



Statistics of Financial Markets

Chapter 10: Scoring Models



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Outline

Motivation

Credit Scoring

Logistic Regression

Discriminant Analysis

Model Evaluation (ROC, AUC)

Applications

Conclusions

References

Motivation

- The importance of credit risk assessment in financial institutions
- From expert judgment to statistical scoring models
- Regulatory framework: Basel II/III and IRB approaches

Credit Scoring

- Overview of credit scoring systems
- Application vs. behavioral scoring
- Data requirements and feature engineering
- Weight of Evidence (WoE) and Information Value (IV)

Logistic Regression

- Binary classification: $P(Y = 1 | x) = \frac{1}{1 + e^{-x'\beta}}$
- Maximum likelihood estimation
- Odds ratios and coefficient interpretation
- Scorecard development from logistic regression

Discriminant Analysis

- Linear Discriminant Analysis (LDA) for credit classification
- Altman's Z-score model
- Assumptions: multivariate normality, equal covariances
- Comparison with logistic regression

Model Evaluation (ROC, AUC)

- ▣ Confusion matrix: sensitivity, specificity, precision, recall
- ▣ ROC curve construction and interpretation
- ▣ Area Under the Curve (AUC) as a discrimination measure
- ▣ Gini coefficient and its relation to AUC
- ▣ Kolmogorov–Smirnov statistic

Applications

- ▣ Building a credit scorecard on real lending data
- ▣ Model comparison: logistic regression vs. LDA
- ▣ ROC analysis and threshold selection
- ▣ Python implementation using `scikit-learn`

 `SFM_ch10_scoring`

Conclusions

- ▣ Summary of scoring model methodologies
- ▣ Best practices for credit scoring in industry
- ▣ Limitations and extensions (machine learning approaches)

References

- ▣ Altman, E.I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy.
- ▣ Thomas, L.C. (2009). Consumer Credit Models: Pricing, Profit and Portfolios.
- ▣ Siddiqi, N. (2017). Intelligent Credit Scoring: Building and Implementing Better Credit Risk Scorecards.