האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

Syllabus

fintech analytics- credit risk - 55790

Last update 19-03-2019

HU Credits: *1*

Responsible Department: *Business Administration*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *English*

Campus: *Mt. Scopus*

Course/Module Coordinator: *Prof ROGER STEIN*

Coordinator Email: *steinr@mit.edu*

Coordinator Office Hours:

Teaching Staff:
Prof ROGER STEIN

Course/Module description:
Data-driven credit analytics have become increasingly prevalent among both

traditional
banks and new lending platform companies. However, machine learning and statistical algorithms are only a
small part of what is involved in building robust risk analytics. This short seminar focuses on the practical
challenges that arise in implementing a variety of data-driven credit models (e.g., bankruptcy and default
models retail and commercial entities). With a focus on large data sets, we explore a number of data-driven
approaches to modeling the likelihood that credit-risky borrowers will default on their obligations. I will
draw heavily on my experiences building and evaluating some of the most widely used and commercially
successful data-driven credit evaluation tools in the industry. This seminar will tend heavily towards discussions
of practical model implementations and the □frictions□ that make these implementations difficult in
real-world settings. We pay special attention to validating discrete-choice models in real-world settings. We
will not focus as heavily on the structure of credit markets or the details of pricing a broad variety of creditrisky
instruments.
We will take the view that an effective, practical credit modeling framework will be rough around the edges
with the odd inconsistency (usually to deal with available data or the lack thereof). This implies that seemingly
incompatible models can each have value in specific contexts, resulting in retention of several models
despite their theoretical inconsistency. Because the focus is applied, we will discuss model validation and
calibration in detail and highlight data issues in estimation and validation. Since credit models for corporate
debt are most well developed, we will deal most extensively with these models. Lectures will to focus on
conceptual themes and practical issues, with much of the technical detail underlying these to be found in the
readings.
I will also provide suggested □mini-projects□ for those students who are more technically inclined. These
projects serve to provide motivation and, if you do them, you will leave the seminar with some very useful
tools for applying this subject matter in practice.

<u>Course/Module aims:</u>

To expose students to the practical challenges associated with building and testing

singleborrower
credit risk models, such as those used by banks, as well as to the types of modeling techniques that can
be used to build them. These mini-projects are described using R syntax, though they may be implemented
in any language in which you work (Python, SAS, Matlab, etc.). I will go over a solution to at least one of
these during the seminar.

Learning outcomes - On successful completion of this module, students should be able to:

build and test single-borrower credit risk models, such as those used by banks.

Attendance requirements(%):

Teaching arrangement and method of instruction:

Course/Module Content:

Day 1
Introduction to credit risk modeling concepts, the challenge of data analytics and the nature of
FinTech platforms
How can we add value in developing data-driven analytics
The features of successful of FinTech platforms
Data problems and resolutions
Key components of credit risk PD, LGD, (EAD), correlation, size
Differing modeling paradigms
Diversification
ACPMIP: Chapter 1, pp. 2-16; 19-23; 32-34; 38; 42-43. Chapter 2, pp. 60-62; 72-74.
Supplemental readings:
Dhar, V. and R. Stein (1997), Seven Methods for Transforming Corporate Data into Business Intelligence, Prentice
Hall, NJ. Chapter 3.
Dhar, V. and Stein R. M. (2017) Economic and Business Dimensions on FinTech Platforms and Strategy.,
Communications of the ACM, 60, 10, October, pp. 32-35.
Day 2
Introduction to PD model validation
Validating model power using ROC curves
Validating model calibration using probability-based measures
ACPMIP: Chapter 7, pp. 361-397.

 Stein, R. M., A. E. Kocagil, J. Bohn and J. Akhavain (2003). Systematic and Idiosyncratic Risk in Middle-Market
Default Prediction: A Study of the Performance of the RiskCalc and PFM Models. Moody s KMV.
For those interested, see if you can write this tool: Function to calculate the AUC ROC for two different subsets of a single data set.
 Definition: subROC