

THE STRATEGIC OPTIONS IN INVESTMENT PROJECTS VALUATION

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Abstract:

The topic of real options applies the option valuation techniques to capital budgeting exercises in which a project is coupled with a put or call option. In many project valuation settings, the firm has one or more options to make strategic changes to the project during its life. These strategic options, which are known as real options, are typically ignored in standard discounted cash-flow analysis where a single expected present value is computed. This paper presents the types of real options that are met in economic activity.

Key words: investment project, real option, valuation, strategic, flexibility

JEL classification: D81, G31

INTRODUCTION

Real Option Valuation represents a new approach utilized in valuation and selecting of strategic investments. It recognizes that the business environment is dynamic and uncertain and that the biggest value can be created through the identification and exercising of the managerial flexibility or real options.

This new method allows the forming of a large image upon a business highlighting the fact that exist many possible routes toward success. Given the uncertainty and the change that characterizes the economic environment, the best success route can not to be selected from beginning. Managers can try to identify the proper action direction, to continuously inform, to identify the real options and, to be prepared to exercise these as the events evolution require this.

A real option confers certain reactive flexibilities on its holder, essentially, the option to invest, wait, or divest in response to new information. Its sensibility to the value of these possibilities is what makes a real option better valuation tool than NPV.

Real option theory is recommended as a useful framework for evaluating investment decisions under uncertainty (Dixit and Pindyck, 1994; Trigeorgis, 1996; Amram and Kulatilaka, 1999; Copeland and Antikarov, 2001).

THE REAL OPTIONS TYPES. THE RESULTS OF RESEARCH

The real options can be classified after diverse criteria (Trigeorgis, 1996; Amram and Kulatilaka, 1998; Copeland and Antikarov 2003).

A distinct classification is that take into consideration **the modality of apparition**. According this criterion the real options can be classified as inherent options and created options.

Inherent options are characterized by the fact that their obtaining or maintaining does not require the special activities. This type of options only must be observed. They include options related by project investment abandoning or stopping, even that the exercise price of these options is, many times, very high. Generally, the inherent options include the following: starting options of some activities, definitive or temporary abandoning options of activities, deferring (waiting) options, options to increase the activity of the investment projects.

The inherent options are named and as control options. The most important element in the case of inherent options is represented by their identification and existence of capacity to utilize them.

The created options are options that require conscious and rational actions for their creation and maintaining. In the moment of their creation there is taken into consideration a possible future evolution of the events. In conditions in which enterprise is operating in an uncertain environment is possible that it wish to have different surviving options. For example, if the enterprise estimates growing the competition in its industry it can try to start businesses in other industries.

Function of **type of flexibility** offered by these, real options can be classified as follows:

Learning options allow enterprises to postpone the principal decision regarding an investment project (waiting options, deferring options) or, to decide step with step if it is opportune to continue or not its implementation (options for sequential investments). These imply the possibility of one part of uncertainty reduction through implication of investment efforts, because it is associated to the period of time prior starting or completion of an investment project.

This type of options appear in the case in which the enterprise is capable to expense money to accelerate the acquisition of an important information (Brach, 2003) and, also, to utilize the obtained information in order to modify the future investment decision.

For example, the obtaining of supplementary information can determine the reduction of technological uncertainty in research & development activity. Also, the obtaining of new information about the amount of reserves can determine reduction of uncertainty in oil and gas fields drilling activities (Copeland & Keenan, 1998).

The option exists only in conditions in which the information can modify the future investment projects. The enterprise must balance the value of option to action on the base of this information with the cost implied by its acquisition (Copeland & Keenan, 1998).

The learning options can be divided in two categories: waiting options or deferring options and options to staged investments.

The waiting option or, deferring option, represents the flexibility to postpone the implementation of an investment project and to decide as to the moment of time at which this will be realized. The investment projects are perceived as potential opportunities for the future periods of time. These are seen as call options. The option to defer investment has been examined by many analysts (McDonald & Siegel, 1986). They show that the value of the project includes an option value of waiting that can be valued and interpreted using option pricing theory.

For example, an investor in real estates that own a land can take the decision regarding the construction of a building for renting. But in condition in which is prevalent an uncertain situation regarding the interest rates and other financial variables evolution (the construction costs, estimated revenues) and, exist a chance that, as time lapsing, the uncertainty can be solved, the waiting can worth.

The waiting options are particularly valuable in the case in which, for example, an enterprise can postpone the exploitation of an iron ore deposit till the time when the market conditions become favourable. The value of waiting and obtaining of new information is balanced with the deferring costs (Copeland & Keenan, 1998). These costs are represented by the value of lost earnings determined as result of the investment postponing.

The expanding of the options valuation techniques in the capital investment valuation area has been stimulated by the important observation that traditional valuation techniques based on the discounted cash-flows underestimates the value of

decisions that are dependent by the uncertain business environment evolution and that can be deferred.

The decisions that are recommended for utilizing of options valuation techniques present three principal characteristics (Dixit & Pindyck, 1994): are irreversible, can be deferred, and their result is uncertain. In the case in which the financial decision is irreversible the made of investment today kills the option to wait till tomorrow (Dixit & Pindyck, 1994). The waiting option has some value reason for which its loose must be taken in consideration in the decision taken in the present. As result of the fact that offers the tools for quantifying the waiting option the real option valuation theory allows investors a more realistic decision approach.

The traditional decision rule is that an investment project must be realized if its net present value has positive values. The new rule offered by option valuation theory highlight the fact that the investment must be realized in the present only if its net present value is sufficiently high to compensate the loose of the waiting option (Trigeorgis, 1996).

The waiting options appear, for example, in the case of licences or patents acquisition that assure the permanent or temporary exclusion of rivals. These can be seen as call options. In the case of an investment projects, the uncertainty can be solved, not only as result of time elapsing, but even through the initial investments that allow obtaining the supplementary information about the true cost or real return of these.

The options for sequential investments are types of options closed by waiting options. These allow implementation of an investment project step by step through many smaller investments. The reason for investment segmentation is related by the fact that, as the time elapse and new information are obtain, managers can form a better image about the investment projects return. They have the possibility to cancel making the supplementary investments in the case in which it is estimated project failure.

The implementation of an investment project in many stages allows the project abandoning or modifying in the case of unfavourable evolution of events. The essential idea is that the first stage investment do not only allows the acquisition of new cash-flows potential in the future but, also, offers the option to enter in a new stage of the project in conditions of favourable evolution of events.

The development of an investment project can be viewed as a succession of stages. The first stage investment represents the acquisition of an option over the future stages of the project. For this reason the options for sequential investments can be perceived as compounded options (options on options) in which the each initial allocated sum reflect the exercise price for sequential option acquisition.

The group of investment decisions that conduct to the oil or gas drilling represent a classical real option of this type (Copeland & Keenan, 1998). Through a tax payment for obtaining a drilling licence an oil company acquire a real option: the right to obtain cash-flows as result of oil fields drilling in the next period of time, through the supplementary investments, without existence of obligation to exploiting the field.

Expanding options and **assurance options** represent forms of action flexibility that can be exercised during of and, subsequent of the current stage of an investment project, being assimilated to an existed project.

Expanding options allow the enterprise to expand the economic activity, to amplify the volume of production or distribution in conditions of a favourable evolution of economic conjecture. These can be seen as call options.

A producer that builds a factory with a supplementary production capacity comparative with the estimated necessary capacity acquires an option that allow him increasing of future production and taking the advantage of a higher product demand comparative with estimated market demand. In this case the management acquires the right but not the obligation to expand the volume of production and will exercise the

option only if the project conditions will be favourable. Even if the implementing of a supplementary production capacity will implies an additional cost, this effort is justified as result of the fact that the project with expanding option is more valuable comparative with the project without this flexibility.

A similar situation is that in which an investor can design an investment project with life duration higher than estimated use duration acquiring thus the option to increase the level of production.

The assurance options allow enterprises to react to unfavourable economic conjecture through reduction or modification (switching options) of economic activity. Function of the level of reduction in the level of activity can be made a distinction between:

- options to contract;
- options to shut down and restart;
- options to abandon

These types of options can be seen as put options.

The contraction options are the equivalents of put options. Some investment projects can be designed in a modality that allows the reduction of their dimension in the future. It is the case, for example, of segmentation of project in modules. Reduction of dimension is equivalent with exercising of put option. Because this option has value, a project with contraction option has a higher value than a project without this possibility.

Also, a company may have the possibility to select an investment project with high maintenance costs relative to construction costs. Management of the firm acquire in this way the flexibility to reduce the life period or to decrease its dimension through reduction of maintenance costs in the future.

Options to shut down and restart allow managers the temporary stopping of project activity in the case in which the businesses conditions became unfavourable and, restarting of operations in the case in which the conditions change. If the price of the oil decrease under the drilling costs, for example, it would be optimal the temporary stopping of production till the probable recover of the price (Harvey, 1999).

The existence of such action flexibility is equivalent with owning of portfolio of put and call options (Harvey, 1999). The temporary stopping of activity is equivalent with put option exerting, while the restarting of activity is similar with call option exerting. An investment project with such action flexibility has a higher value than one without this characteristic.

The abandonment options represent the flexibility of a company to stop the activity of an investment project during its life period in situation in which the businesses conditions became unfavourable. This type of options is similar to the American put options.

As Harvey (1999) highlight these options gives to the owner the right to sell the residual cash-flows associated to residual life period of an investment project in exchange for a residual value. In the case in which the present value of residual cash-flows is lower than the liquidation value, the asset can be sold. The abandon represent the effective exercising of the option.

The switching options are related by the construction of flexible assets that can be adapted to different targets. These are other types of real options. In this category can be made the distinction between the options that allow the change of the production factors (input mix options or, process_flexibility) and the options that allow the change of the realized products (output mix options or product flexibility). This category of options was analyzed by Kulatilaka (1993), Trigeorgis (1996), Harvey (1999) and Brach (2003).

The switching options related by the production factors [Kulatilaka (1993),

Harvey (1999)] allow company's management to modify the production factors necessary for realizing the same product. These types of options are particularly important in agriculture or utilities industry. As Harvey (1999) highlight a meat producer can value the option to change the food for animals, function of the alternative with the lowest cost. An atomic power station can has the option to alternate the different types of possible fuels function of their price.

The switching options related by the realized products (Harvey, 1999) represent the flexibility of the investment projects to be adapted in order to manufacture different products. These options are particularly valuable in the industries in which the realized products are acquired in smaller quantities or are characterized by a volatile demand (Harvey, 1999). An example of such option is the capacity of an automobile producer to stop the production for one type of cars and to launch the manufacturing of other type.

The growth options named and strategic options provide the ability to expand in the future (e.g., Pindyck, 1988; Kulatilaka and Perrotti, 1998). These are options over new projects, created as result of investment in an initial project. The growth options can be seen as call options. This type of options are present in the case in which a realized investment represent a condition or a link in a chain of interdependent projects and, as result, open the opportunities for future development. Every project from this chain is necessary for future expanding.

Function of **effects generated by them**, the real options can be classified as **simple options** and **compound options**.

Simple options offer to the owner the right to buy or sell an asset, at a specified price, with some occasion, at a certain date or, during a period of time, before the date of their expiration. These options are influenced by the evolution of the uncertainty sources. The owner must decide regarding the option exercising as result of ascertaining the uncertain element evolution.

Compound options are options that at the moment of their exercising generate other option and other cash-flow (Copeland T., Keenan P., 1998). The compound options are named options on options. They imply sequential investments (Copeland T., Keenan P., 1998) The realizing of one investment offer to the enterprise the right, but not the obligation, to realize a second investment that, in turn, confers the right to realize a third investment.

CONCLUSIONS

Real Option Valuation is emerging as a new tool for valuing, selecting and managing strategic investments. ROV recognizes that the business environment is dynamic and uncertain and that the greatest value can be created by identifying and exercising managerial flexibility or "real options".

Viewed narrowly, the real options approach is the extension of financial option pricing models to the evaluation of options on real assets. More broadly, the real options approach is a way of thinking that helps managers formulate their strategic options, the future opportunities that are created by today's investments.

The traditional investment appraisal criteria such as Net Present Value and Internal Rate of Return fail to account for the managerial flexibility to adapt decisions function of evolution of market conditions.

The real options can be classified after diverse criteria: the modality of apparition, the type of flexibility offered and the effects generated by them. Some options (inherent options) are characterized by the fact that their obtaining or maintaining does not require the special activities. Others (created options) require conscious and rational actions for their creation and maintaining. An important category of options are learning options that allow enterprises to postpone the principal decision

regarding an investment project (waiting options, deferring options) or, to decide step with step if it is opportune to continue or not its implementation (options for sequential investments). Other important options that can be associated to an investment project are expanding and assurance options that represent forms of action flexibility that can be exercised during of and, subsequent of the current stage of an investment project, being assimilated to an existed project. If the expanding options allow the enterprise to expand the economic activity, the assurance options allow enterprises to react to unfavourable economic conjecture through reduction or modification (switching options) of economic activity. Function of effects generated by them, the real options can be classified as simple options and compound options.

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