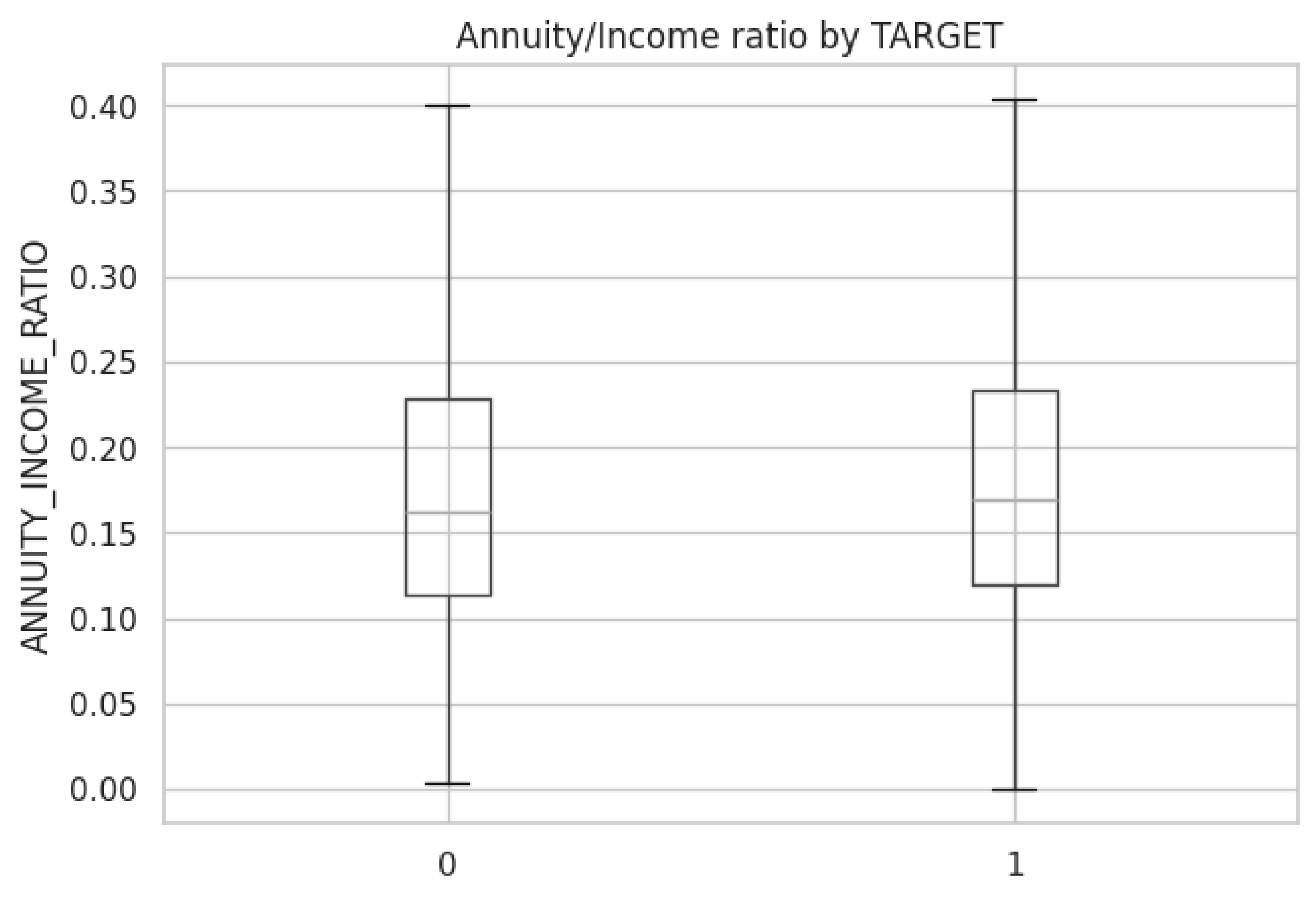
Most important financial predictors:

- CREDIT_INCOME_RATIO
- ANNUITY_INCOME_RATIO

Insight:

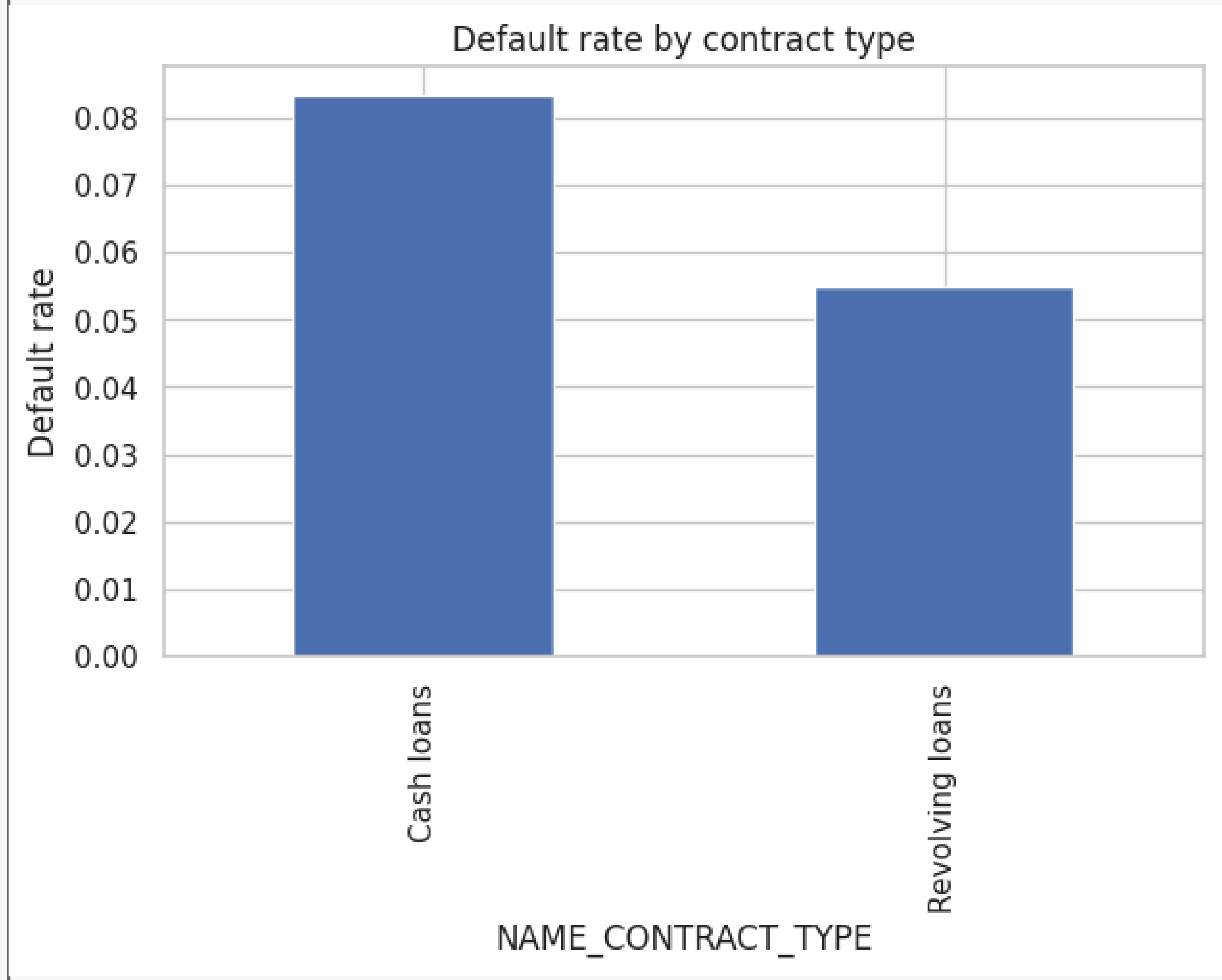
→ Higher ratios indicate higher financial stress → higher default.

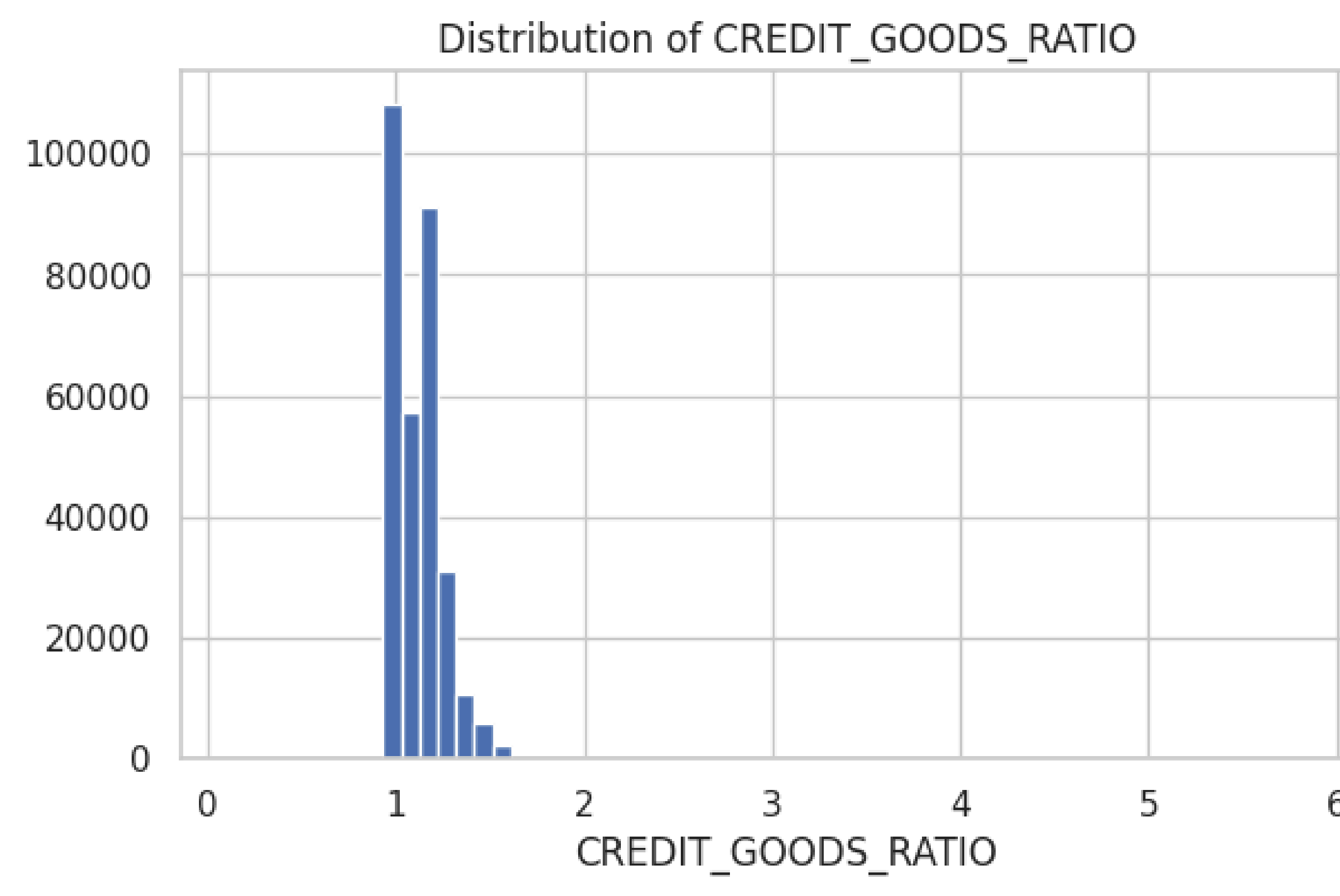


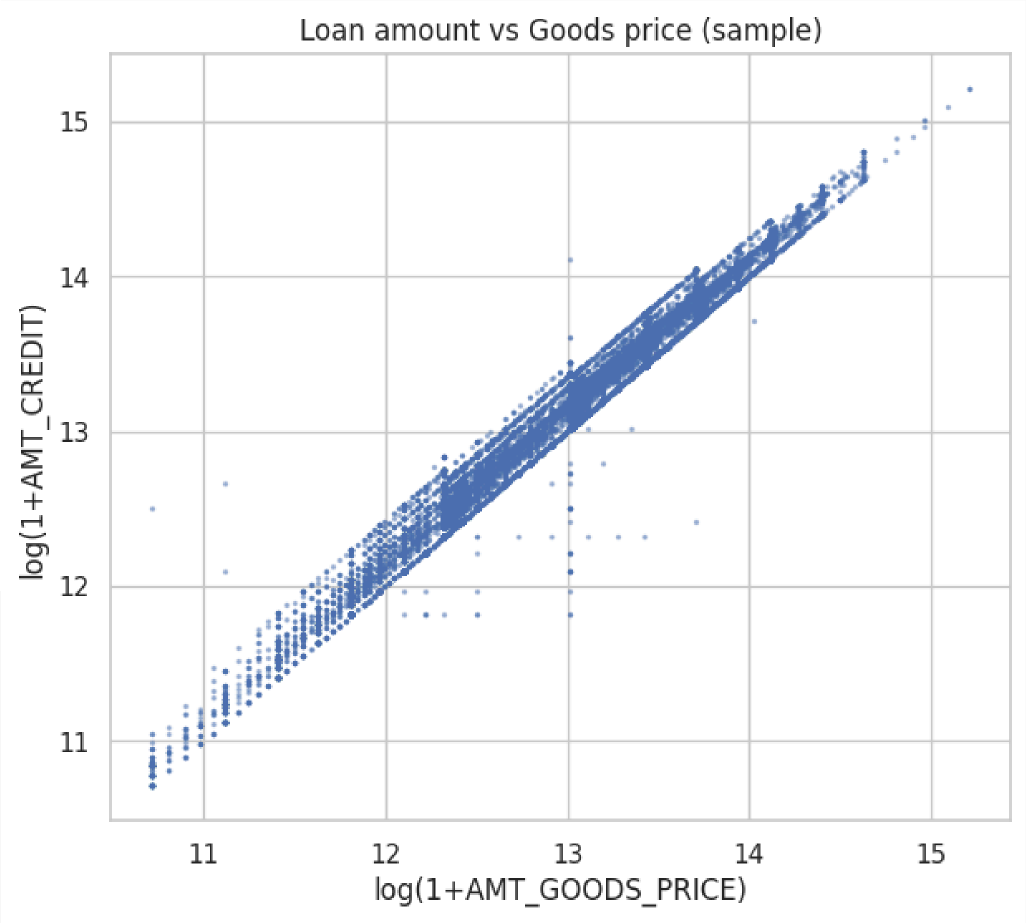


LOAN STRUCTURE & PRODUCT PATTERNS

- Cash loans show higher default than revolving
- Higher CREDIT_GOODS_RATIO → low down payment → high risk

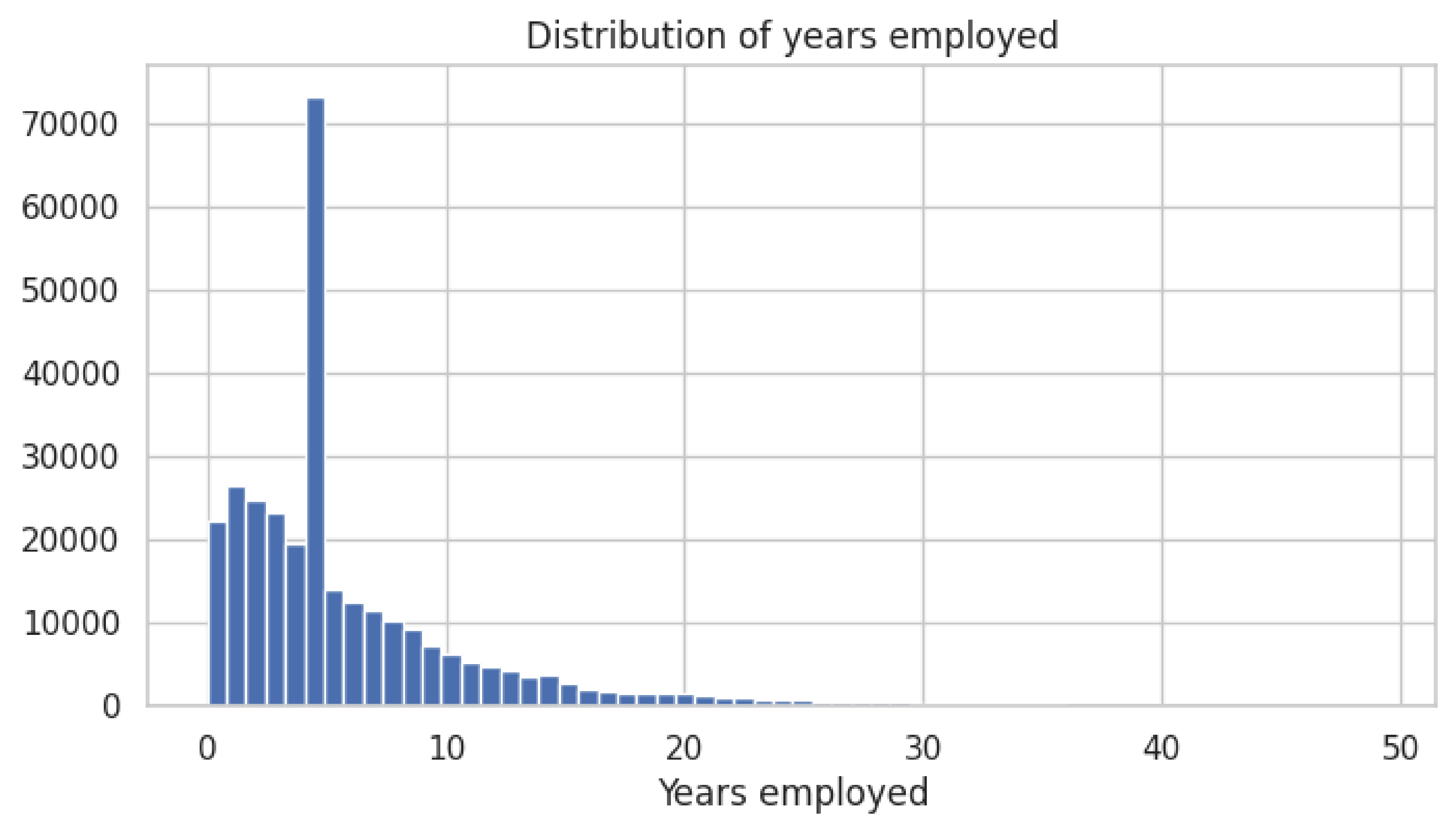


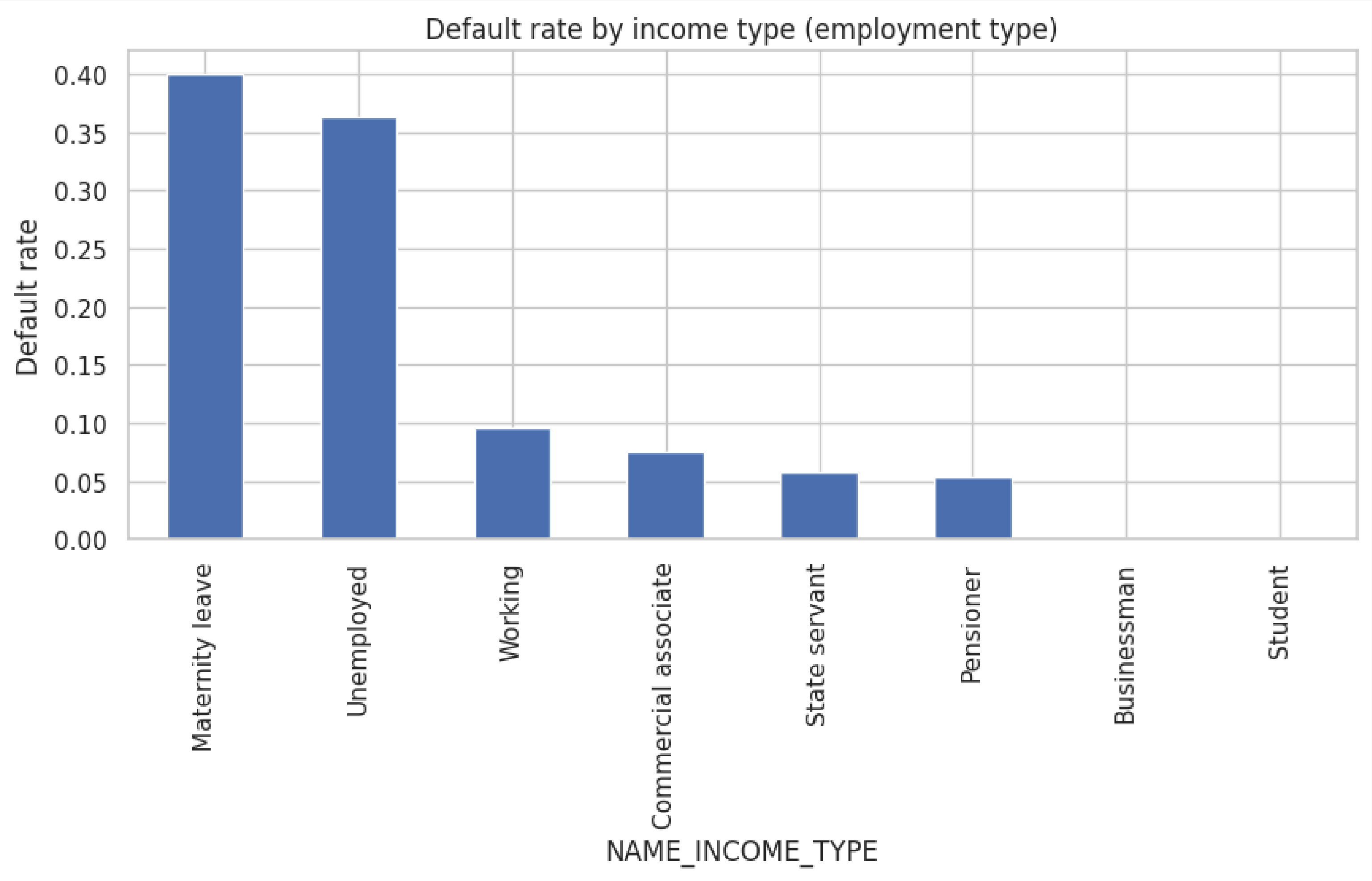


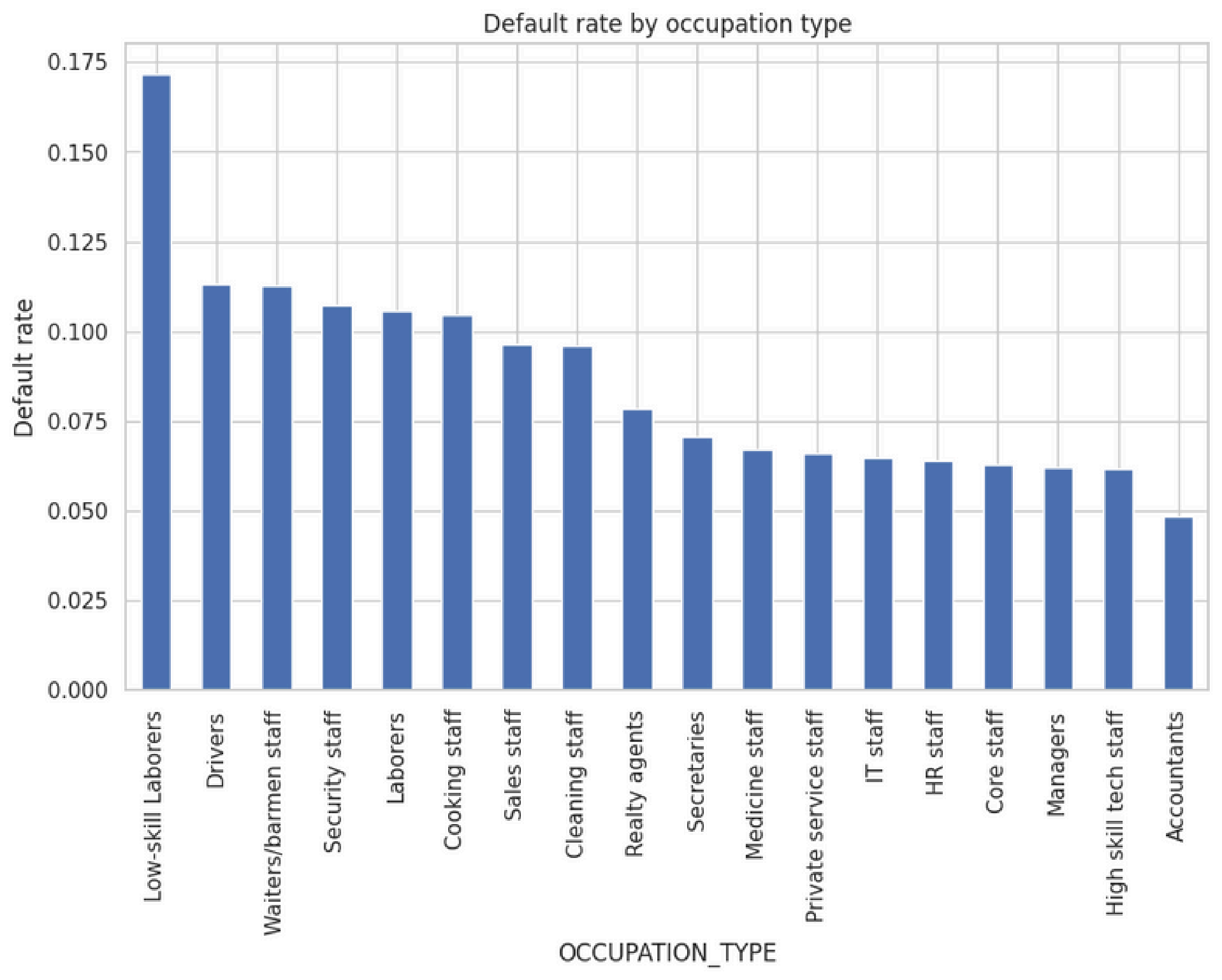


EMPLOYMENT STABILITY

- Key insights:
- Shorter tenure = higher risk
- Self-employed & Laborers → higher default
- Stable jobs (State servant) → lowest risk

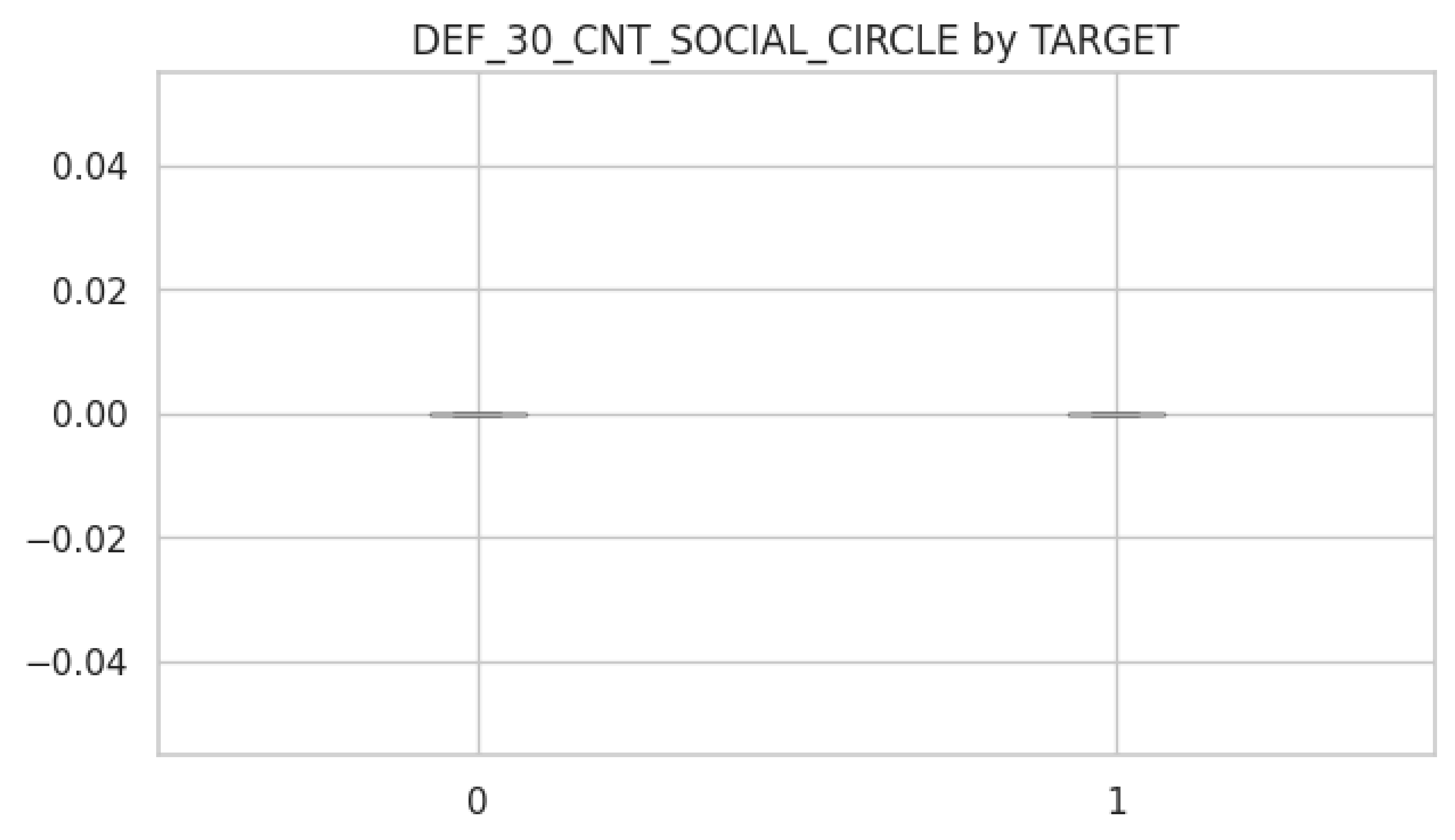


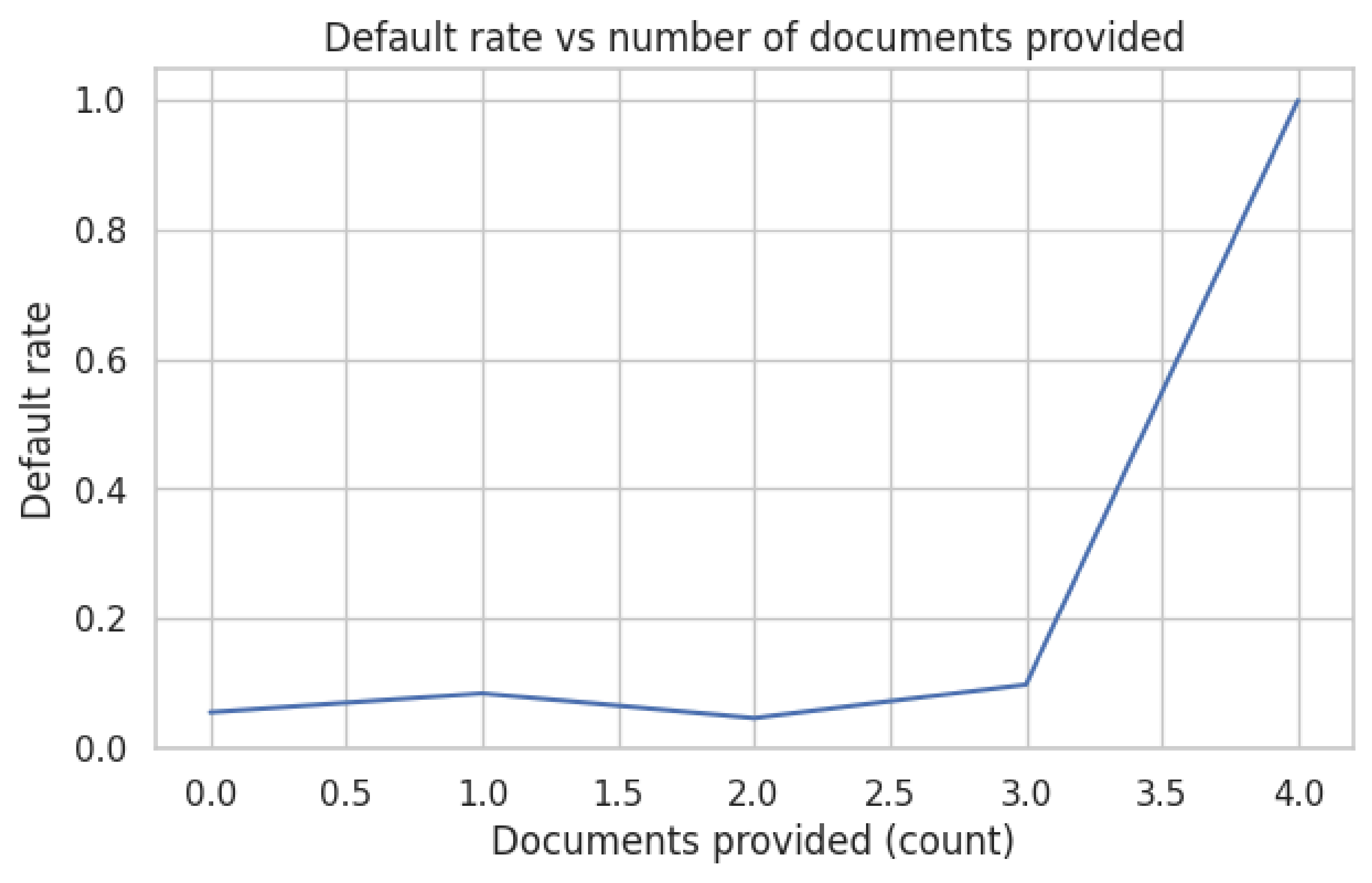




SOCIAL BEHAVIOUR & DOCUMENTATION

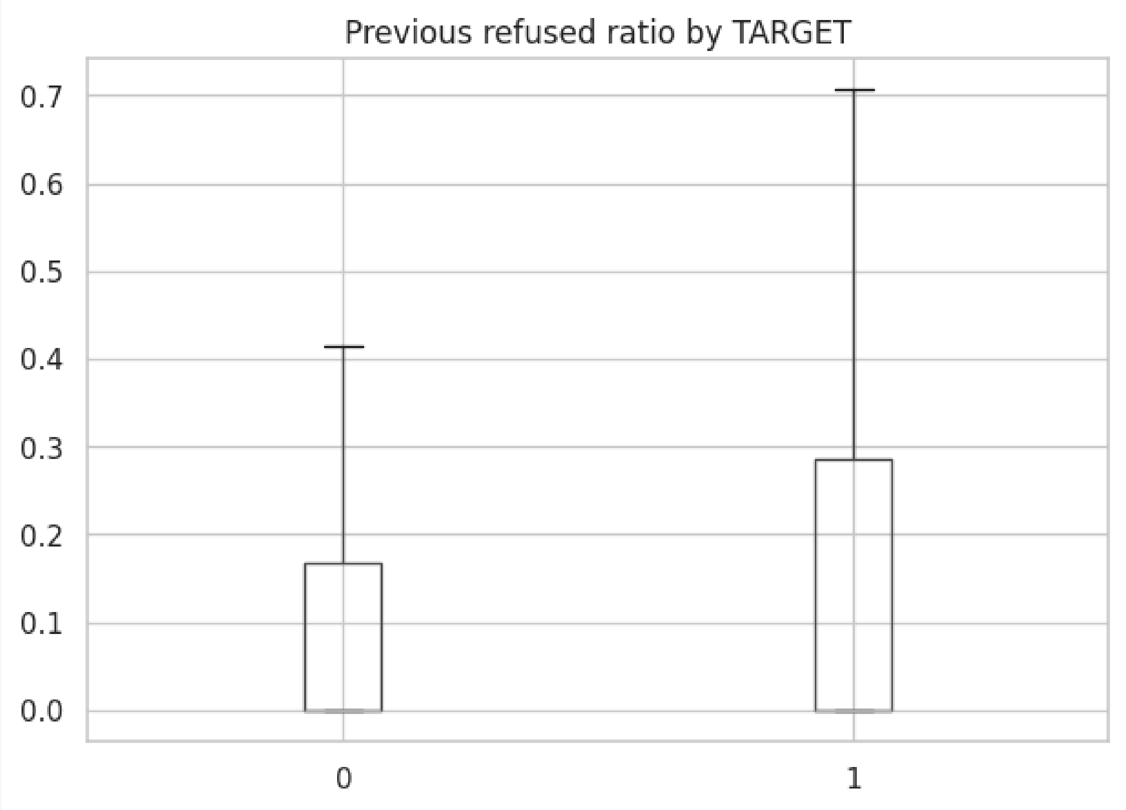
- Social Influence:
- Higher default in applicant's social circle → higher personal default probability
- Document Behaviour:
- More documents uploaded → lower default
- Signals reliability

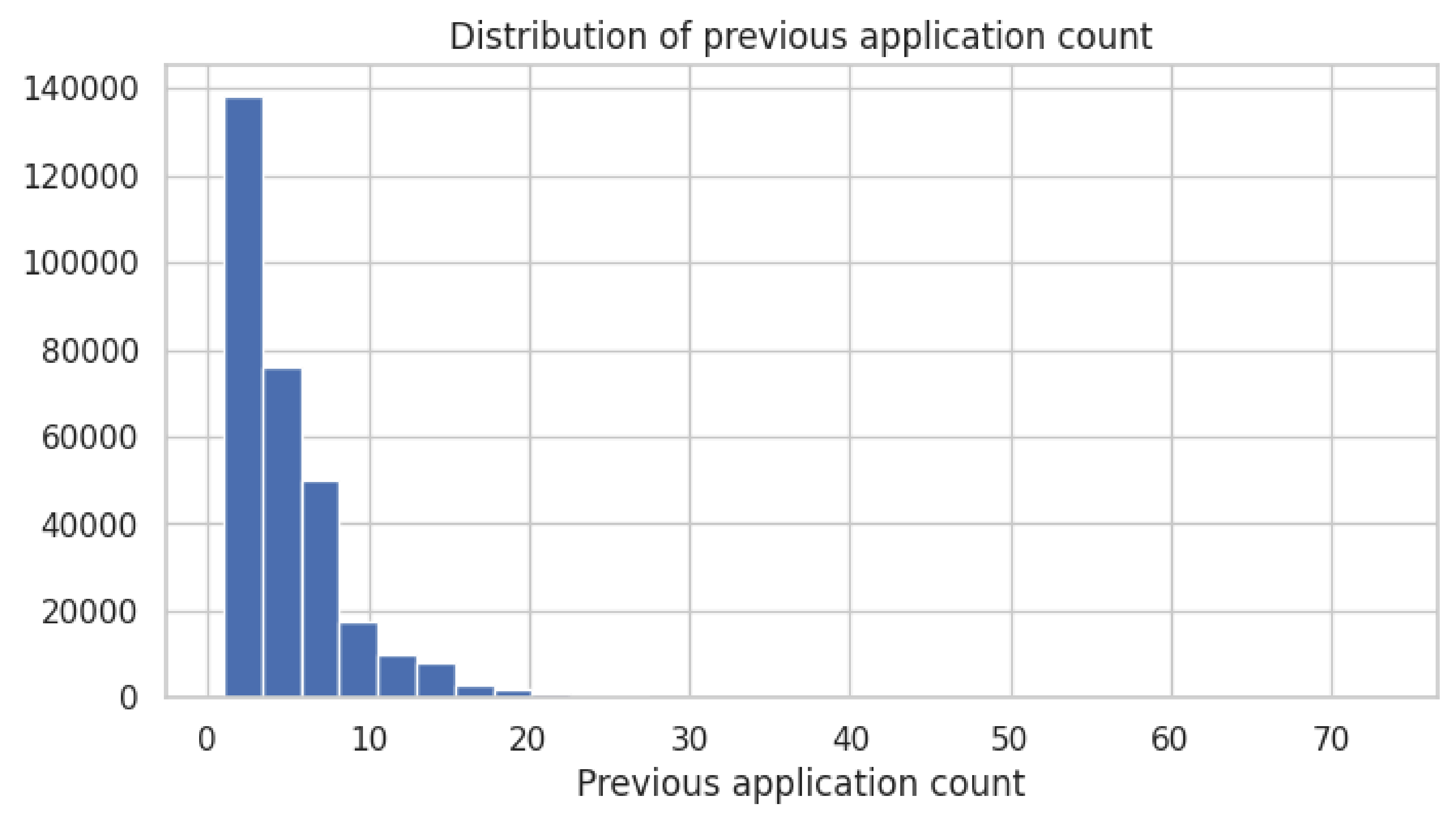


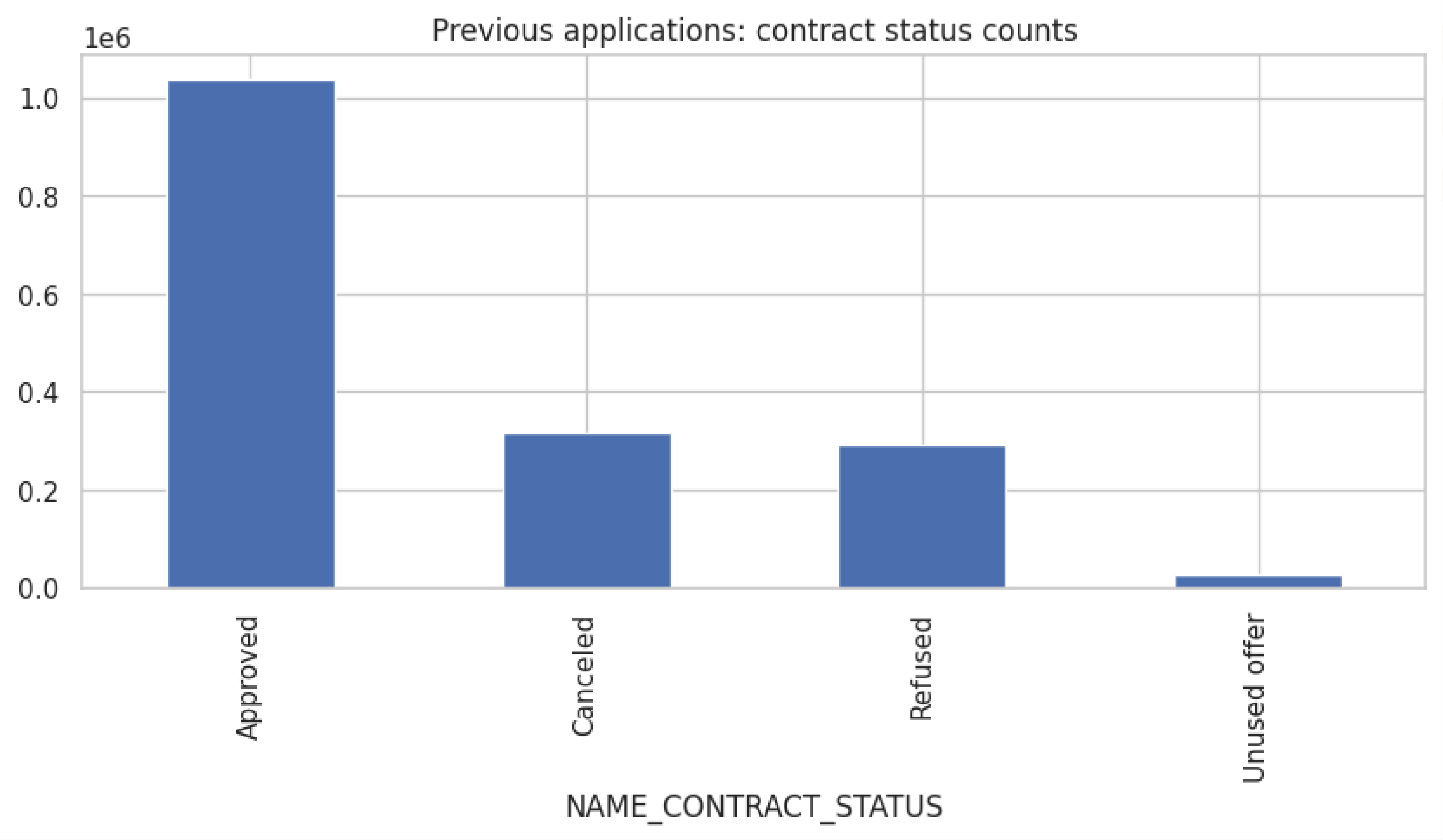


CREDIT HISTORY (PREVIOUS APPLICATIONS)

- High previous refusal ratio strongly predicts default
- More past applications = higher scrutiny required
- Past contract types reveal risk patterns

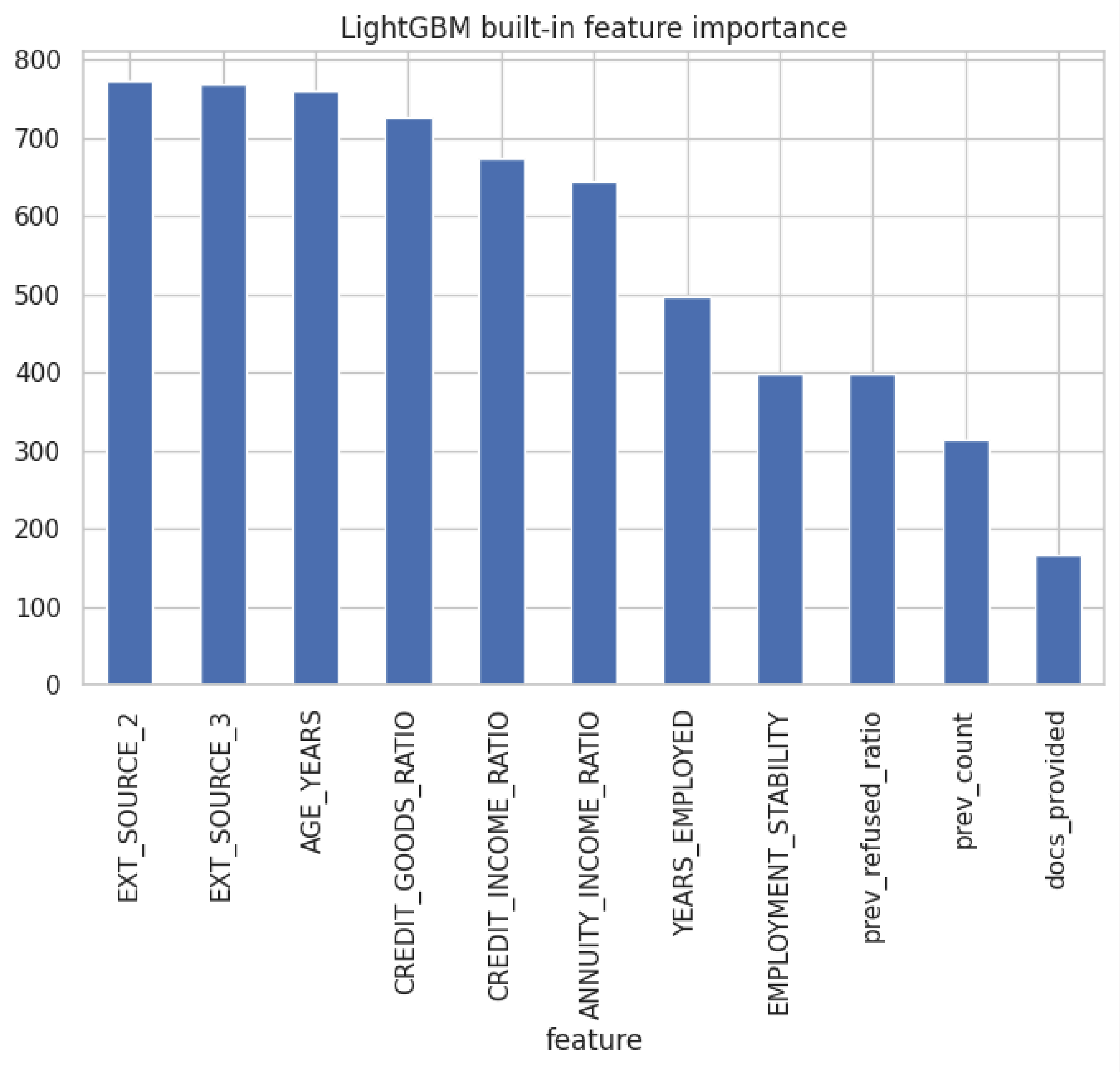


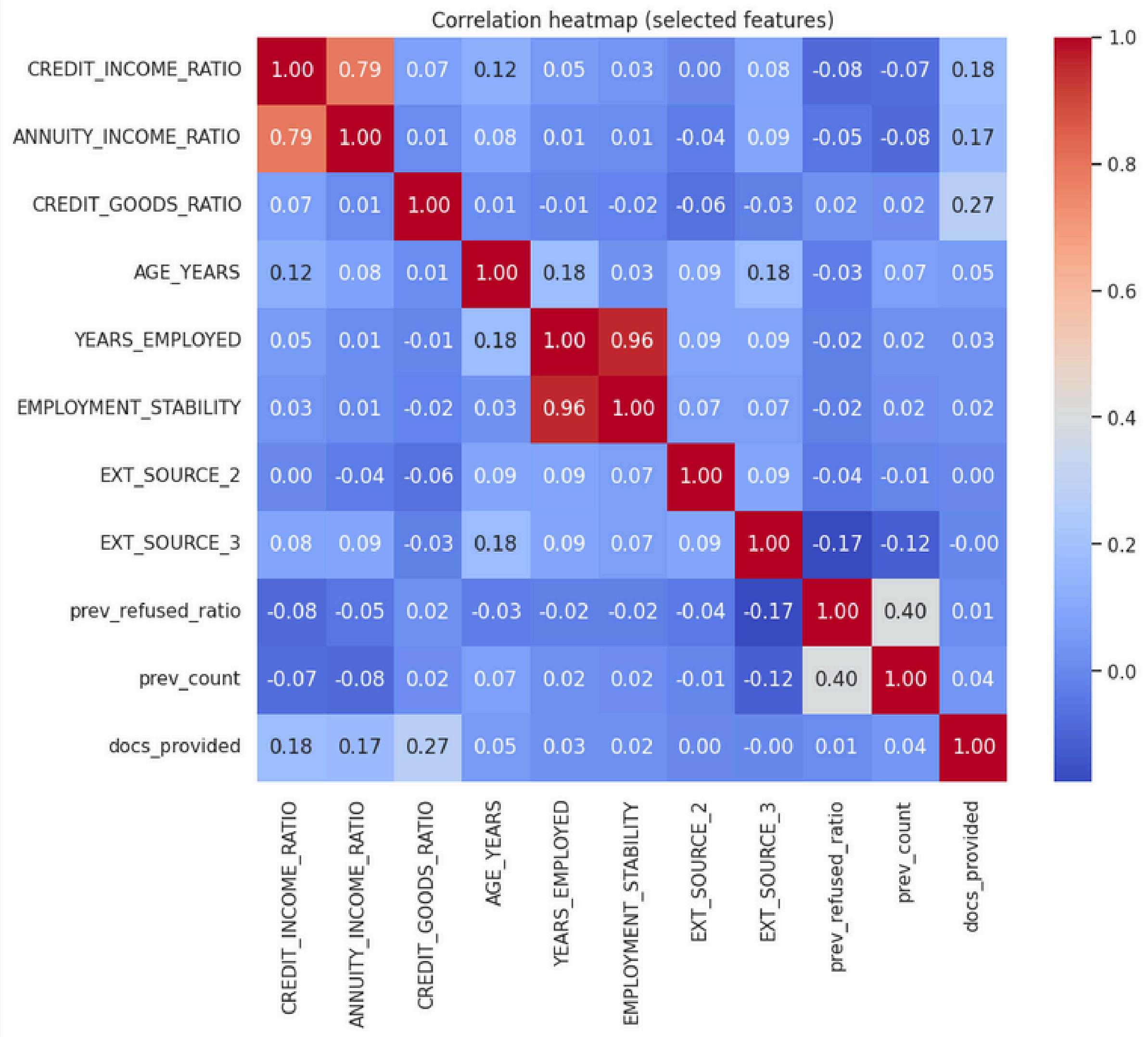


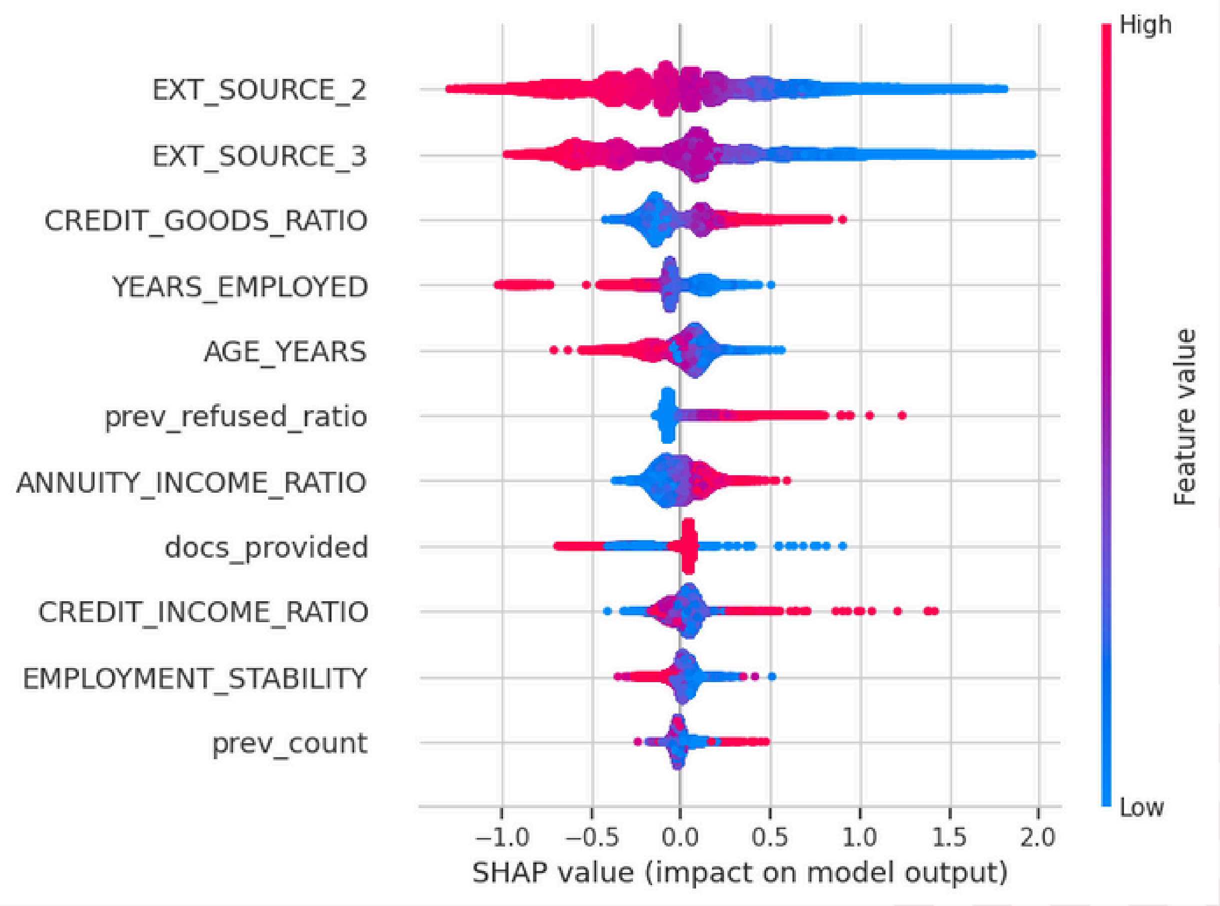


CORRELATION & FEATURE IMPORTANCE

- Model-based insights (LightGBM):
- Most critical predictors of default:
- Credit–Income Ratio
- External Scores (EXT_SOURCE_2, EXT_SOURCE_3)
- Employment Stability
- Previous Refusal Ratio

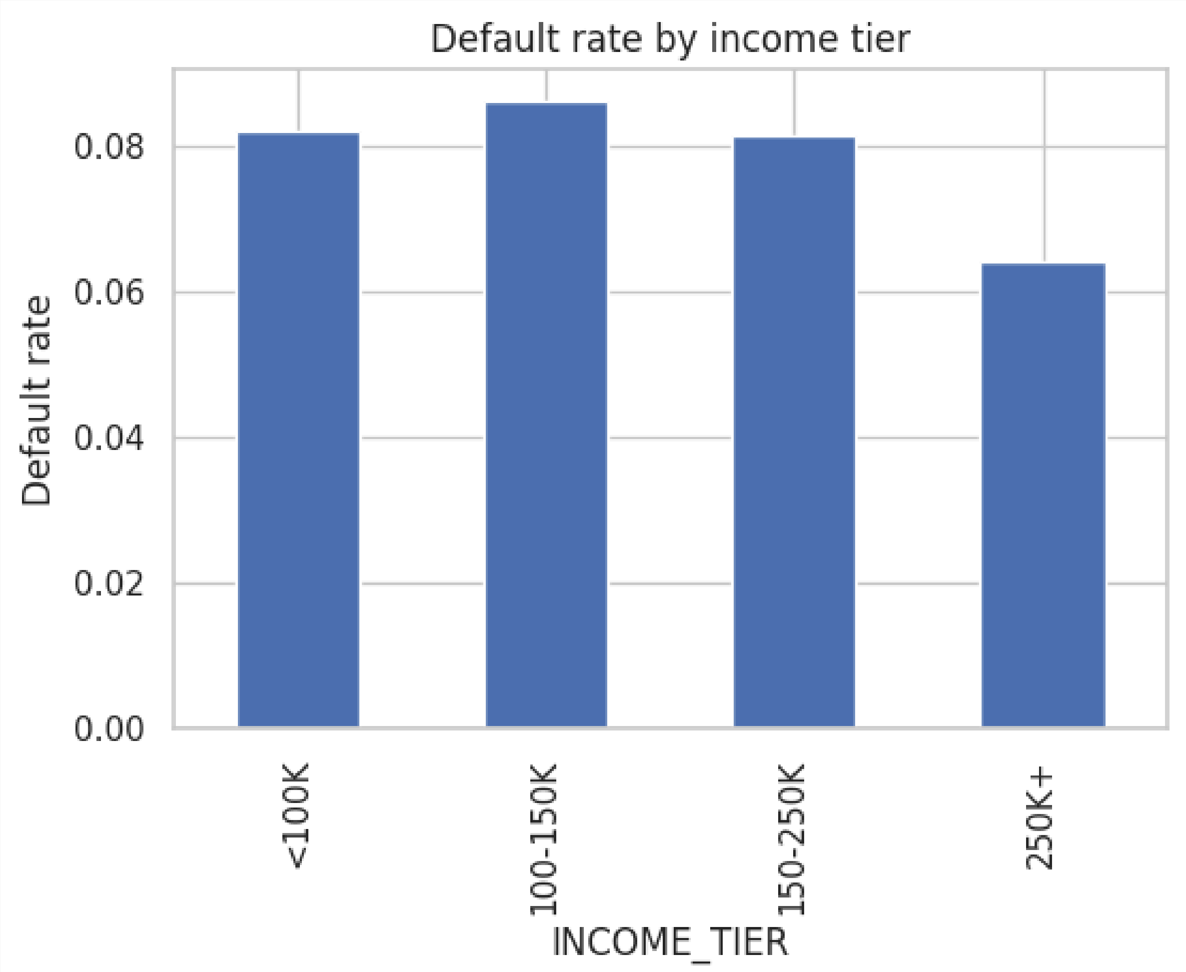


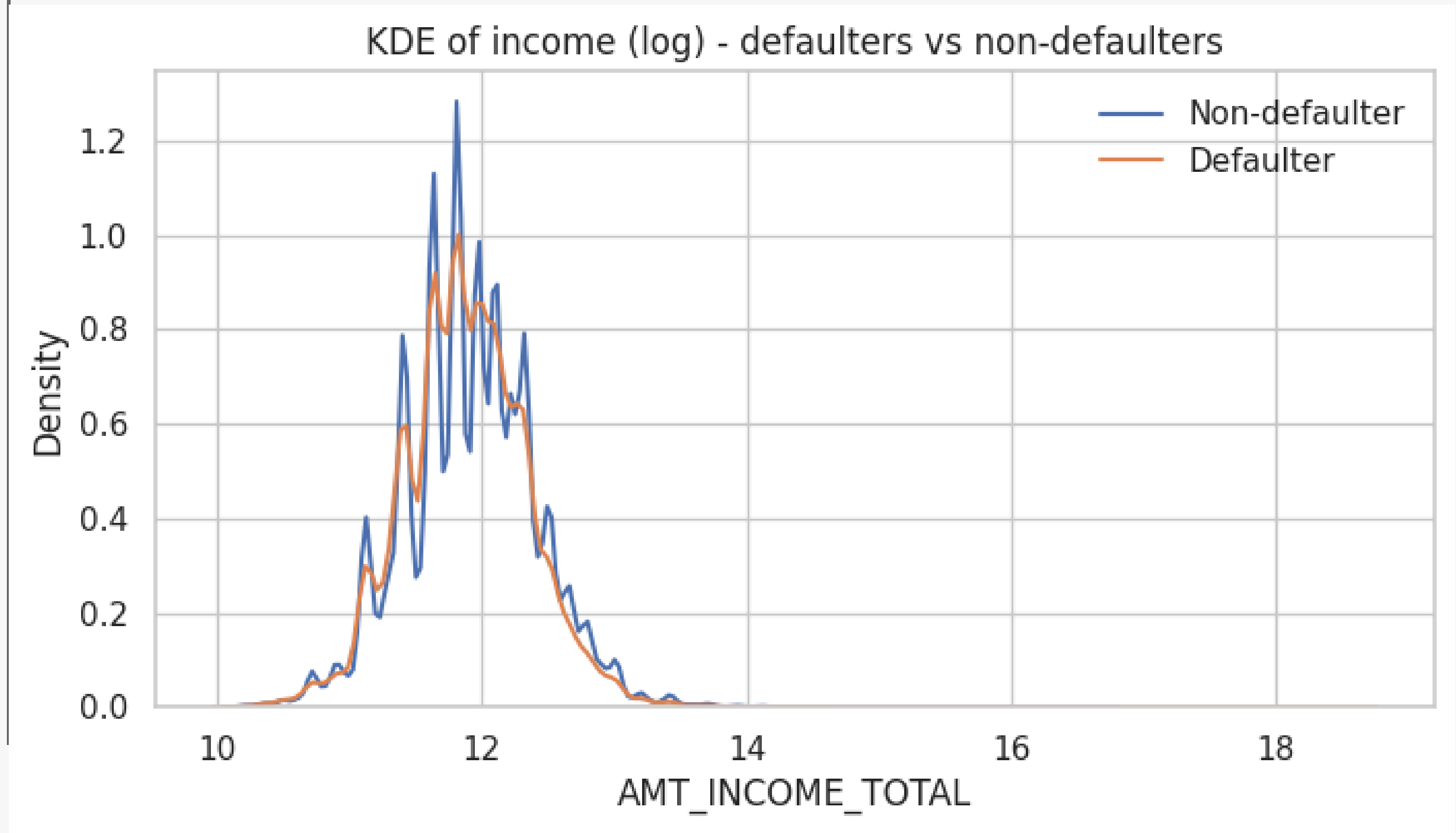


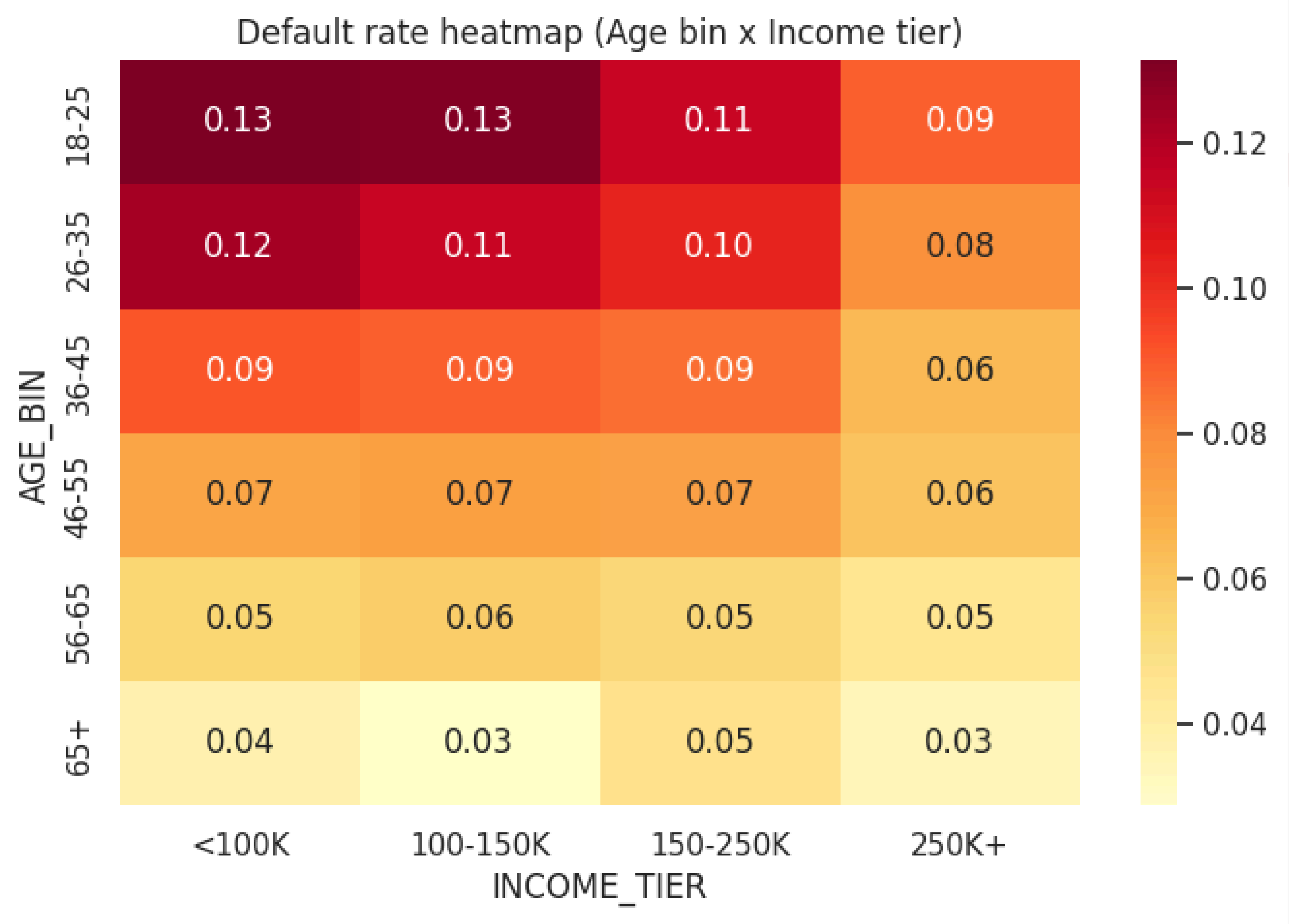


SEGMENTED RISK ANALYSIS

- High-risk groups:
- Young + Low Income
- Low tenure + High credit burden
- Applicants with multiple past refusals







FINAL RISK PROFILE

01 Who is High Risk?

- Age 18–35
- Credit/Income Ratio ≥ 2
- Employment < 2 years
- EXT_SOURCE low
- Previous loan refusals
- Low documentation

02 Who is Low Risk?

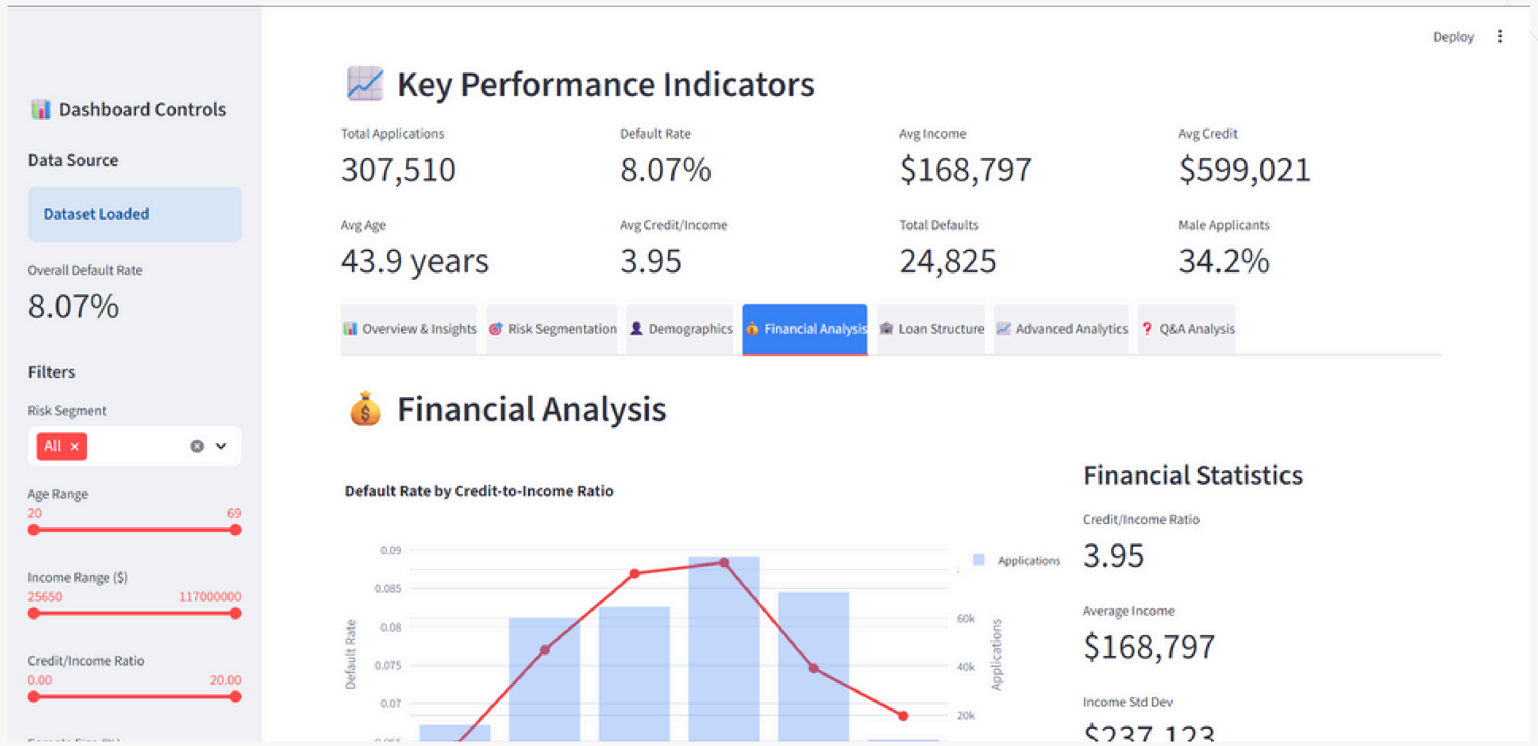
- Age > 40
- Stable employment
- Low credit burden
- Good past credit history
- Higher income tier
- More documentation

Risk is not about who to reject — it's about understanding who needs caution, support, or confidence.

Interactive Dashboard Demo

What our dashboard offers:

- ✓ Applicant filtering
- ✓ KPI cards
- ✓ Default risk segments
- ✓ Risk-by-age, income, occupation
- ✓ Previous application summaries
- ✓ Credit stress indicators



RECOMMENDATIONS TO CREDIT

- Focus on credit burden ratios for approval
- Give benefits to stable employment applicants
- Introduce stricter checks for:
    - • Young borrowers
    - • Self-employed
    - • High previous refusal ratio
- Require more documents for verification
- Use predictive scoring to prioritize safe approvals

The smartest credit decisions balance data-driven caution with customer opportunity.

CONCLUSION

What we achieved:

01 Deep EDA across 30+ visuals

02 Identified top default predictors

03 Built a robust risk dashboard

04 Delivered actionable insights for credit decision-making

Thank You

Presented By

DATA WIZARDS