

Course: Statistical Method to Risk Management
Principal instructor: Desmond Li

Course Objective and Outline

The objective of this course is to lead the students to understand the intuition on the core concepts on probability and statistics that are applicable to the financial risk management. Many practical issues will be discussed in the class. Students will use Excel to practise real cases.

Lecture 1

1. Why and how does a risk manager of a life insurance company manage risk?
2. Why and how does a risk manager of a general insurance company manage risk?
3. Why and how does a trader manage risk?
4. Why and how does a risk manager of a bank manage risk?
5. Why and how does a fund manager manage risk?
6. Intuition of probability
7. P-measure versus \mathbb{Q} -measure
8. The essence of the no-arbitrage rule

Lecture 2

1. The four moments, standard normal distribution, skewness, and kurtosis
2. Probability and statistics from the perspective of finance
3. The subtle meaning and also the most important meaning of the word “expected”
4. **Workshop:** Come up a statistical distribution using Excel and how to interpret it.

Lecture 3

1. Could returns and variances be added together?
2. Diversification and CAPM
3. Square root of time rule

Lecture 4

1. What is yield curve?
2. What is forward curve?
3. The problem of yield-to-maturity
4. How to estimate zero-coupon yield curve?
5. How to estimate coupon yield curve?
6. Bond rich-cheap
7. Butterfly strategy
8. Convergence in reality (Case: LTCM)

Lecture 5

1. Cap, Floor, Forwards, Futures, Interest Rate Swap
2. **Workshop:** Price an interest rate swap using Excel

Lecture 6

1. What is VaR?
2. Introduction to historical, Delta-normal, and monte carlo VaR?
3. **Workshop:** How to come up a VaR using Excel

Lecture 7

1. Factors of Credit risk
2. Two different approaches to estimating the probability of default: Static and dynamic.

3. How traders estimate default probabilities
4. How credit rating agencies estimate default probabilities
5. Is Risk-Neutral Probability Same as Real-World Estimated Probability
6. Estimating Default Probabilities Using Dynamic Approaches – Merton Model
7. How to reduce credit risk

Grading

Class participation	40%
Exam	60%

Bio Data of the Principal Instructor

Mr. Desmond Li acquired his M.Sc. degree from the London Business School. He is an adjunct professor of City University of Hong Kong, a certified Professional Risk Manager (“PRM”) and a certified Financial Risk Manager (“FRM”). He has been in the insurance, IT, and investment banking industries for fourteen years working with PingAn Insurance Group as their Head of Portfolio Management managing portfolios worth RMB 170 billion and Head of Risk Management, Smith Barney Shearson, and Richardson Greenshields of Canada (now a member of the Royal Bank of Canada) in areas including portfolio management, risk management, merger and acquisition, and institutional sales. He is the Chief Financial System Architect and the President of Thomas Ho Company – an American quantitative finance solution company – founded by Dr. Thomas Ho – the co-author of the ground breaking Ho-Lee model. Mr. Li designed The Rational Decision System (“TRDS”) for the company that enables life insurance companies to stochastically optimize their asset-liability portfolio and that enables international companies to manage their treasury and derivatives positions that comply with the IAS39. In addition to his referee’s publication, Mr. Li is the author of *The Professional Guide - Mergers & Acquisitions in H.K* published by Sweet & Maxwell Ltd.