Reject Inference in Credit Risk – Beginner Guide

# 1️⃣ The Basic Problem

When people apply for a loan or credit card, the bank decides:  
✔️ Accept → Loan is given → We see how they repay (good or bad).  
❌ Reject → No loan → We never know how they would have repaid.  
  
But when building a credit scoring model, we need data on both good and bad customers. If we only use accepted ones, the model is biased because it ignores rejected applicants.

# 2️⃣ What is Reject Inference?

Reject inference means: Guessing the repayment behavior of rejected applicants using math/statistics. This way, we can include them in the model and make it more realistic.

# 3️⃣ Why It Matters?

• Fairness: Avoid unfairly rejecting potentially good customers.  
• Business Growth: Find hidden “good” customers in the rejected pool → more approvals.  
• Better Models: Reduce bias and make scorecards more accurate.

# 4️⃣ Simple Methods to Do Reject Inference

Think of it like filling missing pieces of a puzzle:  
  
1. Augmentation (Random Fill) – Assign some rejects as 'good' and some as 'bad' based on probabilities.  
2. Parceling (Smart Fill) – Look at accepted customers with similar scores → assume rejects act the same way.  
3. Re-weighting – Change weights of accepted applicants so they represent the rejected group too.  
4. Machine Learning / Advanced – Use semi-supervised learning or bootstrapping to predict likely outcomes.

# 5️⃣ Limitations & Risks

• We don’t really know how rejects would have behaved.  
• Wrong assumptions = bad model.  
• Regulators sometimes don’t like reject inference because it can reduce transparency.

# 6️⃣ Quick Example (Beginner Style)

1000 people applied for a loan:  
• Bank accepted 600 → 480 repaid, 120 defaulted.  
• Bank rejected 400 → we don’t know their behavior.  
  
Reject inference tries to 'guess' how many of those 400 would repay or default, and then use that in the scoring model.

# 📊 Simple Diagram of Reject Inference

Applicants → Bank Decision → Accepted ✔️ → Observe (Good/Bad)  
 → Rejected ❌ → Unknown → Reject Inference → Estimate (Good/Bad)