

Real Options

- Profiting from Uncertainty

Managers around the world are facing **increasing uncertainty** while taking complex strategic decisions, having an enduring impact on organization profitability. Usually, this uncertainty erodes real value when such decisions are evaluated using conventional techniques, such as NPV or IRR - larger discounting rates are applied to riskier projects. Real options technique presents a way to befriend uncertainty and profit from it.

"... a business strategy is much more like a series of options than a series of static cash flows. Advances in both computing power and our understanding of option pricing ... make it feasible now to begin analyzing business strategies as chains of real options."

-Luehrman, Harvard Business Review, 1998

A real option is the right, but not the obligation, to take an action that will either help maximize the upside or limit the downside of a **capital investment**. Like financial options, real options can be valued using **options-pricing models**.

Common Real Options and Sample Scenarios :

1. **Waiting-To-Invest Options**

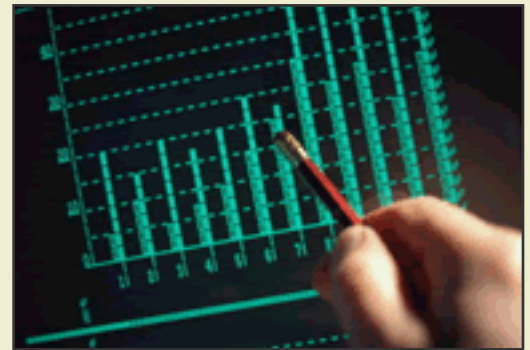
The value of waiting to build a factory, say, until better market information comes along may exceed the value of immediate expansion.

2. **Growth Options**

An entry investment may create opportunities to pursue valuable follow-on projects.

3. **Flexibility Options**

An option to reallocate resources or switch has value. For



More Resources

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- [The Pricing of Real Options: An Overview](#)

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About DecisionCraft Analytics

We provide decision-making solutions to improve operational efficiency and business responsiveness. Our consulting services employ our strengths in industry knowledge, conceptual

example, building two plants instead of one to serve markets on two continents creates the option of switching production from one plant to the other as conditions dictate.

4. **Exit (or Abandonment) Options**

The option to walk away from a project in response to new information increases the value of the project.

5. **Learning Options**

An initial investment creates better information about a market opportunity and whether more capacity should be built out.

(Adapted from Real Options: Managing Strategic Investment in an Uncertain World, by Martha Amram and Nalin Kulatilaka (Oxford University Press, 1998).

The best way to understand real options is to contrast with the popular discounted cash flow based techniques such as NPV.

Discounted cash flow has its roots in stock and bond valuation, where investors are necessarily passive. Applied to real assets, NPV assumes passive management; the end result is known in advance, and managers are not expected to add significant value to a project.

Real-options valuation, by contrast, recognizes that managers can and do obtain valuable information after a project is launched, and that their informed actions can make a big difference. Thus, real options seeks to uncover and quantify a project's **embedded options**, or critical decision points. The greater the uncertainty and flexibility, the greater the value of management's options. Indeed, NPV could be viewed as a special case of real options - one applying to projects with little or no uncertainty and flexibility.

An example of an embedded option is value of investing in development of a blockbuster drug. Process and technical knowledge gained during the development process could be used to improve design and efficacy of existing drugs. The company also has the option to launch related drugs, less expensively, based on competence acquired during drug development. The **value of these options** has to be factored into the original investment decision.

Applications for real options are in the industries characterized by large capital investments and quite a bit of **uncertainty and**

rigor, and information technologies. Developed using concepts from decision theory; our solutions use robust optimization, simulation, and statistical engines adapted to our client's focus areas.

DecisionCraft Products

Application Integrator

Automates operations of asset management companies by integrating business rules and regulations

Travel Route Optimizer

Optimizes travel routes and automates travel planning process

qcCharts™

Enhances process capability of critical processes through interactive data visualization

dataOrganizer™

Integrates data from diverse sources on to one destination database

Supply Chain Simulator

Determines optimum inventory policy such as re-order point and maximum stock based on fill rates

Logistics Planner

Synchronizes supply with demand to minimize distribution costs

flexibility - particularly oil and gas, mining, pharmaceuticals, and biotechnology. Companies in those industries also have plenty of the market or research-and-development data needed to make confident assumptions about uncertainties in real-options analysis.

Information technology is another fertile, cross-industry field for applying real options. IT now consumes the greater part of corporate capital budgets, and large applications are notoriously risky. However, their deployment can be optimized, and the risk minimized, through real-options analysis. Real-option analysis has recently been used to determine the optimal rollout of an enterprise data warehouse, via the phase-wise consolidation of data marts.

The main challenges to using real options are:

1. Their perception as black box tools, as they use sophisticated techniques like partial differential equations, dynamic programming and simulation. However, this challenge is being addressed by the **increasing availability** of these tools in a spreadsheet format, comfortable for practicing managers.
2. As stock options, they only work only for valuation of marketable assets. **Volatility** of marketable assets - a key to valuation - can be estimated from observed market behavior. However, for non-traded assets, one of the ways by which volatility could be estimated is by identifying the assumptions driving the bottom line of a project, identifying the risks associated with those assumptions, and creating a statistical distribution of risk using simulation.

Apart from the benefit of more precise valuations, a subtle side benefit of real options lies in the way it forces managers to chart the entire course of a project, to explore all the options that the project creates. The need to build **multiple scenarios** to arrive at alternate outcomes also helps widen managerial perspective, and helps them guard against **potential downside** of decisions.

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