Credit Risk Model Development & Validation
Under BASEL II Workshop 2012

A highly practical workshop designed for:
• Credit Risk Modellers
• Basel II Analysts/ Consultants
• Mortgage, Credit Card & Loan Specialists
• Credit Risk Managers
• Software Vendors

Research Centre for Modeling and Simulation (RCMS)
Modeling and simulation has become an important part of the research repertoire, supplementing and in some cases replacing experimentation. It employs techniques of applied mathematics and computer science for developing problem-solving methodologies and robust tools which are the building blocks of scientific solutions and engineering problems of very high complexity. The aim of RCMS is to enhance indigenous research capabilities in modeling and simulation, carry out projects of public/commercial nature and assist industry towards improving self-reliance.

The Field of computing is undergoing a revolutionary transformation due to the emerging of massively parallel computing problems. RCMS has established Supercomputing Research and Education Center (SCREC) with theoretical peak performance 128 TERA FLOPS

Explore practical methods for:
• Constructing Credit Risk Models for Basel II
• Monitoring and Backtesting credit risk models
• Stress Testing Models using Sensitivity and Scenario Analysis

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Learning objectives
This intermediate level workshop serves as a Probability of default (PD) / Scorecard development.

How it is different
This workshop is special and unique as applicants would be provided training of statistical tool ‘R’. At the end of this workshop, participants will have clear understanding how to work out PD/Scorecard models in real world environment. Full agenda of workshop is underneath.

Developing Probability of Default (PD) Models (Ratings & Scorecards)

Credit scoring and the business
• What is credit scoring
• Where is credit scoring used
• Why is credit scoring used
• How has credit scoring affected credit provision

The mechanics of credit scoring
• What are scorecards
• What measures are used
• What is the scorecard development process
• What can affect the scorecards

What is the scorecard development process

Minimum Requirement of IRB
• Composition of minimum requirements
• Compliance with minimum requirements
• Rating system design
• Risk rating system operations
• Corporate governance and oversight
• Use of internal ratings
• Risk quantification
• Disclosure requirements
• Validation of Internal Estimates

Data Gathering for Definition of Project Parameters

Proposed variables list

Performance and Sample Window

Development of Sample specification
• Appropriate/optimal size of sample

Scorecard Development Steps
• Explore Data & Data cleansing
• Initial Characteristics Analysis(K-G&B)
• Preliminary Scorecard
• Reject Inference
• Initial Characteristics Analysis(All-G&B)
• Final Scorecard
• Validation

Explore Data
• Explore the sampling data
• Descriptive Statistics
  • Mean, Median & Mode
  • Proportion missing
  • Visual Technique
  • Interpretation of data

Data Cleansing
• Handle missing values
  • Complete case
  • With average method

PD/Scorecard Development

Data Review & Project Parameters

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- K-nearest approach
- Regression modelling
- Examine / Remove outliers and abnormal values

**Correlation / Multicolinearity**
- Principal Component Analysis
- Variance Inflation Factor (VIF)
- Pearson Correlation

**Initial Characteristics Analysis**
- Weight of Evidence & Information Value
- Chi Square
- R-square

**Logistic Regression**

**Probability of default Calculation**

**PD Risk Bucketing & Pooling**
- Risk Buckets
  - External mapping
  - Internal buckets
- Pooled PD
  - Historical default experience approach
  - Statistical model approach
  - External mapping approach

**What is Reject Inference**
- Augmentation Techniques
  - Simple augmentation
  - Parcelling
  - Fuzzy augmentation

**Adverse Code**
- What is adverse code
- Adverse Scoring
- WOE is zero

**Neutral Score Using Weighted Average Approach**
- What are neutral and weighted average scores
- Calculation of weighted average scores
- Ranking of adverse codes

**Logical Distribution of Points Allocation**

**Final scorecard with AGB**

**Model Validation**
- Theoretical Validation
- Data Validation
- Statistical Validation
- Discrimination
  - Cumulative Accuracy Profile
  - Gini Coefficient/Accuracy Ratio
  - ROC Curve
  - The Pietra Index
  - Bayesian error rate
  - Brier score
  - Kolgomorov-Simrnoff

**Calibration**
- Binomial test
- Chi-square test
- Normal test

**System Stability Index**
**Characteristic Analysis**

**Points to double the odds (PDOS)**
- What is PDOS
- How it works
- Odds at a certain score
- Points to double the odds

**Factor and Offset**

**Scorecard Scaling**
Software to be Used
GNU ‘R’ (using R version 2.13.1)

The software application has been selected on the basis of effectiveness and user friendliness. The selected application happen to be the most reputed statistical software globally. Statistical software application to be used for training is as follows:-

- The R Project for Statistical Computing/GNU ‘R’ (using R version 2.13.1)

The training is divided into two main sections which are Basic Statistical Concepts and PD Modelling/Scorecard Development. The ‘R’ will be specifically used for understanding and computation of PD Modelling/Scorecard Development. A brief description of the software is as follows:-

**R Statistical Software**

‘R’ is a free and open source language environment of statistical computing and graphics. Highly reputed due to its diversity and dynamics, the software offers wide range of statistical features which includes linear and nonlinear modeling, classical statistical tests, time series analysis, classification, clustering and lot more.

GNU R happens to be most suitable for PD modeling and scorecard development as it is open source and happens to be highly dynamic.

Other Topics

**Introduction to Modeling and Simulation**

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**ADVISORY TEAM**

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