Real Options and Strategic Decisions | By Tom Copeland and Keith M. Howe

In the October 2001 issue of Strategic Finance, an article titled “The Real-Options Approach to Capital Allocation” presented the basics of real-options analysis and showed why it is a widely used approach for valuing capital investments today. Here we highlight the key elements of the approach and suggest how executives can use it to guide their thinking for more general strategic decisions as well as for capital investments.

For strategic investments, the standard methods, such as discounted cash flow analysis, net present value (NPV), and internal rate of return (IRR), force executives to focus on key questions in a fairly rigid way, not allowing flexibility to be incorporated into the analysis. That means the typical valuation misses the mark, resulting in an undervaluation of the investment. Accordingly, executives must rely on their intuition to try to capture the dynamic flexibility of their opportunity.

In contrast, the real-options approach recognizes that investments contain opportunities for people to observe future events and acquire information before making crucial decisions. Companies can reformulate their investment programs as uncertainty is resolved over time. For example, companies can move in different directions geographically, in product offerings, in suppliers, in production processes, and so on, depending on the information revealed in the marketplace. It may turn out to be wise to withhold major commitments until a portion of the uncertainty is resolved.

Analysis of Real Options

In real-options valuation, we take advantage of the general options framework developed initially for financial
options by Fischer Black and Myron Scholes and translate the variables into the value drivers for real-options investments. The six key variables are value of the underlying asset, investment cost, volatility of the underlying asset, time to maturity, risk-free interest rate, and payout of the underlying asset. These variables allow the analyst to place a value on the flexibility inherent in an investment. (For a discussion of these variables and the option calculation techniques, see Real Options: A Practitioner’s Guide by T. Copeland and V. Antikarov, 2001.) Furthermore, by increasing the value of the underlying asset, management can also increase the value of certain options related to the asset, such as expansion opportunities.

Much of the value of the real-options approach comes from framing the investment strategy properly. Once executives understand the problem sufficiently, they can formulate a decision tree and value the strategic investment with flexibility. From this, they can make a go or no-go decision. The analysis provides decision rules about when to exercise future options, such as abandoning a line of research. A team that agrees to these rules at the beginning of a project is more likely to take the appropriate action dispassionately and in a timely manner later on.

Real-Options Insights
In addition to the generic option to delay investment, a common type of option is the growth option. Growth can take many forms, from R&D expenditures to platform investments in technology infrastructure. Though the immediate value of initial outlay may not be sufficient to justify a decision to go forward, building the “platform” will permit follow-on expansion in one direction or another if profitable markets are revealed in the future.

Another class of options is the flexibility (switching) option. Flexibility in capital investments can be purchased, which has the effect of reducing exposure to negative outcomes by permitting a company to switch inputs or outputs. Examples include investment in facilities that allow changing the product configuration in oil and gas companies and switching within a flexible manufacturing system.

From a real-options perspective, new insights have become evident: “Big isn’t always better.” “There is flexibility in phases.” “Mutual exclusivity is smoke and mirrors.”

“Big isn’t always better.” Recently a biotechnology company planned to spend $500 million over the next five years. The company could invest either in a single large plant with low cost per unit or in five medium-sized plants, each with higher cost per unit. The large plant would be constructed immediately and sized to meet demand growth anticipated over the five years. Alternatively, one small plant could be added each year with the same total capacity as the large plant by the fifth year. Within a static environment (using NPV to compare one setup to the other), it was clear the large-scale plant dominated, in spite of the fact that it would initially have excess capacity, because the lower cost of production resulted in a higher NPV.

Viewing the investment program in real-options terms, however, highlights the flexibility advantage of building smaller plants. Demand for the product is the key source of uncertainty here. Consequently, building the larger, more expensive plant puts the company at greater risk if the demand is low. Building the medium-sized plants contingent on the evolution of demand avoids the excess costs of downturns or shutdowns. It also allows better matching of capacity to variations in demand by geography and hedges against breakdown. In this case, the true net present value, including the value of flexibility, is higher with the smaller plants.

“There is flexibility in phases.” In this example, a commodity chemical company was evaluating a $600 million investment in a new plant at a time when the profitability of production had fallen recently due to declining prices driven by new capacity coming on-line. Profitability was at mid-cycle, and the NPV of the new plant was negative $80 million. It looked like the project would
be refused, but the committee in charge recognized that the NPV analysis assumed that all phases of investment would proceed, regardless of the price cycle. In fact, a design phase costing $50 million and lasting six months was followed by an engineering phase costing $200 million and lasting another six months, and then final construction lasted a year and cost $350 million. Contingent on the evolution of prices, the project could be halted at each phase, so it can be considered a compound option. When viewed this way, its value was positive, and the company started with the design phase.

“Mutual exclusivity is smoke and mirrors.” A common practice with NPV analysis is to treat future decisions as mutually exclusive alternatives. For example, a company might decide to do extensive market testing of a new product or go straight to market—but not both. In analyzing the project, an executive or team studies two mutually exclusive alternatives and chooses the higher NPV. With real options, using a decision tree, there are no mutually exclusive alternatives—only a decision rule about what to do given the information that is available at the time the decision must be made.

Real Options and the Future
Though many lessons have been learned about real-options analysis over the last couple of decades, the model is still in its infancy, but it’s here to stay. Numerous conferences and workshops have been and are being devoted to real options. Several books and hundreds of articles have been written. It is becoming a standard part of MBA curricula throughout the world. And according to a recent survey of 4,000 CFOs, 27% of the respondents always or almost always use it as a decision criterion for major investments. ■

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