PI ETA CONSULTING COMPANY

NEW

Financial Mathematics Part II

Highlights

- Allow a highly trained applied mathematician and a seasoned experienced market practitioner to share with you the key requisite foundational mathematical concepts and tools that are commonly used in the Financial Markets
- An opportunity to re-learn and learn mathematics in an enjoyable and effective manner
- Topics covered include Permutations and Combinations, Probability Theory, Probability Distributions, Interest Computation Methodologies, and examples of their applications in Finance
- A discussion on Time Value of Money, Concept of Fair Value and Discounted Expectation, Term Structure and Yield Curves will also be included
- This program forms part of a Foundational Program which is a requisite for anyone wishing to move on to gain an in-depth understanding of the applied mathematics used in the financial markets

Seminar Facilitator

Dr. Jeffrey C. K. Lim, Ph.D., C.Sci., C.Math., FIMA, FCPS, FRM, PRM, B.Fel.

Seminar Duration
2 Days, 9:00am to 5:00pm

PI ETA CONSULTING COMPANY

Seminar Background

PFM02 is part II of the Essential Foundational Mathematics Program in Finance. This program does not assume that participants have prior knowledge of the topics covered, but instead takes participants through from the very basics all the way up to the requisite knowledge level, providing one with a solid foundational platform to be able to understand applications of some key concepts in financial markets. Without an understanding of the essential mathematics, one cannot be expected to understand some of the underlying concepts in financial markets; hence this foundational program is meant to provide one with the requisite platform to build upon in order to have a better understanding of the financial markets.

Seminar Content

- ➤ **Permutations and Combinations**
    - Fundamental Principal of Counting
    - Permutations
    - Permutations with Repetitions
    - Ordered Samples
    - Combinations
    - Ordered Partitions
    - Group Discussion/Assignment
        - o Perform calculations of Permutations and Combinations
        - o Understand the key difference in the two terminologies
        - o Case Study to explore the use of Permutations and Combinations in building Scenarios in Financial Markets.

- ➤ **Probability Theory**
    - Introduction To Probability Theory
    - Sample Space and Events
    - Finite Probability Spaces
    - Equi-probable Spaces
    - Conditional Probability and Independence
    - Theorems on Finite Probability Spaces
    - Mathematical Expectation
    - Applications in Financial Markets
    - Group Discussion/Assignment
        - o Perform calculations in Probability Theory
        - o Case Study to explore the use of Probability Theory in Financial Markets (which include its usage in the Insurance Industry and Treasury Markets)

PI ETA CONSULTING COMPANY

➢ **Probability Distribution**
- Random Variables and their Moments
  - Random Variables
  - Probability Space and Distribution of a Random Variable
  - Key Moments of Random Variables
    - Expectation
    - Variance
    - Skewness
    - Kurtosis
- Function of Random Variables
  - Definition
  - Sum of Functions of Random Variables
  - Product of Functions of Random Variables
- Some Key Probability Distributions
  - Uniform Distribution
  - Bernoulli Distribution
  - Binomial Distribution
  - Normal Distribution
    - Standard Normal Distribution
  - Log-Normal Distribution
  - Chi-square Distribution
  - Student-t Distribution
- Central Limit Theorem
- Applications in Financial Markets
- Group Discussion/Assignment
  - Discuss the use of Key Moments of Random Variables in the Financial Markets.
  - Discuss the use of the various Probability Distributions in the Financial Markets

➢ **Interest Calculation Methodologies**
- Simple
- Compounding
  - Daily
  - Monthly
  - Quarterly
  - Semi-Annually
  - Annually
  - Continuously
- Discount
- Market Conventions
  - Act/360 DayCount Convention
  - Act/365 DayCount Convention
  - Act/Act DayCount Convention
  - 30/360 DayCount Convention

PI ETA CONSULTING COMPANY

- Group Discussion/Assignment
  - o Perform calculations of Interest using the various Interest Compounding methodologies and under the various Market Conventions.
  - o Case Study to understand the notion of Effective Interest Rate and to compute the Effective Interest Rate for a given series of Amortizing Cashflows.

➢ **Time Value Of Money**
- Definition
- Future Value of Money
- Present Value of Money

➢ **Concept Of Fair Value And Notion of Discounted Expectation**

➢ **Introduction To Term Structure**

➢ **Introduction To Yield Curves**
- Various Types of Yield Curves
  - o Treasury Curves
  - o Credit Curves
  - o Swaps Curves
- Purpose of Yield Curves
- Components Used In Yield Curve Construction
- Factors Influencing the Shape of Yield Curves
- Group Discussion/Assignment
  - o Discuss the reasons behind the shapes of some given Yield Curves

Benefits of Attendance

Participants can expect to be equipped with some of the more advanced foundational mathematical concepts which form the basic requisite platform on which to build upon to have a better understanding and working knowledge of the financial markets.

Who should attend?

Senior Management, Risk Management Personnel, Treasury and Finance Personnel, Operations and Settlements Personnel, Accountants, Internal and External Auditors, and anyone interested in gaining more in-depth knowledge in the Financial Markets.

PI ETA CONSULTING COMPANY

Seminar Facilitator

Dr. Jeffrey C. K. Lim, certified Financial Risk Manager (FRM[1]) and certified Professional Risk Manager (PRM[2]), is currently the Managing Director of PI ETA Consulting Company, a Treasury & Financial Risk Management Consulting Company.

A Chartered Scientist (C.Sci.[3]), a Chartered Mathematician (C.Math.[4]) and an elected Fellow of the Institute of Mathematics and Its Applications (IMA), U.K. (FIMA), Jeff earned his Ph.D. in Stochastic Financial Modeling from the University of Cambridge in England. Jeff's research interest at Cambridge was in the area of Arbitrage Opportunities occurring in the Mispricing of Financial Options, and his original research culminated in the publication of his doctoral dissertation entitled: "Multi-period Mean-Variance Option Portfolio Strategies".

Jeff was an authorized Securities & Financial Derivatives Representative in London, having been certified by The Securities and Futures Authority (SFA) in England, where he started his career as a Derivatives Analyst with Nomura International in London, England. He subsequently joined NatWest Markets from London, England to become its Head of Currency Structured Products for South and South-East Asia. Jeff then moved to American Express Bank to become its Director of Structured Products, prior to assuming his current position.

Jeff has also contributed to the development and enhancement of talent and infrastructure for Singapore's financial center as a guest Professor at the National University of Singapore's Center for Financial Engineering, where he was responsible for the curriculum of its Master of Science degree program's core modules in Financial Derivatives and Treasury Management. In addition, Jeff has also been invited by the Nanyang Technological University and the Singapore Management University to share his expertise in a similar capacity. In recognition of Jeff's expertise and experience in the field of Treasury and Financial Risk Management, the University of New South Wales Asia appointed Jeff to be its first Adjunct Professor with the university's Division of Business and Humanities.

At PI ETA Consulting Company, Jeff was Principal Inventor in two of the Patents that the company currently holds – one in Treasury & Financial Risk Management Systems, and the other in Knowledge Management Systems.

Professionally, Jeff is a Fellow of both The Global Association of Risk Professionals (GARP), U.S.A. and The Professional Risk Managers International Association (PRMIA), U.S.A. He is also an elected Fellow of the Cambridge Philosophical Society, U.K. (FCPS) and a Life-time Member of The Cambridge Society, U.K. Jeff is also honoured to be a Fellow of The Cambridge Commonwealth Society, U.K., having been previously awarded the Cambridge Commonwealth Trust and the Shell Group of Companies Doctoral Research Scholarship.

---

[1] The *Financial Risk Manager* (FRM) designation is awarded by The Global Association of Risk Professionals (GARP), U.S.A.
[2] The *Professional Risk Manager* (PRM) designation is awarded by The Professional Risk Managers International Association (PRMIA), U.S.A.
[3] The *Chartered Scientist* (C.Sci.) designation is awarded by The Science Council, U.K.
[4] The *Chartered Mathematician* (C.Math.) designation is awarded by The Institute of Mathematics and Its Applications (IMA), U.K.

PI ETA CONSULTING COMPANY

As a special recognition of Jeff's professional achievements, on 9 April 1999, Barons Who's Who conferred Jeff with the Barons Fellowship status, making him a Barons Fellow (B.Fel.). This award by their Charter, is limited to only the top 10% of those selected for publication in Barons Who's Who International.

For more information, please contact PI ETA Engagement Resource (PEER) Group at
Tel: +65 634 100 10 | Fax: +65 634 100 20 | Email: marketing@pi-eta.com | Website: www.pi-eta.com

6