Abstract

What are real options, you may ask? Well the majority of the academic community would agree that a real option is “a decision that creates the right, but not the obligation, to pursue a future decision.” In this paper our goal is to take that definition and expand it so that is encompasses multiple areas of business. In addition to that, we will explain real options academic work done in many business fields, explore the amount of work that is being applied in the corporate sector, and propose solutions to make real options a more visible and prevalent force in business policies. This research aims to shed light on the current development, application, and future progress of ROA, and suggest potential solutions to fill the gaps that exist in the field. (Janney, J. J., & Dess, G. G. 1993)
Real options give the buyer the right, but not the obligation, to purchase assets in the future at a price determined at the origin of the decision. Many researchers and some corporations have been using real options since the mid to late 1990’s. Real Option Analysis (ROA) is the expansion of financial options theory to include non-financial assets. Compared to the valuation of financial options, where the decision is made by searching for a particular price on a specific financial instrument, the valuation of a real option requires that the option be recognized then valued using models and formulae developed for the financial industry. ROA requires a strategic way of thinking, one that brings the discipline of the financial markets to internal investment decisions. The uncertainty of cash flows creates the value of the real option; the higher the uncertainty, the greater the value of the option may be. It is the uncertainty factor that gives ROA the depth of its value, because in a Net Present Value (NPV) model the only way to determine if a project has value is by estimating the expected cash flow. If we risk adjusting the drivers, the expected cash flows can be discounted at the risk-free rates and if that discounted cash flow is below expectations the project can be forgone. If a manager is uncertain of a decision the NPV method does not take into account the potential for changes in the future like ROA does. (Brennan, M. J., & Trigeorgis, L. 2003 and Amram, M., & Kulatilaka, N. 1999)

By using ROA, one can calculate the effect of uncertainty over time on financial decisions. ROA can be used to value: start ups, investments in business development, natural resource exploration and development, development of new drugs, or infrastructure investment, to buy flexibility or to preempt competition. (Amram and KulatiAVIKA 143-203)
The majority of literature that defines real options defines it in terms of its abandonment qualities. ROA “allows managers...to ruthlessly abandon floundering projects before making major investments,” which cuts down on the risk of beginning new projects. Although real options serve as a responsible “exit strategy” for major management decision making, they can also serve as facilitators for growing profits by gaining from potential lost projects. Countless journals and scholars agree that to strengthen the weight of management decisions, ROA should be considered to obtain the true value of the project. (van Putten, A. B., & MacMillan, I. C. 2004)

In the academic world, the majority of research done on real options is mostly used as a decision making tool rather than an application that could be implemented into the processes of the company. However, the potential for applications in management are numerous. In one such example, Bryan W. Husted explained, in his article Risk Management, Real Options, and Corporate Social Responsibility, how Corporate Social Responsibility (CSR) could be better valued using a ROA method. CSR can be described as “[a] firm’s consideration of, and response to, issues beyond the narrow economic, technical, and legal requirements of the firm... [to] accomplish social benefits along with the traditional economic gains which the firm seeks.” In other words, ventures that a firm chooses to take part in that are not specifically in their line of business, but instead provide social benefits which are favorable for the company. These ventures all include some level of risk, and require investment, most likely, and Husted recognized the opportunity to value these projects through ROA.

Another example exists in the real estate market. Real estate purchases are typically viewed as one of the most costly and least liquid investments companies make. A type of
investment that could be viewed as an anchor in today’s fast-paced business environment. However, applying a real-options approach to real estate investment could go a long way to ease the burden. Currently, companies use traditional valuation assessment techniques such as NPV, the Capital Asset Pricing Model (CAPM), Internal Rate of Return (IRR), or Discounted Cash-Flows (DCF) to determine whether or not to proceed with an investment. While there is nothing wrong with these methods, they typically lead to rather black-and-white decisions. Either a company *should invest*, or it *should not* invest. Copeland and Howe point out how standard valuation methods can be very inflexible and often undervalue investments. With a real-options approach, a company is given the luxury of time to: develop the situation, reduce risk, achieve a better understanding of the investment’s true value, and retain operational flexibility. In any investment, systematic and non-systematic risk influence decision-making processes. (Copeland, T., & Howe, K. M. 2002)

Alternatively, using a real option valuation method is not strictly bound to management decisions based on future projects. Managers can also value projects that have already been started, and use the data to determine the true value of the project before they get involved too deep. Out of the few valuation methods that exist, most scholars believe in a few general ideas. All valuations would start with a NPV analysis of the projects, added to the valuation of uncertainty, and the valuation of the potential to abandon or delay the decision. As you can see in Exhibit 2, other option value drivers include, the underlying asset, exercise terms, and time. The formulas to actually do this can be individually altered to fit different management structures and levels of input, but the shear purpose allows managers to determine if their current projects project enough value in the steps to come. If not, the decision to abandon or
With traditional methods, the level of risk at the time of assessment might as well be a constant value. However, real-options based investments allow companies to halt investments, either temporarily or permanently, in response to changing risk levels and market conditions. This ability must be compensated for when comparing real-options investments with non-option investments. “Under the real-options approach, firms should apply a higher user cost to new investments in irreversible assets when returns are stochastic, reflecting the option to delay that is lost when investment occurs.” On the other hand, Grenadier states that “factoring in effects from competition reveal that NPV could be a more accurate description of the investment threshold.” Several studies have been written on the effects of competition on investment, with the primary finding being that competition reduces the value of waiting to invest. “[This] is fully consistent with the findings of Caballero, Trigeorgis, and Grenadier” and has even gone so far as to explore the application of strategic game theory in order to
understand actual market behavior. Bulan, Mayer & Somerville show that “increases in the number of potential competitors located near a project negate the negative relationship between idiosyncratic risk and development.” (Bulan, Mayer and Somerville 2008 and Grenadier 1996, 2002)

However, the way these companies have been accounting for their use of real options has been unclear and seems non-existent. Due to the age of the method, traditionally, real options are not required to be published in any records. So, most firms’ real-options activity is neither disclosed in the financial statements nor is it recorded on the balance sheet. Current researchers are now trying to get disclosure requirements set in place for real options valuations. Michael J. Smith wrote about conservative and aggressive accounting treatments for real options. The conservative treatment would be to expense the cost of the project, while an aggressive treatment would be to capitalize the value of the underlying asset. Andrew H. Chen, James A. Conover, and John W. list some support for disclosing a firms real options;

“Satisfactory disclosure requires that accounting reports include adequate information about the firm’s real options, with market-based mechanisms for defining the necessary information and calling it into the appropriate arena”. Voluntary disclosure of real options can be made through the Management Discussion and Analysis section of the financial statements.

This leads into the real situation at hand. The biggest gap between the academic world and the corporate world is the lack of understanding and inability to implement these methods. ROA has failed to supplement NPV as a preferred method of project valuation. A 2000 survey by Bain & Co. showed that only 9% of senior executives used ROA as a valuation technique, and then was not even included in the 2003 survey. This is likely due to the complicated
mathematics (i.e., partial differential equations, used in the calculation of real options), the relative newness of the valuation technology, the belief that the value of the asset must be observable in the open market, or the reluctance of management to abandon projects (Teach 2010).

Due to the mathematical involvement necessary to value these decisions many managers are reluctant, sometimes ignorant, and are not willing to put in the additional hours it may take to understand and value each decision. In addition, another gap exists between the analytical teams and the management teams because many managers do not know how to value real options and very few are willing to learn it. Since the real-options knowledge is being obtained and stored in different departments, management is not seeing the true potential and does not understand the grand value that comes from using ROA.

Another factor that affects management directly is the “management mentality.” This mentality is the regular action of most managers across the corporate spectrum. Janney and Dess called it “managerial adventurism.” This occurs when managers who have worked in their field or industry, and have had successful projects in the past, are not willing to consider ROA as a new method because their methods have worked in the past. With most management, this creates an “intuition gap” where the managers are more trusting of their gut-feelings and past experience, then the new methodology. The managers who are still unsure about the system will not want to implement it because it could be time consuming and the potential for failure exist where it did not exist before. Managers who have had funded projects may see that their prior projects could have been forgone to save funds, or their future projects could be scrapped
because they may not bring in the targeted profit. These situations make management uneasy and many feel like ROA could undermine their authority.

On the other side, the management that does understand real-option valuations, may act nonchalantly towards the decision making process because real options allows the smaller, less invested steps to be taken first instead of making a full investment. With that in mind, management may put off the importance of the small investments and not utilize the true real option potential. Also, the managers that do know about ROA worry that it may eliminate some of the projects they want to get started which could lower their end of year bonus. (Janney, J. J., & Dess, G. G. 1993)

The best way to supplement these situations is to find ways to help companies learn about real options in a way that simple, concise, and appealing. That way the increase in use will grow exponentially. Once companies see that ROA can do nothing but help them build a better company that makes stronger, better processed decisions, and they start recovering losses from projects they will implement the system in as many places as possible. One way to encourage learning is to develop a Real Options Training Manual that outlines and defines the steps, outcomes, and potential pitfalls of using ROA. In addition to the manual, the next most important development would be the development of ROA software that could make the mathematical and analytical calculations simpler and more convenient to management and their employees. This would eliminate the ignorance of some employees and the simple processes would make management more willing to experiment with the system.

Also, to help urge the management to incorporate ROA in the preliminary stages, companies can create incentive programs that applaud managers for going the distance and
using the analysis to better value their projects. A value-based incentive program could be implemented to reward management for their actions that create and enhance ROA. Not only could management be rewarded for sponsoring and encouraging ROA. They could also be rewarded for taking the necessary steps to record their actions. With the new SEC rules adopted in January 2003 that require disclosure of off-balance-sheet arrangements in a designated section of MD&A with a detailing known as contractual obligations in tabular format. Chen, Conover, and Kensinger have encouraged that companies should develop a management incentive program to persuade managers to disclose the results of their firm’s real options. This, hopefully, will help overcome the “management mentality” and encourage all management to take part.

The last big thing that can be done is to continue training. Once the management know the processes and are implementing them well themselves, they should continue to train the people beneath them so that the ideas and applications for real options don’t disappear when that manager disappears. This way when young managers come in they can continue to use the process and the different departments are aware of the process and can account for it themselves.
References


