

Predicting Loan Defaults

From Data to Business Decision Support

Andrea M. Pena
05/13/25

Why predict loan defaults?

- **Loan officers**
- **Risk Managers**
- **Customer Service**
- **Stakeholders**



Designed by Freepik

Business Goals

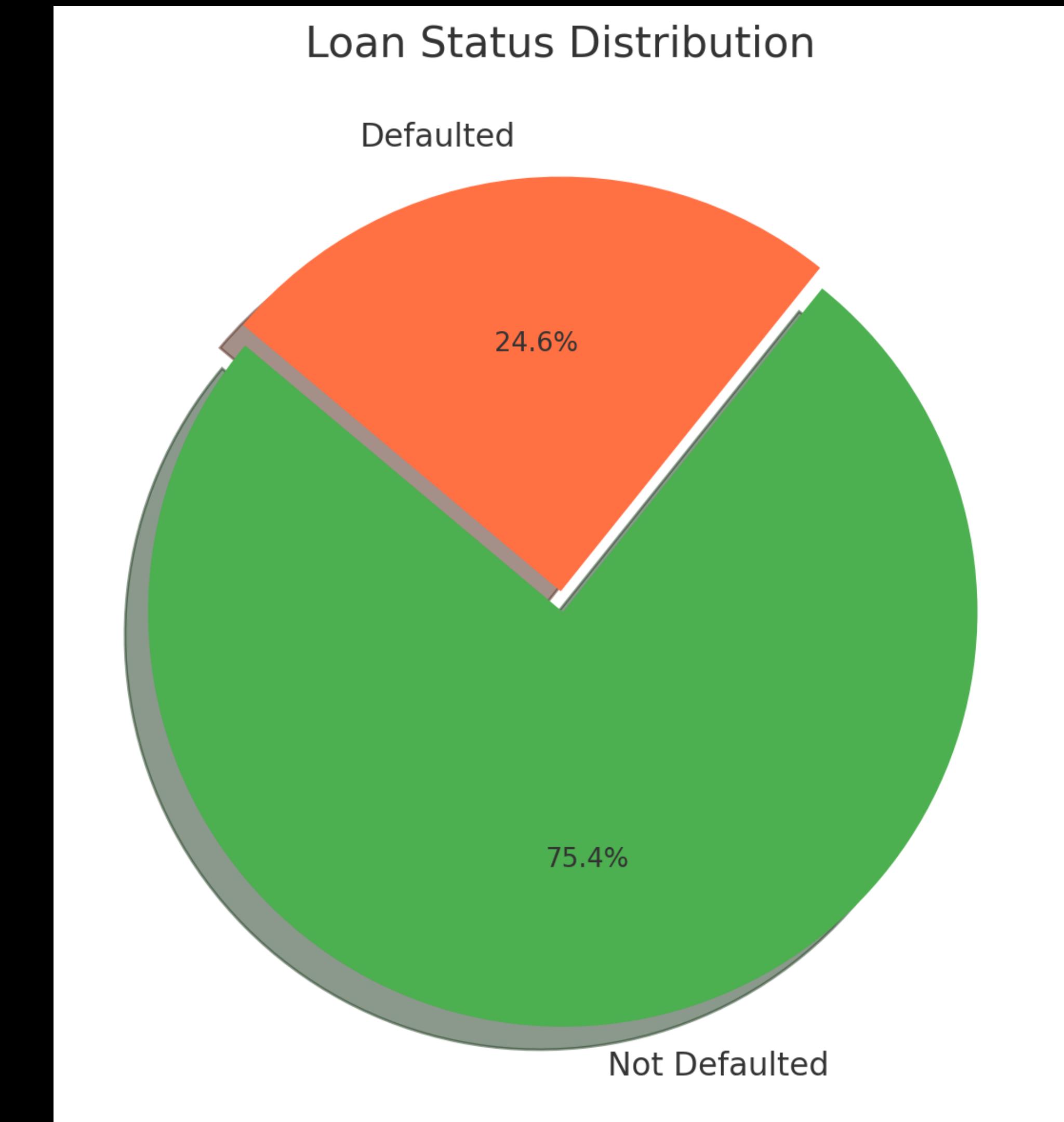
- Predict high-risk applicants
- Improve clarity behind loan decisions
- Support business strategy



Designed by Freepik

Data Overview

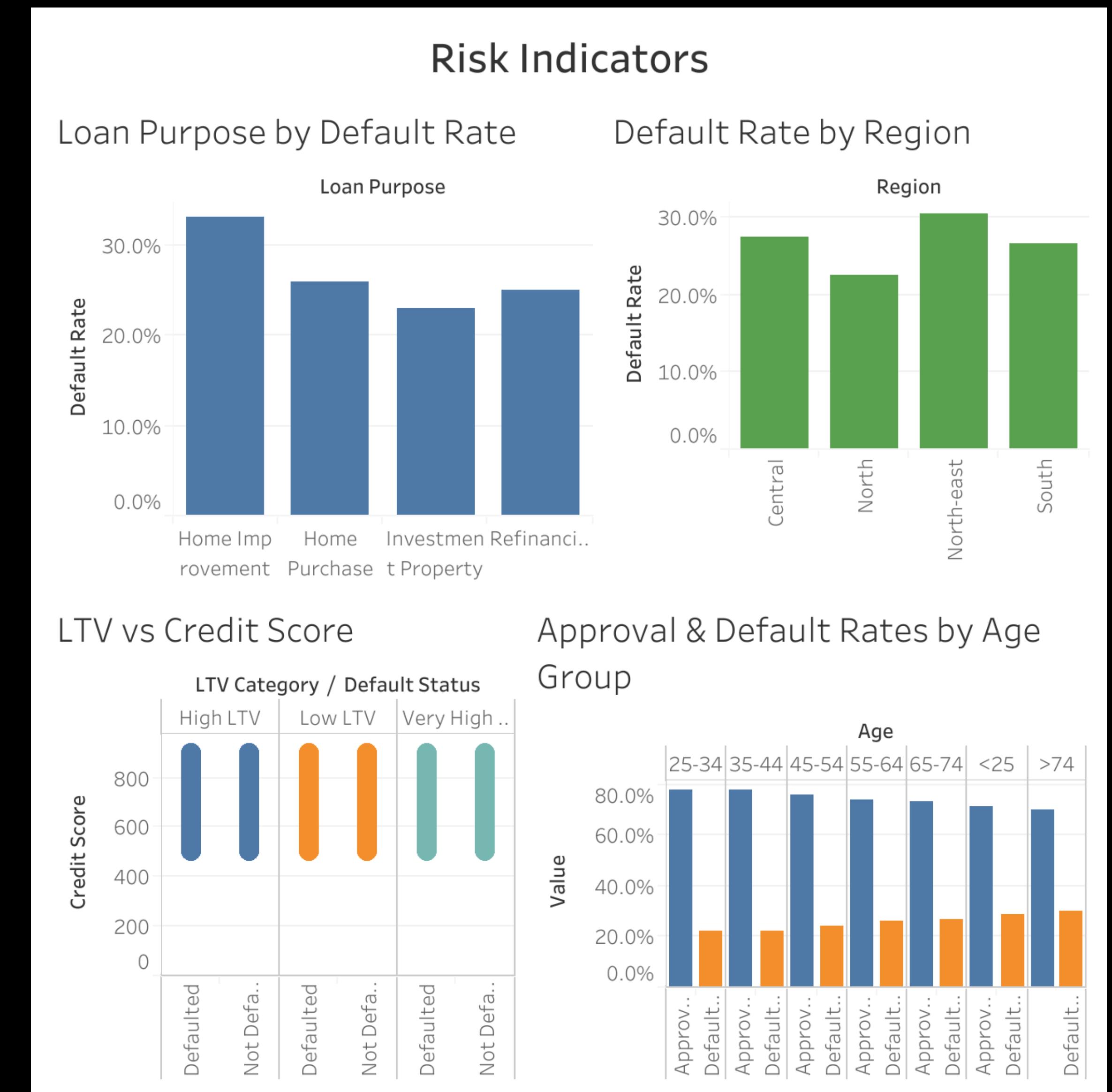
- **Source: Kaggle Loan Dataset**
- **148,670 applicants, 39 features**
- **Target variable: Status**
- **Data cleaning**



Data Cleaning: Found class imbalance

Exploratory Data Analysis

- **Data Overview**
- **Data Insights**
- **Risk Indicators**
- **Hierarchies**
- **Relationships**



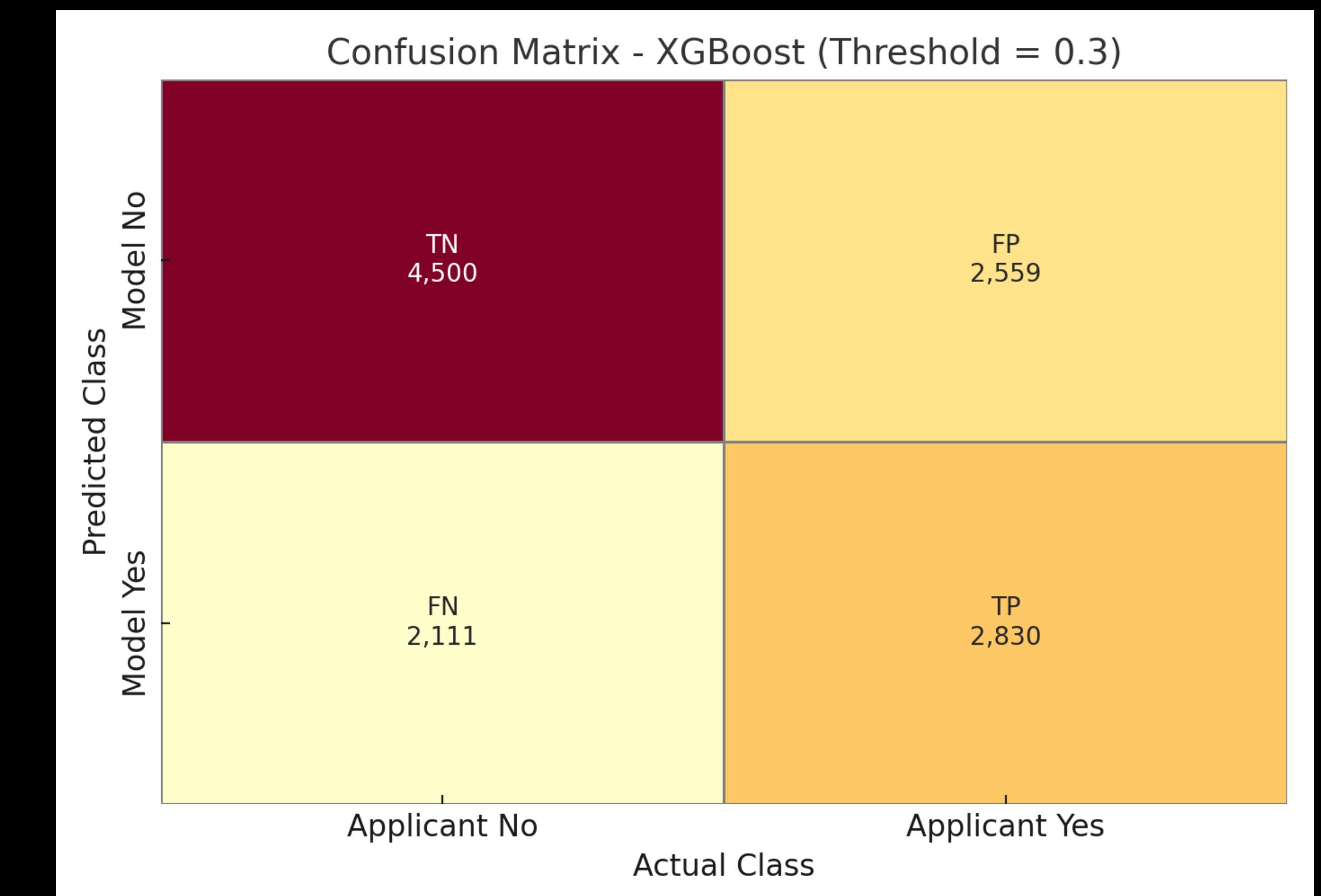
How This Model Protects and Grows the Business?

Key Performance Indicators:

- Recall
- Precision

Business Risks:

- False Negatives
- False Positives



Modeling Approach

- Model Selection
 - Logistic Regression
 - Random Forest
 - XGBoost
- Custom Thresholds
 - $0.5 \rightarrow 0.3$



Designed by Freepik

Why This Model Wins: High Recall + Strong Balance

XGBoost(0.3)

71% RECALL

- Catches more defaulters
- Still precise(67%)
- Generalizes well(90% train acc)
- Strong classifier(AUC = 0.87)

Error Analysis: Who Are We Misclassifying?

False Negatives:

High-income borrowers → 
→ **Risk: Unexpected Defaults**

False Positives:

Low-income and credit score applicants → 
→ **Risk: Missed Lending Opportunities**

Key Predictive Features

- **Loan-to-Value Ratio (LTV)**
- **Debt-to-Income Ratio(DTI)**
- **Income**
- **Property Value**
- **Credit Type - Equifax**



Designed by Freepik

Business Recommendations

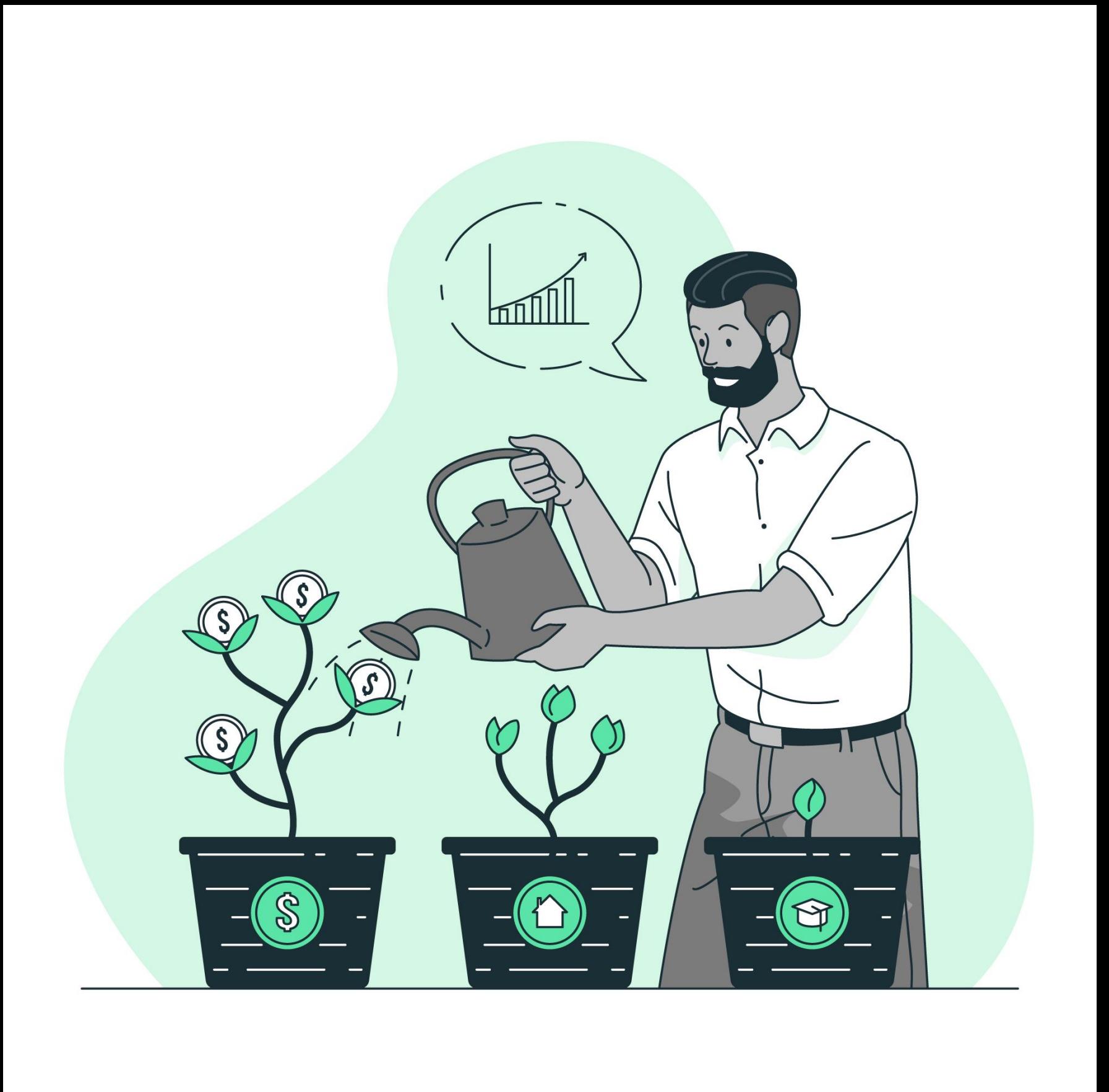
- Deploy a real-time risk scoring tool
- Recover revenue with precision-based overrides
- Add explainable risk scores
- Monitor approved loans with high-risk signals



Designed by Freepik

Future Steps

- Fairnesss audit
- SHAP visualizations
- Explore deeper segmentation
- Test model on real-time applicants
- Fine tune model



Designed by Freepik

Thank you
Q & A