

# Credit Risk Modelling Using SAS

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## Aims and Scope

In this course, students learn how to develop credit risk models in the context of the recent Basel II guidelines. The course provides a sound mix of both theoretical and technical insight, as well as practical implementation details. These are illustrated by several real-life case studies and exercises. The target audience consists of people who are involved into building scoring systems (e.g. for Basel II) and/or are responsible for monitoring their behaviour and performance.

You will learn how to:

- develop probability of default (PD), loss given default (LGD), and exposure at default (EAD) models
- validate, backtest, and benchmark credit risk models
- stress test credit risk models
- develop credit risk models for low default portfolios

## Date

30 November - 2 December 2009, 9 a.m. – 5 p.m.

## Location

Prague

## Language

English

## Price

CZK 33,750 + VAT per participant.

Up to 20% discount applies for multiple participants from one company.

## Prerequisites

Before attending this course, you should:

- have business expertise in credit risk
- have basic understanding of statistical classification methods

Previous SAS software and SAS Enterprise Miner experience is helpful but not necessary.

## Lecturer

Prof. dr. Bart Baesens is assistant professor (Lecturer) at the School of Management from the University of Southampton. His research focuses on the use of data mining and machine learning techniques for credit scoring and customer relationship management (CRM) applications. His findings have been published in various journals and presented at international conferences.

<http://support.sas.com/training/us/bks/instr.html#baesens>

## Course Outline

### Review of Basel I and Basel II

- application scoring, behavioral scoring, and profit scoring
- bankruptcy prediction models
- credit ratings
- the Basel I and Basel II regulation
- standard approach versus IRB approaches for credit risk
- PD versus LGD versus EAD
- expected loss versus unexpected loss

### Sampling and Data Preprocessing

- selecting the sample
- types of variables
- missing values
- outlier detection and treatment
- exploratory data analysis
- categorization
- weight of evidence coding and information value
- segmentation
- reject inference (hard cut-off augmentation, parceling, etc.)

### Developing PD Models for Basel II

- basic concepts of classification
- classification techniques: logistic regression, decision trees, linear programming, k-nearest neighbor, cumulative logistic regression
- input selection, such as filters, stepwise regression, and p-values
- setting the cut-off (strategy curve, marginal good-bad rates)
- measuring scorecard performance
- splitting up the data: single sample, holdout sample, cross-validation
- performance metrics, such as ROC curve, CAP curve, and KS-statistic
- defining ratings
- scorecard alignment and implementation

## **Developing LGD and EAD Models for Basel II**

- modeling loss given default (LGD)
- defining LGD, such as market approach and work-out approach
- time weighted versus default weighted versus exposure weighted LGD
- choosing the discount factor and the workout period
- dealing with incomplete workouts
- economic downturn LGD
- modeling LGD using segmentation
- modeling LGD using regression
- shaping the Beta distribution for LGD
- modeling LGD using two stage models
- modeling exposure at default (EAD): estimating credit conversion factors (CCF)
- cohort/fixed time horizon/momentum approach for CCF
- risk drivers for CCF
- CAP curves for LGD and CCF
- correlations between PD, LGD, and EAD
- calculating expected loss (EL)

## **Validation, Backtesting, and Stress Testing**

- validating PD, LGD, and EAD models
- quantitative versus qualitative validation
- backtesting for PD, LGD, and EAD
- backtesting model stability (system stability index)
- backtesting model discrimination
- backtesting model calibration using the binomial, Vasicek, and chi-squared tests
- traffic light indicator approach
- backtesting action plans
- through-the-cycle (TTC) versus point-in-time (PIT) validation
- benchmarking
- internal versus external benchmarking
- Kendall's tau and Kruskal's gamma for benchmarking
- use testing
- data quality
- documentation
- corporate governance and management oversight
- stress testing for PD, LGD, and EAD models
- static versus dynamic stress testing
- correlated trend analysis
- scorecard management
- low default portfolios (LDPs): implementation and validation
- likelihood approaches to LDPs
- rating mapping approaches to LDPs