CQF 2009 Module 6.1

Live Lecture: May 26, 2009 **Lecturer: Riaz Ahmad**

Further Finite Difference Methods

In this lecture:

- Review of explicit scheme and introduction to stability analysis
- Implicit finite-difference methods including Crank-Nicolson
- Review of numerical linear algebra
- The T methodAmerican-style exercise
- Numerical schemes for Exotic options
- About the explicit finite-difference method for two-factor models
- The Alternating Direction Implicit (ADI) methods

1 Introduction.	3
2 Model Problem	
2.1 Taylor Series Approximation	7
3 Fourier Stability (Von Neumann's) Method	14
4 Early Exercise Feature – American Options	18
5 Variable Parameters	20
6 The Greeks	21
7 Implicit Finite Difference Approximations	23
8 The Crank-Nicolson Scheme	28
9 The LU Decomposition	31
10 Iterative Techniques	35
10.1 Successive -Over-Relaxation (SOR) Methods	43
11 The T – method	45
12 Three time-level methods	48
13 Jump Conditions	49
13.1 A discrete cash flow	49
14 Path-dependent options	52
14.1 Continuously sampled quantities	54
15 Two Factor Models	
15.1 The explicit method.	62
15.1.1 Stability of the explicit method	66
15.2 Alternating Direction Implicit	67