



**The Peter F. Drucker and Masatoshi Ito Graduate School of Management
Claremont Graduate University**

**REAL OPTIONS
MGT 476
Fall 2009**

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STRUCTURE AND CONTENT:

The course, Real Options Valuations (ROV), deals with the subject of resource allocation or project appraisal under uncertainty, particularly with the valuation of managerial operating flexibility and strategic interactions. Traditionally, the central paradigm for making decisions about resource allocation has been net present value (NPV). Unfortunately, NPV doesn't work for the many business realities: strategic investments with lots of uncertainty and huge capital requirements; projects that must adapt to evolving conditions; complex asset structures; and the relentless pressure from the financial markets for value-creating strategies.

Faced with uncertain decisions, managers intuitively know they have the option to defer, stage, abandon or expand a project, or even switch funds to a more profitable financial opportunity, yet the traditional static DCF framework of capital budgeting fails to take such managerial flexibility into account. ROV capitalizes on this uncertainty and provides the basis for a more robust decision-making methodology which is conducive to adaptation, learning, risk taking and innovation. ROV captures both the value of managerial flexibility, which allows a firm to adapt to unexpected market developments, as well as the strategic value that results from proving a new technology, capitalizing on dynamic or cross-project synergies, and strategic or competitive positioning.

ROV is revolutionizing corporate strategy by bridging the existing gap between finance and strategic planning. Just as an option gives its owner the right - but not the obligation - to take a particular course of action at some time in the future, flexibility embedded in capital investment projects and company strategies allows managers to take a staged approach to strategy and react to changes in the business environment, so they can limit downside losses while fully capitalizing on upside potential opportunities. ROV imposes a financial discipline that the manager can employ to consistently evaluate and compare its alternatives, whether they are to invest in instruments traded in the financial markets or in non-traded physical assets.

The real option approach has three components that are of use to the corporate decision maker:

1. Options are contingent decision. An option is the opportunity to make a decision after you see how events unfold.
2. Option valuations are aligned with financial market valuations. The real options approach uses financial market inputs and concepts to value complex payoffs across all types of real assets.
3. Option thinking can be used to design and manage strategic investments proactively.

What will you learn in this Real Options course? You'll learn:

- How to make flexible step-by-step decisions and adapt to change to gain competitive advantage
- How to take advantage of uncertainty to capitalize on upside opportunities while limiting downside risk
- How to translate corporate strategic plans into forward-looking real option value that enhances shareholders' wealth and market price
- How to communicate the advantages of options thinking compared to conventional discounted cash flow (DCF) analysis
- How to structure your contracts to leave you valuable flexibility
- How to quantify the value of strategic investment opportunities

WHO SHOULD TAKE THIS COURSE?

This course is designed for either the MBA student who has a serious commitment to a career in finance or for MSFE student who would like to bridge the gap between finance and strategy. Completion of MGT 335 "Corporate Finance" is required *and the student should have a very basic knowledge of financial option valuation*. Knowledge of advanced mathematical techniques is not a requirement for this course.

LECTURE NOTES, MODELS, AND PROBLEMS SETS

Are on the intranet site sakai.claremont.edu. Download and print out the lecture notes as soon as you can. You will need the lecture notes for class.

REQUIRED TEXTS

Real Options Analysis, Johnathan Mun, (Wiley Finance), Second Edition - 2006
(hereafter referred to as **MUN**)

Real Options: A Practitioner's Guide, Tom Copeland & Vladimir Antikarov (Thomson-

Texere) 2003 (hereafter referred to as CA)

VIDEOS TO WATCH: These videos accompany the materials in the test by Mun
Go to www.realoptionsvaluation.com, downloads, getting started videos

Video A- Real Options Analysis: Basic Theory

Video B- Real Options Analysis: Basic SLS Software

Video C- Risk Simulation: Getting Started

Video D- Risk Simulation: Running Monte Carlo Simulation

Video E- Risk Simulation: Analytical Tools

ELECTRONIC RESERVE (Article are hereafter designated as JACF#.

“Taking Real Options Beyond the Black Box”, Susan Woolley and Fabio Canizzo,
Journal of Applied Corporate Finance-Volume 17 Number 2, Spring 2005 (**JACF#1**)

“Realizing the Potential of Real Options: Does Theory Meet Practice?”, Alexander Triantis,
Journal of Applied Corporate Finance-Volume 17 Number 2, Spring 2005 (**JACF#2**)

“Real Options Analysis: Where are the Emperor’s Clothes?”, Adam Borison,
Journal of Applied Corporate Finance-Volume 17 Number 2, Spring 2005 (**JACF#3**)

“Real Options: Meeting the Georgetown Challenge”, Thomas Copeland and Vladimir
Antikarov, Journal of Applied Corporate Finance-Volume 17 Number 2, Spring 2005
(**JACF#4**)

“A Response Real Options: Meeting the Georgetown Challenge”, Adam Borison, Journal of
Applied Corporate Finance-Volume 17 Number 2, Spring 2005 (**JACF#5**)

“The Case for Real Options Made Simple”, Raul Guerrero, Journal of Applied Corporate
Finance-Volume 19 Number 2, Spring 2007 (**JACF#6**)

“The Role of Real Options in Capital Budgeting”, Robert McDonald, Journal of Applied
Corporate Finance-Volume 18 Number 2, Summer 2006 (**JACF#7**)

“Valuing Assets Using Real Options: An Application to Deregulated Electricity Markets”,
Gregory Swinand, et.al., Journal of Applied Corporate Finance-Volume 17 Number 2,
Spring 2005 (**JACF#8**)

“Valuing Pharma R&D: The Catch-22 if DCF”, Ralph Villiger and Boris Bodgan, Journal of
Applied Corporate Finance-Volume 17 Number 2, Spring 2005 (**JACF#9**)

“Real Options Valuation: A Case Study of and E-Commerce Company”, Rocio Saenz-Diez,
et.al., Journal of Applied Corporate Finance-Volume 20 Number 2, Spring 2008
(**JACF#10**)

MATERIALS TO PURCHASE ON-LINE

“MW Petroleum Corporation (A)”, by Timothy Luehrman (HBS 9-295-029)

“Capital Projects as Real Options: An Introduction”, by Timothy Luehrman (HBS 9-295-074)

“Investment Opportunities as Real Options: Getting Started on the Numbers”, by Timothy
Luehrman (HBR 98404) July-August 1998

SUGGESTED RESOURCES – For your personal library

Real Options: Managing Strategic Investment in an Uncertain World, by Martha

Amram and Nalin Kulatilaka (Harvard Business School Press) 1999
An Applied Course in Real Options, by Richard Shockley (Thomson-Southwester) 2007
Real Options: Managerial Flexibility and Strategy in Resource Allocation, by Lenos Trigeorgis (MIT Press) 1997
Real Options in Capital Investment, edited by Lenos Trigeorgis (Praeger) 1995

COURSE OUTLINE**

Date/ Class	Subject/Lecture Note Reference/Additional Readings/Cases	Readings/ Exercises (P)
Sept. 3 Week 1	<p><i>Introduction to Real Options</i> Introduction to Real Options (Section One, Part A) An Algebraic Approach to Real Options (Section One, Part B) JACF#2, JACF#3</p> <p><i>Video A</i></p>	<p>MUN Ch 1, including appendices</p> <p>CA Ch 1-2 (P) Ch 1: 4,7,9-11,14 Ch 2: 2-5,7</p>
Sept. 10 Week 2	<p><i>Introduction to Real Options</i> An Algebraic Approach to Real Options (Section One, Part B) “Investment under Uncertainty” by A. Dixit and R. Pindyck (to be distributed in advance) JACF#1, JACF#6</p> <p><i>Creating the Foundation</i> NPV and Certainty Equivalent Cash Flows (Section Two, Part A) Creating a Tracking Portfolio on Financial Assets (Section Two, Part B)</p>	<p>MUN Ch 2</p> <p>CA Ch 3 (P) Ch 3:1, 5-7, 9-10</p>
Sept. 17 Week 3	<p><i>Creating the Foundation</i> Creating a Tracking Portfolio on Real Assets (Section Two, Part C) From a Tracking Portfolio to Real Options</p> <p>JACF#4, JACF#5</p>	
Sept. 24 Week 4	<p><i>Alternative Methodologies</i> Closed-Form Solutions (Section Three, Part A) Investment Opportunities as Real Options by Timothy Leuhrman Capital Projects as Real Options by Timothy Leuhrman</p> <p>JACF#7</p>	<p>MUN: Ch 3, 5</p>
Oct. 1 Week 5	<p><i>Alternative Methodologies</i> Binomial Lattices (Section Three, Part B)</p>	<p>CA: Ch 4, 7 (P) Ch 4: All</p>

	<i>Case Study “MW Petroleum Corporation (A)”</i>	Ch 7: 1-2, 4-6 MUN: Ch 6
Oct. 8 Week 6	<i>Alternative Methodologies</i> Binomial Lattices (Section Three, Part B) Comparing Methodologies (Section Three, Part C)	
Oct. 15 Week 7	<i>Mid-term exam</i>	
Oct. 22 Week 8	<i>Valuing Real Options</i> Four Step Process (Section Four, Part A) Estimating Volatilities (Section Four, Part B)	MUN: Ch 4-5, 7A CA Ch 8, 9 (P) Ch 8: 5-8 Ch 9: 1-3, 5
Oct. 29 Week 9	<i>Sable Island Gas Project</i> <i>Guest Lecture: Dr. Larry Chorn, Encana Oil and Gas Co, Strategic Planning and Portfolio Management</i>	MUN: Ch 7, 8 CA Ch 5,6 (P) Ch 8: 5-8 Ch 9: 1-3, 5
Nov. 5 Week 10	<i>Valuing Real Options</i> Valuing Simple Real Options (Section Four, Part C) Valuing Complex Real Options (Section Four, Part D) <i>Super Lattice and Risk Simulator Software</i> <i>Video B, Video C, Video D and Video E</i>	MUN: Ch 9 + appendices
Nov. 12 Week 11	<i>Real Options Case Studies</i> JACF#8, JACF#9, JACF#10	
Nov. 19 Week 12	<i>Real Options Case Studies</i> <i>Review both the Portes Case and Pharma X</i>	CA Ch 11 CA (P) 1,4-6
Nov. 26 Week 13	<i>No Class – Thanksgiving Break</i>	
Dec. 3 Week 14	<i>Real Options Applications (using software)</i> <i>Option to Abandon</i> <i>Option to Contract</i> <i>Option to Expand</i> <i>Chooser Options</i> <i>Compound Options</i>	MUN: Ch 10
Dec. 10 Week 15	<i>Real Options Case Studies</i>	MUN: Ch 12

	<i>High-tech Manufacturing</i> <i>Pharmaceutical Development</i> <i>Oil & Gas</i> <i>Employee Stock Options</i> <i>Due Date: Project Assignment on Real Options</i>	
Dec. 17 Week 16	<i>Final Exam</i>	

****Calendar subject to change**

The solutions to the problems in the Copeland and Antikarov text and the Mun text are on electronic reserve. You are expected to work on these problems on your own.

Course Grading (approximate distribution)

Examination #1	33.33%
Final Exam	33.33%
Individual Project	33.33%

Examination #1 will cover everything up to and including the material through week 6 of the class. **The midterm will be held during class on Thursday, October 15.** The Final will cover the material presented from week 7 through week 15 and will be administered during finals week most likely on December 17.

Project Assignment

A key component of this course is an ROV project, where you conduct a strategic analysis and valuation of growth options in a (public or non-public) company of your choice and write a 5-page original report (Plagiarism will be severely punished!). Using the tools of the course, your analysis will contain evaluation of the competitive environment (including uncertainty factors); analysis of the upcoming stages of development and their risks; and a valuation analysis benchmarked to pricing and norms in the financial markets. You may want to use this ROV project to explore already the valuations of lesser known, early stage growth (venture capital?) companies. This project will be something you can show potential or current employers, as a way of introducing your knowledge of advanced strategy and finance skills. The project report is due December 10.