OFFSHORE OUTSOURCING CONTRACTS ANALYSIS: THE REAL OPTIONS APPROACH

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In this paper, we analyze the offshore outsourcing contract types using the Binomial Option Pricing model. This model is very useful in analyzing real options associated with Projects. Earlier studies by Granedier (1995) and Pashley, Krishnaswamy and Gilbert (1997) have used the option pricing model to analyze lease contracts and debt contracts respectively. So far there are no studies that address offshore outsourcing contracts. Gopal et al (2003) and Ethiraj et al (2004) have found, through empirical studies, that there is a significant relationship between profits and type of contracts, and price and types of contracts respectively. But they do not provide a theoretical basis for their findings. In this paper we provide a theoretical basis for such a relationship using the real options analysis. To our knowledge, this is the first study that does theoretical analysis of such a relationship.

Key Words:

Real options, Lookback options, Outsourcing, Time and materials contracts

1. INTRODUCTION.

Gopal et al (2003) and Ethiraj et al (2004), through empirical studies have shown that there is a significant relationship between profits and type of contracts, and price and types of contracts respectively. But they do not provide a theoretical basis for their findings. In this paper we are interested in providing a theoretical basis for such relationships using the real options analysis. To the best of our knowledge, this is the first time such a study has been attempted in this area.

Offshore outsourcing or simply offshoring development has seen remarkable growth in the last ten years. This particular kind of outsourcing occurs when the contracting parties are in different countries and for example; software is developed in the developer's country and then transferred to the buyer's organization. Spurred by the trend toward globalization in the business world, countries like India, Philippines, Ireland, Russia and Israel among others have seen an impressive growth in their software industries. Offshore outsourcing development also poses significant challenges because lack of proximity hampers a client's ability to monitor its vendors and coordinate development activities closely. Therefore, viability and profitability of vendor-client relationships depend crucially on the efficacy of contractual arrangements both parties agree to at the outset. [Lacity and Willcocks (1998)]

2. LITERATURE REVIEW.

In their paper, Gopal et al (2003) conduct an empirical investigation of the determinants of offshore contractual arrangements, and the manner in which contract choice affects project performance. The context in their paper is offshore contracts.

In a world of complete information, theoretically speaking, it does not matter which type of contract is chosen; parameters of different types of contracts can always be chosen to make them ex-ante welfare-equivalent. However, in most real-world settings, incomplete information is the order of day and hence contracts are also incomplete [Hart and Moore, 1988]; the offshore outsourcing context is no exception. It is unrealistic to assume that the contracting parties can foresee all future contingencies at the time of contracting. All else being the same, a risk-averse agent would prefer a contract that shields him from risk ex-post to a contract that does not adequately compensate for risk ex-ante because of incompleteness of information.

In the offshore outsourcing context, analyzing how contracts are formed, and the extent to which contracts address risks and uncertainties, is important in understanding the dynamics behind what determines project success.

incomplete or make incorrect assumptions. When these omissions or errors are discovered during the project changes must be made that increase the final project cost. No contract, no matter how well written, can predict and define remedies for all of the potential risk events in a project. The effort required to resolve risk events, like time and effort overruns and changes in scope, throughout the life of the project will drive costs above and beyond the original contracted price.

All fixed price projects guarantee the buyer will pay a specific amount as long as there are no scope changes and no delays caused by unforeseen events. Of course the odds of there being no delays and no functional changes on a project are extremely high. Fixed price contracts increase the risk for the vendor that the buyer will try to introduce new activities or deliverables into the project that were originally out of scope. "It's just a little change that will take no time to implement." This puts the onus on the vendor to control scope. During a fixed price contracts the vendor and the buyer may spend an inordinate amount of time preparing, evaluating, and arguing over change request to determine what is within the original project scope, what is legitimate change, and what is outside of the original project scope. [CMP Media LLC (2004)]

Fixed price contracts may induce the vendor to cut corners in order to finish all the in scope deliverables on time and on budget. Corner cutting will occur especially when a project's tasks run past major deadlines. Finally the vague contract or the limits in the functional specifications of the product become the vendor's most powerful tools. They may used generate change requests that drive up the price of the end product to recoup the losses the vendor is taking on the fixed price portion of the project.

Fixed price contracts may also lead to poor client/vendor relationships. As the vendor tries to do the least amount of work to complete the assignment and the buyer tries to get the most functionality for the money invested the relationship between the buyer and the vendor could sour. Over time, the relationship becomes strained, which explains why the duration of most vendor/buyer relationships is one to two years. After about two years the buyer is sick of the vendor making promises he can't keep or cranking out too many change requests forms. And the vendor is concerned by the buyer's lack of understanding of their requirements.

3.2 Time & Materials Contracts.

No buyer is going to enter into a time & materials contract where the deliverables are not well defined and therefore the costs are unlimited. If contracts had to be negotiated on a time & materials bases, both the vendor and the buyer are motivated to create smaller contracts with clearly defined and achievable deliverables.

Time & materials contracts motivate the buyer and the vendor to have the project finish on time in order to stay on budget. The buyer has an additional incentive to control scope to stay on budget. While the vendor is motivated to do a good job in a timely manner to secure follow on business. If this is true, then, there must be more demand for time & material contracts; but it is not so.

Most organizations believe the myth that fixed price projects lessen the risk of cost over runs and that time & materials projects are more risky. But in a fixed price contract risk isn't reduced or eliminated it is merely being shifted from the buyer to the vendor. Shifting the burden occurs when the buyer wishes to avoid risk by ensuring that as much risk as possible is assumed by the vendor. If the project fails the vendor takes the blame. However, both the vendor and the buyer will eventually "feel the pain" if the risk is only shifted and not eliminated.

A more appropriate approach to managing risk is due diligence on the part of the buyer. When purchasing professional services the watch words are still caveat emptor. Trying to set a fixed time, fixed scope and fixed cost on a complex project doesn't work in the variable and dynamic business like information technology business. We have to be prepared for changes and to eliminate or resolve (not shift) the risks associated with changes. The only way to do this is to draft solutions for the big picture but build these systems in small manageable and well defined slices.

Enough projects fail in the information technology business that one would think by now we should have caught on to what causes the failures. The primary cause of project failure is fixing a price on a poorly defined product and then failing to meet price, functionality or benefit expectations. If the product is not well defined or if a large amount of "customization" is required to the product being purchased then a fixed price contract is a huge risk for the buyer and the vendor.

If someone is looking to give up all responsibility for your project's success to a third party vendor and are prepared

underlying asset in this case is not a share of stock, but the present value of the net cash inflows from opening up a new route. The strike price is the present value of the fixed costs involved in setting up the new route, which may also include the purchase or leasing of new planes, among other outlays. This is sometimes referred to as the initial investment in capital budgeting. The volatility of the project is the standard deviation of the present value of the project's net cash inflows. The risk-free interest rate and time to expiration have the same interpretation with real options that they do with stock options. However, with real options setting the time to expiration is not always a straightforward exercise. It may even be tempting to state that a real option never expires, but this is seldom the case. Competition often shortens the effective time to expiration of real options. For example, the value of Southwest's option to expand through introducing new routes may be diminished by the emergence of other discount carriers who are well positioned to duplicate their business model. Dividends on the real option consist of the present value of any cash outflows from the underlying project that the firm misses out if they don't initiate the project immediately. Since the value of the project falls after these cash flows are paid, they decrease the value of the call option on the project in the same way that they reduce the value of a call option on a share of stock.

While growth options are analogous to financial call options, another important type of real option, known as an abandonment option, is modeled as an American or European put. If the underlying asset is marketable, then the firm may salvage some value from a failed project through liquidation. For example, when a long-haul trucking firm is evaluating the decision to purchase an additional truck, the value of the project is enhanced by the option to sell the truck at the market price. If the value of the future cash flows that can be earned from operating the truck falls below the strike price, which is the liquidation value of the truck, then the trucking firm can gain by exercising the put option. Similarly, some projects contain an option to scale down the investment without entirely abandoning it. Another particularly important type of real option that is similar to a call is the option to delay a project. Many projects contain more than one type of real option. It many cases, by undertaking a project the firm is giving up the option to delay and purchasing options to expand, to abandon, and to scale down. This implies that many investment opportunities should be valued as a combination of a currently available project using standard NPV and a collection of real options using option-pricing techniques.

For real options analysis to be meaningful, it is also necessary that some degree of uncertainty, flexibility, and irreversibility exist in the underlying project. If there is no uncertainty that can potentially be resolved through time, then we might as well simply apply standard NPV to the project and make an immediate decision to accept or reject. Flexibility is important so that managers can respond to the resolution of uncertainty. If a development firm purchases a tract of land in an urban area, there may be option value in waiting to see if rents on local apartment houses increase before building. However, this value would not be present if the land was purchased from the city with the stipulation that it be developed immediately. The requirement that the investment in the underlying asset be at least partially irreversible may seem to conflict with our assertion that real option analysis is best suited for valuing flexibility. In standard NPV analysis, it is generally assumed that the investment is completely irreversible, while real options analysis allows for the possibility of investment and disinvestment in stages. If the investment is completely reversible, management possesses almost complete flexibility in deciding whether to own the asset or not at any given point in time. This tends to make the calculation of option value trivial. A completely reversible investment carries very little risk, and thus is unlikely to be an investment that allows management to use their expertise to create shareholder value. In practice, most major investments in fixed assets or intangible assets are at least partially irreversible. While there may be an option to abandon, the present value of the strike price or liquidation value is usually less than the present value of the investment required to enter the project. [Copeland, Weston, and Shastri (2005)]

4.2 Valuing Real Options.

Copeland and Antikarov (2001) recommend a four step process for finding the value of an investment opportunity using real options analysis. The first step is to frame, or define, the opportunity and identify the embedded options and their parameters. This step can be quite complex if we are dealing with investments that resemble "exotic" options, such as compound options or rainbow options. Second, we must find the value of the parameters of the options. As we will see, this step will usually also involve finding the NPV of the underlying project. Third, we use an option pricing model to value the options and then determine the total NPV of the project. The fourth step is to evaluate our estimated value using qualitative tools and sensitivity analysis. In part two we provide examples that illustrate the complete valuation process. In the remainder of this section we concentrate on some of the more

= 2/3

$15 and $0 are payoffs for the call option in up and down states.

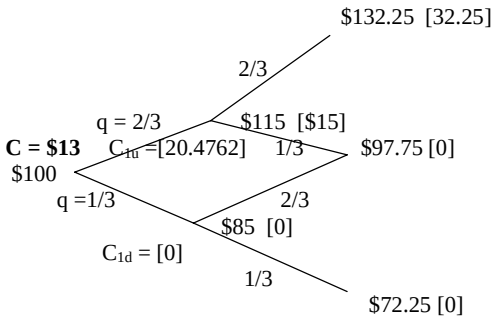
Call Option Price C = [(15)(2/3) + (0)(1/3)]/[1+0.05] = $9.5238

Table 2 below provides Call option prices for various and contract values for various values of up and down percentages.

Table 2: Option and Contract Values for Various Up and Down percentages

Up or Down %	q	C	Total Value of the Contract to Client
10%	0.75	$7.1429	$107.1429
15%	0.6667	$9.5238	$109.5238
20%	0.625	$11.9048	$111.9048
25%	0.6	$14.2857	$114.2857

4.4 Two Period Fixed Price Contract.

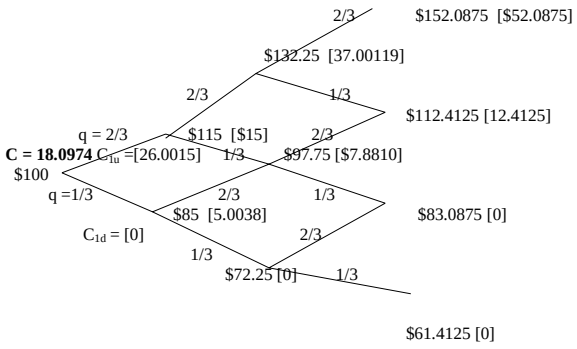


C_{1u} = [(32.25)(2/3) + (0)(1/3)]/1.05 = $20.4726

C_{1d} = [(0)(2/3) + (0)(1/3)] =0 ; and;

C = [(20.4726)(2/3) + (0)(1/3)] = $13

4.5 Three Period Fixed Price Contract.



4.6 Three Period Variable Price (Time and Material) Contract: [Lookback Option]

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