REAL OPTIONS

Lecturer: Prof. Marc CHESNEY, UNIZH
First lecture: May 10, 2006
Location: UNISI LUGANO
Time: Wed. May 10, 2:00 – 6:00 pm, Th. May 11, 9:00 -12:00 am and 1:30 – 4:30 pm
Fr. June 23, 9:15 – 12:15 am and 1:30 – 4:30 pm, Sat. June 24, 9:00 am-1:00 pm
Language: English

Grades: The final grades will be based on a written examination.

Contents:

● The Limitations of the Traditional Net Present Value (NPV) Approach
● Dynamic Optimization under Uncertainty
● Real Options: the Basic Models of the Monopolistic Firm
● Lévy Processes and American Option Pricing: Applications to Real Options
● Real Options and Exotic Options
● Real Options and Competition
● Irreversible Investment Decisions in Presence of Incomplete Information

Description of the course:

Investment (and disinvestment) decisions, which are crucial for economic growth, have a few essential characteristics: they are partially or totally irreversible, can be possibly delayed and are made in a risky environment. Taking these characteristics into consideration generates incentives to wait for better information before investing. More generally, it yields investment rules which are radically different from those corresponding to the standard Net Present Value (NPV) approach. The latter approach does not meet requirements, as it ignores the flexibility inherent in decision-making processes and the dynamic aspects of project selection. The course aims firstly at deriving and explaining the basic real options models, after which more recent models will be presented. These include the introduction of competition and incomplete information into the real options framework. Finally, a particular focus on Lévy processes is given. As the introduction of possible discontinuities is essential in some models, a clear understanding of Poisson processes is important. A standard background in stochastic calculus is required.

Literature:

BOOKS
1. BERTOIN J.
   Lévy Processes
   Cambridge University press, 1996.

2. CONT R. and P. TANKOV
   Financial Modelling with Jump Processes
3. DIXIT A. and R. PINDYCK
   Investment under Uncertainty

4. ELLIOTT R. and E. KOPP
   Mathematics of Financial Markets

5 FUDENBERG D. and J. TIROLE
   Game Theory

6 HULL J.
   Options, Futures and Other Derivative Securities

7 JEANBLANC M., M. YOR, and M. CHESNEY
   Mathematical Methods for Financial Markets
   Forthcoming Springer Verlag.

8 KARATZAS I. and S. SHREVE
   Brownian Motion and Stochastic Calculus

9 LAMBERTON D. and B. LAPEYRE
   Introduction to Stochastic Calculus Applied to Finance,

10 REVUZ D. and M. YOR
    Continuous Martingale and Brownian Motion

11 ROSSETTO S.
    Optimal Timing of Strategic Financial Decisions
    Research Series, University of Amsterdam, 2002.

12 SCHWARTZ E. and L. TRIGEORGIS.
   Real options and Investment under Uncertainty
   Classical Readings and recent Contributions

12. SMIT H.
    Growth Options and Strategy Analysis
    Erasmus University Rotterdam, 1996.

13. SMIT H. and L. TRIGEORGIS
    Strategic Investment: Real Options and Games

14. TRIGEORGIS L.
    Real Options
ARTICLES

1. ABEL A. and J. EBERLY
   A Unified Model of Investment under Uncertainty

2. BARONE-ADESI G. and R. WHALEY
   Efficient Analytic Approximation of American Option Values

3. BELLAMY N. and M. JEANBLANC
   Incomplete Markets with Jumps

4. BOTTERON P., M. CHESNEY and R. GIBSON
   An Application of Exotic Options to Firms’ Delocalisation Policies under
   Exchange Rate Risk

5. BOYER M., E. GRAVEL and P. LASSERRE
   Real Options and Strategic Competition: a Survey

6. BRENNAN, M.J. and E.S. SCHWARTZ,
   Evaluating Natural Resource Investments, *The Journal of Business* 58,

7. CARR P., R. JARROW and R. MYNENI
   Alternative Characterization of American Put Options

8. CARR P. and L. WU
   Time-changed Lévy Processes and Option Pricing

9. CHESNEY M., and L. GAUTHIER
   American Parisian Options
   Forthcoming *Finance and Stochastics*

10. CHESNEY M., and M. JEANBLANC
    Pricing American Currency Options in an Exponential Lévy Model

11. DIXIT, A. K.
    Entry and Exit Decisions Under Uncertainty

12. DURBIN J.
    The First Passage Density of the Brownian Motion Process to a Curved
13. GAUTHIER L.
Options Réelles et Options Exotiques, une Approche Probabiliste

14. GERBER H. and B. LANDRY
On the Discounted Penalty at Ruin in a Jump-Diffusion and the Perpetual Put Option

15. GIBSON R. and E. SCHWARTZ
Stochastic Convenience Yield and the Pricing of Oil Contingent Claims

16. LAMBRECHT B. and W. PERRAUDIN
Real Options and Preemption under Incomplete Information

17. McDONALD R. and R. SIEGEL
The value of Waiting to Invest

18. MERTON R.
Option Pricing when underlying stock returns are discontinuous

19. MORDECKI E,
Optimal Stopping for a Diffusion with Jumps

20. PHAM H.
Optimal Stopping Free Boundary and American Option in a Jump Diffusion Model

21. RICH D.R.
The Mathematical Foundations of Barrier Option-Pricing Theory
Advances in Futures and Options Research, 7:267-311,1994

22. ROCHE H.
The Optimal Value of Waiting to Invest
Working paper, ITAM, Mexico, 2003

23. VILLENEUVE S., H. LOUBERGE and M. CHESNEY
Long Term Risk Management of Nuclear Waste: a Contingent Claim Analysis

24. ZHANG X.
Formules Quasi-explicites pour les Options Américaines dans un Modèle de Diffusion avec Sauts