

# MODELING CREDIT RISK OF A CONSUMER LOANS PORTFOLIO

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## ABSTRACT

The work presented in this paper is the development of a portfolio credit risk model for consumer credit. The proposed model is intended to be an instrument to obtain distributions of loss of consumer credit portfolios in Brazil. The application of the proposed model can be divided in two main steps: division of the portfolio in segments and simulation of the loss distribution.

To segment the portfolio we propose the use of the consumers' profiles and the risk classification of the credit operations. To segment consumers according to their profile we use the correlation between time series of credit loss as a measure of similarity. Since it is not feasible to build time series of loss for each individual consumer, we make a preliminary clustering of consumers using socio-demographic and behavioral variables. These initial clusters are grouped according to the correlation among their time series of credit loss.

The risk of the credit operation is defined through a risk classification model with the objective of forecasting credit loss one period ahead. The result of this model is a score that can be categorized into classes of risk. Both the consumer profile

segments and risk of the credit operations are used for the final segmentation of the portfolio.

After segmentation, credit loss distributions for each segment are selected. The approach is selecting empirically the statistical distributions that best fits the historical data of loss in each segment. The portfolio segments with their respective marginal distributions of credit loss are used in a Monte Carlo simulation process. The dependence among the credit loss in the different segments of the portfolio is modeled through an elliptical copula function. The simulation generates thousands of joint realizations of loss in the various segments. Weighting the realizations for each segment accordingly to the amount of credit exposition in the portfolio leads to simulated realizations of credit loss of the portfolio that represent the distribution of loss for the portfolio. Statistical tests are done and show that the proposed model is adequate to represent credit loss distributions in consumer credit in Brazil.