Manager’s Flexibility & Cancellation Option: Insights of a Case Study in the Latin American Oil Industry

ARTHUR RIDOLFO NETO,† and MARCELO MOREIRA RUSSO,‡

† Fundação Getulio Vargas (FGV-EAESP)

ABSTRACT

Objective. This article focused on the main business insights of the use of Real Options valuation analysis in the eyes of a finance professional. It used a case study of an investment opportunity in the oil and gas field services industry in Latin America to discuss the methodology implementation and its insights. As a secondary objective, it discussed the insights and options embedded in this investment opportunity.

Methodology. The investment opportunity was examined using the Real Options Analysis (ROA) framework and the results compared to the traditional methodology of Net Present Value. The valuation technique was performed as if it had been applied at the time the project was approved.

Findings. The most important of Real Option valuation is not the results, but how one arrives at them. After the project value is calculated and the project approved or not, the Real Option valuation requires and supports the monitoring of the project. By understanding how the options are created, managers can make better decisions about the project after it was approved.

KEYWORDS: Real options, capital budget projects, decision under uncertainty, NPV, option to cancel.

1 INTRODUCTION

Emerging markets will continue to present many investment opportunities in the coming years. Specific characteristics of these investments as commodity-linked prices (e.g., oil and gas and agribusiness projects) and the customary uncertainties related to emerging markets are additional challenges that will be faced. In this scenario, a more sophisticated capital budgeting framework,
Real Options, offers a more robust theory to deal with uncertainty, managerial flexibility, and volatile outcomes imbedded in these opportunities. Real Options theory assumes that the managers’ involvement in the project generates value. Managers should capitalize on good outcomes or reduce losses by abandoning projects with bad results. This article is part of study that applied Real Options valuation analysis for an investment project and discussed the process and the results of such methodology. It analyzed an investment project in Colombia and compared the results under traditional NPV (net present value) methodology and Real Options.

This article focused on the main business insights, in the eyes of a finance professional, of the use of Real Options valuation analysis. It is part of a broader study (Russo, 2012) study the tradeoffs of Real Option Analysis (ROA) between the complexity (costs) of using it and the benefits of improving the analysis’ explanatory power for decision-makers. Are real options a real option for real-world finance professionals? This is one of the questions the article tries to answer.

2 RESEARCH METHOD

This research used the current literature and application of Real Options methodology in a real case study to discuss the application and insights in a real-world situation. Data was collected, focusing on the raw data regarding the investment opportunities approval and historic performance of the projects. Finally, one Real Options methodology was applied to the case study following a proper methodology.

After reviewing several Real Options methodologies and reproducing several of these case studies, the Real Options field appears very disperse among several streams, with no mainstream approach. Up to this point, the research was in risk due to the lack of practical and applicable framework to evaluate the proposed case study. A series of three articles helped to clarify the current situation of the field and the position I should take for this study. The three articles are a sequence of discussions on the future and applicability of the methodology:

(i) Real Options Analysis: Where are the Emperor’s Clothes? (Borison, 2005a)
(ii) Real Options: Meeting the Georgetown Challenge (T. E. Copeland & Antikarov, 2005)
(iii) A Response to “Real Options: Meeting the Georgetown Challenge” (Borison, 2005b)

After analyzing the different positions set forth by the above articles, this research employed that of T. E. Copeland & Antikarov (2005). In the article, the authors attempted to provide the foundation for establishing a consensus on
methodology. They proposed the methodology described in Figure 1 based on the Binomial Lattice model.

One of the important screenings in the selection of the methodology to be applied in the case study was my ability to be comfortable with the algebra involved. As an average practitioner of capital budget analysis, any method involving complex calculus, advanced statistics or stochastic calculus was disregarded as viable methodology. To apply the methodology of Real Options to evaluate a real case investment project, a combination of the five-step process proposed by T. E. Copeland & Antikarov (2005) and the adjustment used by Brandão, Dyer, & Hahn (2005) was implemented. Different from the T. E. Copeland & Antikarov (2005) approach, this method uses most of the binomial lattice methodology in terms of cash flow already discounted by the risk-free rate. This approach facilitates results analyses and the modeling of the variables.

3 The case study: investing before the 2008 financial crisis

Capital Budget project decisions should be taken based on reasonable assumptions that reflect the project reality oversimplification can lead to wrong conclusions. The case study identified several problems in the original investment decision and highlighted several problems in the original analysis. The revised business case or NPV was the base for the implementation of the real option methodology that priced important options embedded in the invest-

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**Table: Five-Step Process for Real Option Valuation**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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</table>
| 1. Calculate NPV | a) Estimate expected free cash flows
b) Estimate the cost of capital
c) Separate different flows
d) Calculate NPV |
| 2. Analyze Uncertainty | a) Map the uncertainties
b) Keep separate those uncertainties that evolve discretely and those that evolve continuously through time using Monte Carlo techniques
c) Combine those risks that evolve continuously |
| 3. Build Event Tree | a) Construction of the underlying asset event tree
b) Models dividends payment
| 4. Create Decision Tree | a) Understand the type of option being modeled
b) Can have multiple decisions at one node
c) Ensure no arbitrage with underlying and risk-free bond, event tree should reduce to PV |
| 5. Estimate Value of Real Option | a) Solution provides decisions as well as a value |

*Revised by the Author

**Source:** Adaptation from T. E. Copeland & Antikarov (2005).
ment decision. OFS, the company analyzing the investment, was evaluating the purchase of drilling rig for a client project. The project was approved in mid-2008. At the time of the investment approval, the Colombian operation of OFS was presenting very good results (see Figure 2).

The investment proposal for the purchase of Rig O was a response to Client E’s strategy for the future development of its fields in Colombia. The project intended to purchase a state-of-the-art drilling rig that would work in an initial 18-month pilot program. The project was expected to have a high success rate, and therefore commitment to this rig would be at least 5-year time. Some assumptions were revised in the eyes of the period in which the investment analysis was performed, correcting some gross simplifications and conceptual mistakes. In the case of Rig O investment analysis, the following adjustments and revisions were required:

- The Discounted Cash Flow analysis was previously only annual; it was adapted for a monthly projection. The monthly projection was used to facilitate the breakdown of the total project into several contracts that are not necessarily multiples of 12 months. The monthly projection also facilitated the identification of trends and impacts within the year.
- Original model did not consider any working capital investments. Total estimated working capital investment was almost $1 million.
- The original case considered the Rig working for almost 10 years without any maintenance stop. It did not consider any additional CAPEX in the following years for maintenance overhaul and technological updates. It was adjusted to reflect those investments.
- The salvage value for the Rig at the end of year ten, in the original analysis, was unrealistic: it was 87% of the initial investment. It was adjusted for

![Oil Prices Chart](chart.png)

*Source: Bloomberg.*

**Figure 2:** Oil Prices and monthly average and standard deviation for the period
a more realistic value, the liquidation value or forced sale value. The liquidation value was estimated based on the real useful life of the rig, 30 years. The forced sale would be 32% of the original investment plus any refurbishment and technological updates, depreciated in 30 years. The 32% value was calculated based on recent appraisal for the company assets.

It is not uncommon that most investment analyses and decisions are made before any contract or formal arrangement is made with the client. In the case of a large investment, it is recommended that the contractual terms be fully reflected in the investment analysis and consequently in the decision. It avoids a very common trap, the investment decision is approved under certain assumptions and the project is implemented under different and more relaxed ones. However, in most cases, it is not practical to negotiate the terms of the contract and the investment decisions together. In this case the contract had two condition that were not considered in the original business case:

- The contract specified that the client could cancel the contract at any time, paying only the demobilization tariff estimated at $2.5 million. The contract clearly included a put option for client E at no additional charge. The value of this option should be discounted from the NPV analysis for the decision-making.
- The contract stipulated an 18-month contracted service with the option for the client to contract again under the same terms. In fact, this option does not have a lot of value for the analysis as the investment project already considered that the contract would be renewed for 10 years with similar terms which was not reasonable.

4 REAL OPTION METHODOLOGY IMPLEMENTATION

4.1 Reframing the Project

It was necessary to decide what was most important uncertainties to model. It was tricky because there was no single methodology that would produce the answers; only a deep understanding of the reality of the project and the dynamics of the industry could yield the answers. After defining these elements, it was necessary to go back to the methodology to determine whether the uncertainty could be modeled.

In this case study, the first step was to recognize that unlike the original investment analysis, the project was not a single series of cash flows from a single client. In fact, it was a combination of several sets of cash flows from various contracts, which may or may not come from a single client. To facilitate the analysis, the discounted cash flow was divided into 5 contracts: One base contract for 18 months, according the investment proposal with Client E, and 4
contracts for 24 months each and an additional 1 month for mobilization for a new project (see Table 1 and Table 2).

Table 1: Project O Contract Breakdown Assumptions and CAPEX

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
<th>Capex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Contract (Client E)</td>
<td>18</td>
<td>21.09</td>
</tr>
<tr>
<td>New contract 1</td>
<td>25</td>
<td>0.20</td>
</tr>
<tr>
<td>New contract 2</td>
<td>25</td>
<td>0.20</td>
</tr>
<tr>
<td>New contract 3</td>
<td>25</td>
<td>1.00</td>
</tr>
<tr>
<td>New contract 4</td>
<td>21</td>
<td>0.20</td>
</tr>
<tr>
<td>Total 5 Contracts</td>
<td>114</td>
<td>22.7</td>
</tr>
</tbody>
</table>

Source: Management estimates.

Table 2: PV of Cash Flow Breakdown per contract

<table>
<thead>
<tr>
<th></th>
<th>PV Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Contract (Client E)</td>
<td>6.4</td>
</tr>
<tr>
<td>New contract 1</td>
<td>7.6</td>
</tr>
<tr>
<td>New contract 2</td>
<td>6.3</td>
</tr>
<tr>
<td>New contract 3</td>
<td>5.2</td>
</tr>
<tr>
<td>New contract 4</td>
<td>4.0</td>
</tr>
<tr>
<td>Total 5 Contracts</td>
<td>29.5</td>
</tr>
</tbody>
</table>

Source: Author's calculation.

4.2 Defining the uncertainties

After reframing the project, it was easier to define the main uncertainties involved in the contracts and the options involved. The main uncertainties involved can be divided into two main groups: OFS company Uncertainties or Technical Uncertainties:

- **Rig Efficiency**: Total days/hours worked and billed divided by the total days/hours contracted. A drilling rig, such as the one described, operates 24 hours per day 7 days per week and generates revenue according to the number of hours or days it is ready to operate (available to the client). A stable operation generally requires high levels of efficiency, around 98%; however, a rig could have several operational problems such as personnel strikes, difficulties in moving the rig between wells, mechanical problems or even human errors in the drilling activity.

- **Rig utilization**: Rig utilization is a similar to the former variable, total days/hours worked and billed divided by the total days/hours available,
but it also considers the impact of an idle rig between contracts. It was important because the project has only one contract guaranteed. After the first contract was finished, the OFS would be back to the market and susceptible to the market forces to get a new contract.

- **Tariff and Day Rate**: Once the rig is engaged, this variable is mostly fixed as all tariffs are calculated according to the contract with little space for renegotiation. However, as the contract is renewed or the rig is available for a new contract, it will have to take the new “market” tariff.

- **Costs and Day Cost**: Differently from the tariffs that are mostly defined as the contract is signed, the operational costs involved in the operation are not; foreign exchange variations and supply shocks could significantly influence the costs and the overall profitability of the project.

- **Client / Operator Uncertainties or Market Uncertainties**: Oil Price and Economic downturn: The OFS’s clients are the ones who bear the direct impact of drastic fluctuations in the oil prices or an economic downturn; they are the ones who will sell oil at a lower price and at a lower volume. The drilling service they contract is only a part of the initial investment they have to incur to be able to sell their products; it is only one part of a more complex value chain. The practical implication of these uncertainties for the OFS investment project are:

  (i) If the oil price drops substantially with no expectation of recovery, the client’s project (in which the rig is being used) may not be viable any more (in light of the new expected price of oil). In this case, the client could cancel the contract for a specified penalty (generally the demobilization costs).

  (ii) In a downturn or in a lower oil price environment, the clients will be less willing to contract new rigs, depressing the tariffs and the utilization. Using the previous division of uncertainties, it becomes clear that part of the first group has a direct impact on the OFS cash flow as it may manage and mitigate most of the risks. They are directly involved in the cash flow projections, for instance: the total revenue will depend on the day rate and the efficiency. The impact of the second group will depend on the economics of the operator’s project as: the total investment it will require, expected lifting cost (cost to extract the oil after the well is complete), type of oil it will produce and the price it is expected to sell. The impact on the OFS cash flow will only happen if the operator cancels the contract or if it hires the OFS for a new contract with a lower tariff.

4.3 **Setting the methodology parameters**

Our revised version of the original business case was the base DCF used to estimate the project value. During the application of the methodology, separating
the different “flows” was found to facilitate analysis and the binomial lattice approach, thus in the NPV analysis, they can be mixed together. I separated all flows related to investment or divesture decisions (CAPEX, salvage value, margin lost between contracts) from other flows related to the regular operation. After separating the flows, each piece can be discounted by the same WACC and added together in the NPV (see Table 3).

I combined the two uncertainties, day rate and day cost, into one variable, day margin. As the dynamics of this variable are strongly correlated to each other. Some cost increases as labor costs are passed to the tariffs (in some contracts) and the market dynamic of lower activity generating lower tariffs also reflects on lower operational costs for the whole market as demands reduces. To capture the effects of the uncertainties that were discussed, the day margin and utilization rate were used to drive the Monte Carlo simulation of changes in the project value. Using historical data and management estimates, considering the information available at the time. In the case of the investment project on Rig O, one might be tempted to identify the risk of the investment project with the volatility of the efficiency benchmark, 4.6% (Figure 3), or the day margin of a benchmark rig, 16% (Figure 4).

This simulation in turn allows for estimation of the volatility of the rate of return on the project (which, as we shall show later on, is 24.3%) a number that is different from the volatility of the efficiency and from the volatility of the day margin, calculated directly from the Monte Carlo simulation. In fact, the project volatility is a combination of the volatilities from these two risks combined with the economics of the projected defined by the remaining assumptions. Even though the other assumptions were not randomly simulated in the Monte Carlo model, they can influence the project volatility. For instance, if the project had no working capital requirements the project volatility would be only 0.8% higher; on the other hand, if it had a monthly fixed cost of $100, regardless of reducing the PV of the project it would have increased the volatility of the project in 22.4%.

The Monte Carlo simulation of the project return was accomplished by

<table>
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<th>Table 3: Project O NPV Breakdown</th>
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<tr>
<td><strong>Base Contract (Client E)</strong></td>
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</tr>
<tr>
<td>New contract 4</td>
</tr>
<tr>
<td><strong>Total 5 Contracts</strong></td>
</tr>
</tbody>
</table>

*Source: Author’s calculation.*
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Source: OFS internal data.

**Figure 3:** Efficiency Evolution of Benchmark rig

Source: OFS internal data.

**Figure 4:** Day Margin Evolution for Benchmark rig

running 10,000 random draws of the two risks, efficiency and day margins, as described. The project return is defined by

\[
\ln \left( \frac{PV_1 + FCF_1}{PV_0} \right).
\]

In this case, \( PV_1 \) is the present value of future cash flow generated by the operation without investments and salvage value in Year 1 discounted at WACC (from the Monte Carlo simulation). \( FCF_1 \) is the nominal cash flow generated
in the first month without any investment, rather than working capital, from
the Monte Carlo simulation. $PV_0$ is the cash flow generated by the operation
at Year 0 from the standard PV analysis without the Monte Carlo simulation.
The volatility of the project calculated by this methodology was 24.3%. The
volatility for the first group was already calculated by using the Monte Carlo
simulation. For the second group, based on the operator’s economics, the
risk of an economic downturn would make the operator’s project unfeasible,
also requiring a volatility estimation. In this case, the OFS cash flow is the
operator’s capital expenditure in its project. If the operator’s project becomes
unfeasible because of a drop in oil prices, an analysis will be performed to
determine if it is worth exercising its put option to cancel the contract and
pay the contract penalty. It is a relevant option that the OFS gives away to
the operators by the time the contract is signed and should be discounted in
the original PV calculation of the project. To calculate this option, We used
a simplified approach and considered as the volatility driver the oil prices’
standard deviation for a similar period. It was used the last 20 months previous
the project approval. Steps 3 to 5 from the methodology was applied twice: first
for the second type of uncertainty related to the OFS client, the company that
hired the OFS and can cancel the contract any time if it faces difficulties, and
then for the sets of uncertainties related to OFS related operations (efficiency
and day margin). This order is important because the project value should be
calculated after discounting the embedded put option that the OFS company
gives to its clients. This is a cost that should reduce the project value that will be
the base to calculate the impact of the other uncertainties in the total project
value. The annual risk free discount rate used in both cases was 3.4% in $\text{dollar}
equivalent to a 0.28% monthly rate.

4.4 ROA—Operator Perspective—Option to Cancel the Contract

I assumed that the operator’s project value on T0 is 100. I also assumed that its
value would change according the oil price volatility. The weakest assumption
considered to calculate the option value is that the operator project will be
unfeasible if it reduces its value by 50%. When this happens, the operators will
choose between continuing the contract and paying the remaining contract
value or canceling the contract and paying the contractual penalty; it will choose
the lowest value and make its decision. According the OFS contract with Client E,
the penalty for early cancelation of the contract is the mobilization revenue,
about $2.5 million. Once the operator decision was modeled, I have to reflect
this decision on the OFS project value to calculate the option value. The project
value with operators’ flexibility was calculated using the backward induction
technique described in T. E. Copeland & Antikarov (2005) and exemplified
in Russo (2012). This is the value of the option to cancel the contract that
OFS gives to the client and should be seen as a cost to be subtracted from the
original contract PV. The value of this option is entirely owned by the operators. In fact, the value that was calculated is the OFS cost on giving this option to the operator not the value of the option to the operator. The value for the option that OFS gives to the operator was valued at $0.5 million or 8% of the value of the first 18-month project. A similar approach was taken to obtain the amount required to cancel the new contracts. The other four contracts are longer (24 months), generating an option to cancel, or cost to the OFS, valued at $1.2 million or 14% of the project value. More central than calculating the cost of the option was the understanding of the risk involved in the project caused by a contractual clause. By agreeing to such a clause, OFS was more exposed to the market uncertainty (oil price). By understanding this dynamic, the company could be more prepared to negotiate new agreements with clients (management flexibility) if such drastic events occur. This was the case as the 2008 finance crisis drastically reduced oil prices.

4.5 ROA—OFS Perspective—Options to Wait, to Reduce Tariffs and to Abandon

Now we are going to apply the methodology to the other uncertainties using original PV reduced the put option cost that was given to the client. The decision tree was modeled as several European options that OFS has at the end of each contract. At the end of the contract with Client E, after Contracts I and II the OFS has the option to enter into a new contract with the same or a new client, and either wait until the market improves or sell the rig for the current liquidation value. If the OFS decides to enter into a new contract, it has a small maintenance CAPEX to incur. After almost five years the OFS has an additional option of investing $1 million for updating the rig or accepting a reduction of 30% on the day margin and consequently the cash flow. At the end of Contract III if it did not choose to update it will have to continue with lower margins. After almost 10 years, if the rig was not sold yet it will be sold for a liquidation

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18,885 | 20,122 | 23,174 | 24,669 | 26,034 | 27,265 | 28,231 | 28,907 | 29,268 | 29,268 | 32,913 | 33,159 | 33,414 | 33,414 | 33,414 | 33,414 | 33,414 | 33,414 |

Note: This table shows remaining cash flow to be paid to the OFS contract.

Figure 5: Client E Decision Tree Based on Oil Price and Cash Flow to be Paid to OFS
value similar to the original business case. Using this approach, we are able to obtain the total project value during the period of the projections without the need to calculate any terminal value for cash flow projections. The binomial lattices were model in order to calculate the option value:

- Flexibility to do not contract (A) at the end of each contract and wait for better margins; in this case it is not necessary to invest in maintenance CAPEX;
- Flexibility to do not contract (A) + To be able to continue contracting with lower margins and without incurring the update CAPEX (B);
- A+B+ To sell the rig for liquidation value at the end of each contract (C).
- In addition to this binomial lattice, one lattice more was performed only with the option to sell for liquidation value.

Using the backward induction technique, first it was calculated the option to do not contract. This option could be exercised when the expected cash flow from the current client is lower than the required investment (maintenance CAPEX) added to the option to cancel that OFS awards its clients. As OFS has the option to offer service latter if the market improves it is also necessary to model this contract separately. The value of the option of not entering into new contracts if the situation is not favorable was calculated to be $2.6 million. At this point a new variable was added to the option calculation: the option not to invest in updating the rig in Month 69.

The only difference was that in the Month 69 the model should also contain the option to reduce the investment by $1 million with the value that comes from the backward induction representing the future cash flows from the subsequent contracts being reduced by 30%. Comparing this value with the value of the project with flexibility only to not enter into a new contract, the option value was calculated. The option of reducing tariffs (reducing the day margin) but not to invest on updating the rig resulted in an additional value of $0.4 million. Finally, the most valuable option was incorporated, which, as we will see, is the option to sell the rig for its liquidation value at the end of each contract. The same formulas from the previously binomial lattice were used, but incorporating the value of the liquidation value as an additional option at end of each contract. The additional value of the option of selling the rig for liquidation value was calculated to be $1.2 million. However, unlike the previous option that was built on the option of not entering into a new contract, this option and decision is independent from the others and has the potential to offset the flexibility added by the other options. In order to better understand this dynamic, I implemented an additional binomial lattice only with the flexibility to sell the rig for liquidation value. It has the same value of the project with all of the other options. The option to sell Rig O for liquidation value is dominant over the other options. From a numerical
Figure 6: Decision Tree for OFS after Each Contract
perspective of this framework, all other options could be eliminated, but the last one, the project would have the same numerical value. However, if you take into consideration the business perspective it is very different: the option of selling the rig could not be accessible. The liquidation value could also be misestimated or the market for this kind of rig could become less liquid. Another import aspect of having additional options even though it does not represent any additional monetary value for the project is the fact that by having the option mapped, managers could act on the value levers in order to maximize the value throughout the project life.

Case Study Conclusions

As described in Figure 6, the project valuation with all real options was $ 8.7 million. This value was formed by: i) All contracts expected cash flow totaling $29.5 million; ii) All CAPEX investments ($22.9) million; iii) The salvage value of the end of the project (rig liquidation value) $ 2.7 million; The first components of the tree combined is the project traditional NPV without any flexibility and static, $ 9.3 million.

Including the real options:

- Cost of the option to cancel the contract awarded to Client E, ($ 0.5) million;
- Cost of the option to cancel the new assumed contracts to be awarded to the new contracts expected to be signed ($ 4.2) million;
- The option to be able to not invest on maintenance and updating CAPEX and not enter in a new contract waiting for better tariffs (expected cash flow) to improve $ 2.6 million;
- Option to be able to work with lower tariffs in Month 69, before entering in contract 3 and not investing on updating the rig $ 0.5 million;
- Option to sell the rig for liquidation value that has a marginal impact of $ 1.2 million considering the previous options; or $ 4.2 million considering it by itself.

5 Originality & value

Unlike several Real Options examples and case studies in which the Real Option analysis increases the project value compared to the NPV approach, this one also reduces. By incorporating the cost of the put option that OFS puts forth for the client it reduces the value by giving flexibility to its clients it is a similar impacted described by T. E. Copeland & Weston (1982) on their note on the evaluation of cancellable operating leases. By incorporating some options brought by the OFS management due to the flexibility to act, it partially offset the project value reduction caused by the cancelation “put option”.

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According to Block (2007), in the survey with 279 Fortune 1000 companies, only 14.3% used Real Options in the capital budget process in contrast with the majority using NPV analysis. Despite being recommended by academics and experts, the practical application of Real Options in organizations is still meager. According to Lander & Pinches (1998), the main barriers for wider adoption are: i) the types of models are not well known or understood by corporate managers; ii) the required modeling assumptions are often violated in a practical Real Options application; and iii) additional assumptions required limits the scope of applicability.

Several authors have developed simplified approaches and methodologies to try to open the Real Options black box (T. Copeland & Tufano, 2004). Recent literature and several case studies have also helped bring together academics and practitioners to overcome these challenges. However, most companies are still far from the correct application of the traditional NPV methodology. As shown in the case study, important projects are still being approved without comprehensive discussions of their main assumptions. In this case study, the company have over-simplified some assumptions and the valuation methodology and was not ready to use the ROA methodology. Before going further in the use of Real Options, the company should revise its internal decision-making process and ensure that the results are being calculated with all information available, not only the ones given to the financial analysts.

The Real Option methodology will not solve the problems of poor assumption or overconfident estimates. However, it could better reflect the reality and the flexibility involved in the project: the flexibility of the company acting to solve problems and at the same time the flexibility for its clients to cancel contracts. This was the situation in case study. By subtracting from the NPV

**Figure 7:** Project Valuation Breakdown with all Real Options
the cost of the put option, it would reduce the project value reflecting possible economic downturn. It was exactly the case with the 2008 financial crisis.

7 “THE JOURNEY NOT THE ARRIVAL MATTERS” – T. S. ELIOT

The project value with the revised NPV (adjusted after the OFS oversimplified initial valuation) and the NPV added the Real Options had similar monetary values. The option to sell for the liquidation value is dominant to the other two options, so why take the trouble of calculating the all the options? The answer lies on the understanding that the most important point of Real Option valuation is not the results, but how one arrives at them. Unlike a static NPV analysis in which after the project value is calculated and the project approved or not, the Real Option valuation requires and supports the monitoring of the project. By understanding how the options are created, managers can make better decisions about the project after it was approved. They can decide on exercise the project options or not. Even the projects that were not approved might be feasible if certain circumstances change. By performing the analysis, the option dynamics are mapped and its values drivers explored. It helps managers to identify possible opportunities and threats and allows them to act in time to increase the project value. As a finance professional, I answer yes to the research question. Real Options can be used in real-world organizations, not only in academia. The case study showed how valuable it can be especially to price contractual clauses that typically companies give to clients at no charge. However, there is still a long way to go in making the methodology more practical to use. The case study also showed that there was no single framework that fits all organizations’ needs or types of investment projects. The framework should be customized to calculate a specific option or investment project. It is still far from being a simple framework for all organizations.

REFERENCES


