

Acquisition Strategy and Real Options

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Abstract

In this paper we will present strategic level real options that acquiring companies have in the corporate acquisitions process. The real options presented are such that exist on the strategic level and are different from the real options that reside within the acquisition candidate companies as stand-alone. We will present acquisition synergies as real options and as sequential real options to acquisition timing, and the rather special case of acquiring businesses with divestible non-core assets. Models for the valuation of the aforementioned real options are discussed with special focus on input variable values. We will illustrate the non-core-business acquisition issue with a case of acquisition and partial divestment of Partek by Kone.

Keywords: Strategic Real Options, Acquisitions, Synergies, Non-Core Assets, Divestment

1. Introduction

Corporate acquisitions are a common and a popular form of corporate development. With an overall yearly value of hundreds of billions of dollars and numbering in tens of thousands (Cartwright & Schoenberg, 2006) acquisitions are also the most important form of foreign direct investment (Brackman, Garretsen, & van Marrewijk, 2006; Schjelderup, 2001), with about 75% of FDI being in the form of acquisitions (UNCTAD, 2000). Even if acquisitions are very common, research results on their effect on company profitability and performance are mixed, and there is no clear wisdom on wealth transfers between the acquiring and target company shareholders. (Bruner, 2004b; Cartwright et al., 2006; Moeller, Schlingemann, & Stultz, 2005). It seems that when done under the right circumstances and executed well, acquisitions can be highly profitable and win-win for shareholders of both the acquiring and the target companies, however, in some cases the results of acquisitions turn out to be negative for one, or both of the parties. For reaching a win-win result from corporate acquisitions valuation issues play a major role.

For valuation of companies (e.g., acquisition targets), we believe in the total value concept. In the total value concept the value of a company does not only include the cash-flow generating active assets, i.e., the economic capital, but also the strategic capital, including the intellectual and human capital that includes the plans and the know-how of turning the plans into economically viable operations. This concept is presented well, e.g., in (Boer, 2002), see Figure 1. The idea of the concept acknowledges the value of real options as a part of the value of a company.

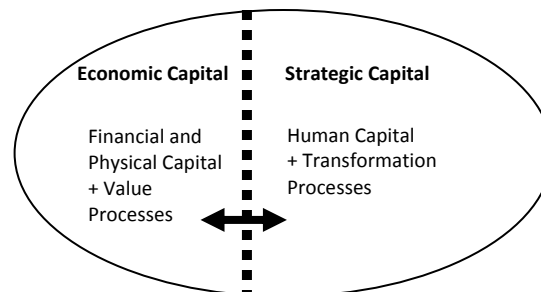


Figure 1. Total value of a company includes the value of the economic capital and the value of the strategic capital. Adopted from (Boer, 2002).

What this means is that when companies are targets for acquisition, their stand-alone value should include the strategic capital that the company has as a separate entity, i.e., including the real options that exist for the target company without the acquiring company.

When we reflect this with the notion that possible synergies caused by, or created in, the acquisition can be understood as *added* real options and *increase* in the (value of) strategic capital that the involvement of the acquiring company adds to the equation, we can see that synergies are not the same thing as the strategic capital that already exists in the target company. Put in other words, if the synergies were real options and other strategic capital already existing for the stand-alone company, then they would, and should, already be included in the value

(acquisition price) of the company, i.e., they would not be synergies at all, and acquisitions made at a fair prices could never be wealth creating (NPV positive).

As we view it, if synergies are the additional new real options (the possibility to create synergies) brought to the table by the acquiring company, then acquisitions can be NPV positive, even if fair price (even with premium) is paid for the target company, and win-win. This means that when acquisition synergies are priced they should be valued as the real options that the acquiring company brings to the acquisition process plus the added value of strategic capital. Viewing synergies as options is in line with reality, as synergy benefits are not given (do not autogenerate), but most often require investments, and their size is uncertain.

In this paper we are interested in the real options that the acquiring company has on the strategic level, including the possible synergies as real options, as discussed above and the inverse to synergies as options, splitting the business as an option. Other strategic acquisition related real options of interest to this research are the postponement (timing) of the acquisition, staging of the acquisition, and the abandonment of the acquisition (partly or fully). We will also look at the rather special situation of ex-ante analysis of a strategy to acquire targets with non-core assets that are from the get-go on the track to be divested after the acquisition; we will also discuss the possibility to time the divestment of the non-core business part of the acquired company.

In the next section of this paper we will look at some selected previous literature on real options and real options within the domain of corporate acquisitions. Then we will look at acquisition process level real options of interest to us as a whole, followed by analysis of each one of them separately. We will continue with a case presentation of the non-core-business acquisition issue, with a case of acquisition and partial divestment of the acquired company. We close the paper with a summary and conclusions.

2. Literature on Real Options in Corporate Acquisitions

The idea of real options is an old one, but the term “real options” was introduced in (Myers, 1977), four years after Black and Scholes presented their famous option pricing formula for European financial options (Black & Scholes, 1973). Since the coining of the term, using option valuation models to frame analogous real investment problems has been growing and real options are a subject of increasing attention among academics and practitioners.

Real options literature can be divided roughly into two categories, general theory and application. Some topics on the general theory side have been (with selected references), e.g., entry and exit decisions (McDonald & Siegel, 1986), (Majd & Pindyck, 1987), (Dixit, 1989), (Berger, Ofek, & Swary, 1996), (Alvarez, 1999), and (Pennings & Lint, 2000), growth options (Kogut, 1991) and (Garner, Nam, & Ottoo, 2002), and the valuation of interrelated projects (Trigeorgis, 1993) and (Childs, Ott, & Triantis, 1998). Real option valuation has been applied notably to some specific types of industries and situations (with selected references), e.g., to petroleum (Ekern, 1985), (Paddock, Siegel, & Smith, 1988), and (Smit, 1996), mining (Cortazar & Casassus, 1998) and (Moel & Tuffano, 1999), natural resources in general (Brennan & Schwartz, 1985) and (Cortazar, Schwartz, & Salinas, 1998), R&D (Newton & Pearson, 1994), (Grenadier & Weiss, 1995), (Smit & Nau, 1995), (Faulkner, 1996), (Lint & Pennings, 1998), and

(Childs & Triantis, 2000), information technology (Benaroch & Kauffman, 1999), (Balasubramanian, Kulatilaka, & Storck, 2000), and (Campbell, 2002), and corporate strategy (Kulatilaka & Marks, 1998), (Bowman & Hurry, 1993), and (Das & Elango, 1995). Real options have also been found to be useful, when framing problems found within the realm of corporate acquisitions and mergers. Below we present a selection of literature on applying real options in corporate acquisitions in more detail.

According to (Myers, 1977) growth opportunities can be viewed as real options, whose value depends on future investment by the firm. This suggests that the value of a firm can be decomposed into the value of assets in place and the value of growth options. We find that this is in line with the total value model, presented earlier and also in line with our position on synergies being real options available to the acquiring company (and are not included in the stand-alone valuation of companies). (Kester, 1984) takes a similar approach stating that the difference between the total value of a firm's equity and the capitalized value of its current earnings stream estimates the value of its growth options.

(McDonald et al., 1986) consider the option to postpone investment, i.e., timing, this is also relevant to corporate acquisitions. They build a simple rule for timing of investment (acquisition) with the practical intention to minimize the lost NPV of suboptimal investment timing. By simulation of parameter values they analyze the value lost during waiting versus the gains of waiting. Their conclusion is that timing considerations are quantitatively important for a wide variety of parameters, i.e., suboptimal timing can lead to substantial (10-20%) loss of value. Their finding is in line with the known NPV caveat of ex-ante single number (non-fuzzy) future cash flow expectation. The timing rule presented in the paper can be applied for acquisition timing.

(Smith & Triantis, 1995) discuss *strategic acquisitions* that create real options able to increase upside potential, while truncating downside risk. They argue that synergies have an effect on the growth options that an acquirer has on an acquired firm. They state that in the long run, the success of an acquisition program is determined by the options acquired, created, or developed and the actions taken for the optimal exercise of these options. They identify three classes of real options important in acquisitions: growth options, flexibility options, and divestiture options. The findings are in line with our perception that synergies are the real options that are available to the acquirer in excess of the stand-alone value of a target company, even if the point of view is different. We see the synergies as real options on top of the stand-alone value (with real options); they see synergies as positively affecting the, after acquisition, total value of companies – two sides of the same coin.

Option value in acquisition and timing of acquisition entry are discussed in (Miller & Folta, 2002). The authors start by discussing the opportunity cost of moving from having the option to invest (acquire) to investing (acquiring), the authors call this the incremental value of moving from an option position to a sunk investment. Opportunity cost of delaying entry is the dividends forgone during the time the option is held and dividends are paid; the authors observe that in the absence of dividends the best strategy is always to wait until the end of the option maturity before exercise. This means that dividends (the opportunity cost of delaying entry) are the primary reason for early exercise, and this is reflected also by the literature. "Dividend" may be the competitive advantage gained by moving early (early exercise), or as we interpret it from the

point of view of synergies the PV of synergies lost by waiting (synergies are realized later). The paper presents the discussion with a formula and solves for the optimal time of exercise. Three major areas that affect the value of waiting are discussed: threat of preemption, whether the option is simple or compound, and whether the option is shared or proprietary. The paper discusses different preemption situations and their effects on the value and hence the optimal timing of exercise, also under different market conditions (e.g., monopoly). The possibility to signal exercise to force the competition exercise (and forfeit option value) is also discussed.

(Dapena & Fidalgo.S., 2003) study tender offers and acquisitions with a real option point of view (looking at acquisitions of a controlling / majority stake of a firm as a sequential, rather than a one-time purchase), and looking at the control premium value as valued as a real option. The paper concentrates on two options found in the acquisition: the option to wait (to acquire) and the option to grow (through growth possibilities opened up by acquisition; embedded options). The authors discuss the learning process (during waiting) and the value of corporate control (especially important with embedded options) that can be gained by making an investment to a company to become a minority or a majority shareholder (a large minority holding will give a position on the board and access to information, majority share will give control rights). The paper illustrates shortly on three ways of making a tender offer. The model presented studies the differences between obtaining a controlling stake immediately and obtaining a minority stake and then contemplating (learning about the company) and having the possibility of acquiring the rest that is needed for the controlling stake later. The paper presents a model for optimal acquisition timing that assumes full irreversibility of the acquisition; the paper also presents a numerical example of the model that calculates the value of the control premium.

The impact of real options on practice in M&As is discussed in (Bruner, 2004a). He emphasizes the importance of real options for M&A practitioners. The book presents important reasons to master real options thinking: pervasiveness of real options, RO influence on company value for both the acquiring and the target company, the possibility to actively create or passively destroy the value of ROs, and the fact that real option analysis captures value that DCF methods do not take into consideration.

(Smit, van den Berg, & de Maeseneire, 2005) research the distribution of value gains in acquisitions with a real-options game model that examines the bidding process, the likelihood of a bidding contest (war) and the expected value distribution for the acquirer. The model presented is a two-player (two bidder) game and three variants are considered: pre-emptive bidding, accommodating bidding, and deliberation. The paper considers the cost of a due diligence a purchase of a real option on the target's value (that is revealed). Similar bidders can learn from this signal about the revealed value of the target and benefit. This is especially true if the opening bidder is a bidder that has performed due diligence on the target (which is the case of the presented model). Important point illustrated in the paper is that similarity or dissimilarity of bidders has an effect on the probability of a bidding contest and the outcome of the acquisition price.

(Warner, Fairbank, & Steensma, 2006) investigate in this empirical paper how, in an industry where formal standards are important (for example IT), companies that develop technology are acquired to enter, or stay present in the industry. As a future standard can be one of a number of

possible technologies, the relevant technology companies are all potential “hosts” of the coming standard. This means that any company with a relevant technology could receive a boost from having their technology being selected as the standard technology. The authors explore the hypothesis that when an acquiring firm lacks technical knowledge, it is more likely to make an acquisition before a formal standard has been established. This is supported by the presented data. They further expect that targets possessing relevant technical patents are more likely to be acquired before the establishment of a formal standard, rather than after – due to the possibility to assess the technology via viewing the patents (technological due diligence), this is also supported by data. Thirdly the paper expects the firms that already have an alliance with, or especially firms that are partially owned by, a potential acquirer firm will be more likely to be acquired before a formal standard is established – the cases where equity ownership was the form of an alliance, the hypothesis was supported (with a high level of significance). When the alliance was not of an equity form, no significant support was found.

The logic behind these hypotheses is that a company with more knowledge of the technology of the target (less uncertainty) is in a better position to acquire a company with technology; also if the acquirer is large they may have a possibility to influence the standardization process (this is also discussed in the introduction of the paper). The sample in the study is from the US, from 1995-2000 and the data is from 163 ICT sector companies (acquisitions), mostly having to do with network technologies. The possibilities of the larger acquiring firm are what we would in this research call synergies. An issue that the paper implicitly presents (which is not however written down) is the idea of “staged acquisition”, i.e., first stage - an alliance or a partial ownership; second stage – acquisition of the rest of a company. By investing in an alliance or in a direct equity ownership the company buys an option to strike with an acquisition at a later time. This can be compared with direct acquisition where the whole company is acquired at once.

(Alvarez & Stenbacka, 2006) discuss the different types of real options available in corporate M&A including the option to divest parts of the acquired company. They consider the divestment option as an embedded sequential option. The paper discusses synergies as a result of reorganization of the target firm by the acquirer, which is in line with our perception of what synergies are. The paper refers to (Mulherin & Boone, 2000) observation that both successful acquisitions, as well as, divestures will have positive effects on the acting firm. (Alvarez et al., 2006) present a compound real options model that considers the different phases of acquisition: divestment, synergy, consolidation, and takeover. The model is useful for calculation of optimal timing and price of acquisitions.

We acknowledge that in addition to the literature presented above there are a number of articles, not presented here that research real options in the context of corporate acquisitions. In the following we will present the different types of strategic level real options connected to acquisitions and of interest to this research, and continue by closer illustration of the same.

3. Different Types of Strategic Level Real Options Connected to Acquisitions

In this research we are mainly interested in the strategic level real options that acquiring companies have in the process of acquisition and following acquisitions; including the possible synergies as real options, as we have discussed above. Other strategic acquisition related real

options of interest to this research are the postponement (timing) of the acquisition, staging of the acquisition, and the abandonment of the acquisition (partly or fully). We will also look at the rather special situation of ex-ante analysis of a strategy to acquire targets with non-core assets that are, from the get-go on the track to be divested after the acquisition; we will also discuss the possibility to time the divestment of the non-core business part of the acquired company. The possibility to split existing business to parts is also discussed.

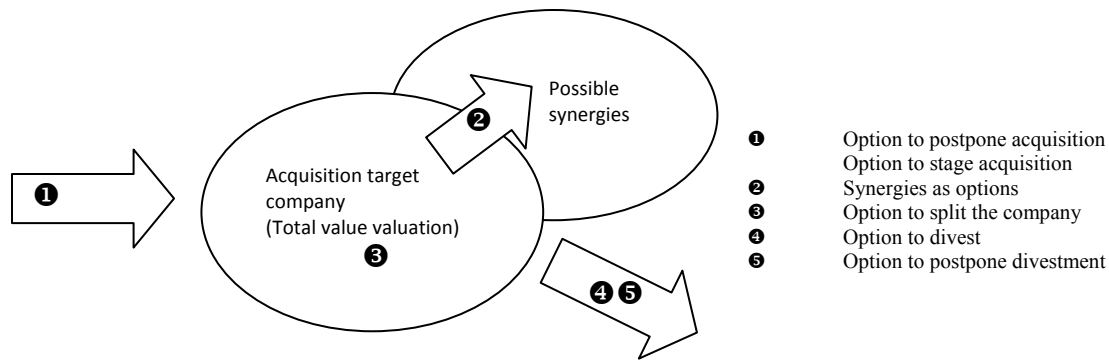


Figure 2. Acquisition related strategic level real options available for the acquiring company and of interest to this paper

This research is limited to discussing the strategic level real options in the acquisitions process and does not present new models for valuation of real options. However, we note that there are a number of general option valuation approaches available to choose from, e.g., the methods based on the Black-Scholes option valuation formula (Black et al., 1973), binomial methods based on the work by (Cox, Ross, & Rubinstein, 1979), and numerical methods including methods based on parameter value simulation, e.g., Monte Carlo (Boyle, 1977). There are also methods available for using fuzzy numbers as inputs into real option valuation by using the Black-Scholes method (Collan, Carlsson, & Majlender, 2003), the binomial method (Muzzioli & Torricelli, 2000), and also some methods for valuation of real investments that are based on novel fuzzy real option valuation constructs (Carlsson & Majlender, 2005), or constructs that to a very large extent resemble real options valuation (Collan, 2004). To the best of our knowledge, methods based on the binomial lattice and on the Black-Scholes formula are the most often used methods for valuation of real options.

Figure 2 depicts the different strategic acquisition process level real options of interest to this paper. Firstly we will look at the option to postpone the acquisition and the issues connected to acquisition timing. We will also discuss the possibility to stage the acquisition, or as it is discussed in the literature, the possibilities to first engage in cooperation with a target firm, or the possibility to buy a minority share of the target. The rest of the real options under analysis are all contingent on the acquisition decision (exercise of the option to acquire) and hence are a part of an options sequence.

The acquisition opens the possibilities to split the acquired company into parts, which in turn opens the possibility to divest a part, or parts of the company; the divestment can be postponed (timing). The Acquisition also makes it possible for the acquirer to invest in generating the synergies.

Even if this research is not about option valuation methods, we include a discussion of the inputs needed in valuation of each of the presented strategic level options. We will do this by presenting, for each one of the presented options, suggestions on the source for values to the six inputs needed in the Black-Scholes framework with the enhancements by Merton (Merton, 1973): time to expiry (t), present value of investment expected cost (X), present value of expected cash-flows (S), standard deviation (σ), discount rate (r_d), and cost of keeping the option alive (δ). We have selected the Black & Scholes inputs, as the needed inputs to binomial lattice methods can be derived from them. In addition to the above listed parameters, a tailor made analysis on a specific acquisition case would most likely require a number of additional inputs/parameters.

In the following we start by presenting the options to postpone and to stage acquisition, continue by discussing synergies as real options, and followed by the option to split the existing business into parts. We close with the option to abandon (non-core) parts of a company.

3.1. Options to Postpone and to Stage Acquisition (❶ in figure 2.)

The possibility to postpone an acquisition is born when the possibility to acquire a target company becomes available. We can say that for a “rational” company this would mean at the minimum after a screening and a short analysis of the target, and definitively after a comprehensive due diligence. These both are investments and constitute the price of the option to acquire that comes with the option to postpone. Similar is presented, e.g., in (Smit et al., 2005).

The decision to postpone an acquisition is most often driven by a cost-benefit assessment of value lost during the time of waiting and the positive effect of waiting. In this analysis the factors that contribute the total value of the target company should be taken into consideration, i.e., the stand-alone value of the target plus the potential acquisition synergies. The options that are sequential to the acquisition may also gain or lose in value if the acquisition is postponed, for a complete analysis these changes in value should also be considered.

The situation with loss of value caused by the postponement of competitive position and synergy effects can be analyzed by pointing to the analogy between loss of value with the loss of dividends, this is discussed, e.g., in (Miller et al., 2002). We must, however, observe that lost synergies may not be constant over time, which may require simplification, by using, e.g., averages. If the acquisition case is such that the acquirer is contemplating further strategic actions with the target company, e.g., splitting the company and selling non-core parts, then the effect of postponement to the value of these, follow-up, or sequential options should also be taken into consideration.

Learning may be an important reason to defer an acquisition or to execute the acquisition in stages. The value of learning may be especially important in cases where the acquisition opens further options, the value of the opened options is often not observable immediately – by becoming a minority stakeholder in the target company the acquirer can commit less than full resources to the acquisition and have the possibility to learn about the value of the target and the

options that are embedded in the target. Staged acquisition is discussed, e.g., in (Dapena et al., 2003).

In the table below we discuss some inputs for the analysis of postponement of an acquisition:

Table 1. Analysis of postponement of acquisition	
t = time option available	Option to acquire and postpone, or stage acquisition is acquired by identifying and screening, or due diligence of the potential target. The time the options are available may be limited by the existence of competing bidders.
S = PV of revenues	The revenues of the option to postpone are connected to the gains that are realized by waiting, e.g., a lower acquisition price or lower level of risk that can be obtained through learning (that will have a corresponding value). Also possible increase in value of possible sequential options should be attributed to the revenues of waiting.
X = PV of costs	The costs of postponing are the revenues lost during waiting, including the value that is lost in the form of synergy benefits starting to materialize later and negative changes in the value of possible sequential options during postponement. If acquisition cost is known to increase this should be taken into consideration.
σ = standard deviation	If the target is a publicly traded company then the standard deviation of the stock of the target can be used. The analysis of lost synergies value should be done separately, in addition to the option valuation. In the case of non public companies, where the stock movement is not market based (but negotiation based) it may not be sensible to use option valuation models in analyzing the cost vs. benefit of waiting.
δ = cost to keep option alive	As the cost term (X) includes the cost caused by waiting, the costs of keeping the option to postpone acquisition alive are ,e.g, the costs of monitoring and learning. We can also consider, in the case of staged acquisition, the costs of a minority share purchase (which may be reversible, even at a profit) of a target company a cost of keeping the option to postpone alive.
r_d = selected discount rate	The option calculation discount rate for the time the acquisition is postponed should be the risk-free rate (nothing is ventured), however the discount rate used to derive the PVs for revenues and costs should be selected, based on the risk of the revenues and the cost.

Interestingly, our discussions with senior managers involved in acquisitions, have revealed that in the case of non public companies the analysis on the option to postpone is often simplified by the fact that the acquisition cost often remains constant over time. Id est, the seller will sell at a certain price that does not change during the time the possible acquisition is on the table. In such cases the problem of analyzing postponement becomes simpler.

3.2. Synergies as Real Options (🔴 in figure 2.)

We view synergies as the potential value, i.e., real options that are created in an acquisition on top of the stand-alone value of the target company. The potential added value can be realized in the acquired company by the acquirer by exercising the real options. This differs from (Smith et al., 1995) who discuss synergies as a factor affecting growth options within a firm, in the way that we propose synergies to be added value over and above the growth options that already exist in the target firm. Put in another way we do not consider “the option to be acquired” something that is in the hands of the target, but something that is in the control of the acquirer – hence we see the added value caused by the acquisition as separate from the growth options within the stand-alone target company.

Obviously we are trapped in a semantic discussion about which real options already exist within the target and which do not exist, this issue can probably never be fully resolved, however, existing real options that cannot be exercised by the target at the present, nor in the near to medium term future, and that become exercisable because of the acquisition, we consider as belonging to our definition of synergy. That is, if such possibilities are already identified by the target and valued as “low value, far out of the money” and there is a change in the perception due to, e.g., the resources of the acquirer, then the dramatic shift in RO value (be it growth options or something else) will be attributed as synergies. This also means that the synergies can be seen as such existing real options that the acquirer can turn to cash flows, i.e., RO that can be turned from strategic to operational capital, and the additional new RO that are generated through the acquisition. Ending the philosophical discussion on synergies, we observe that the real options world is one of incomplete markets, which cause the possibility of finding synergies. The synergies (as real options) are sequential options on the option to acquire, i.e., they will not be available before the acquisition option is executed.

The sources of synergies are numerous, but they can be roughly divided into three major categories: revenue (increasing) synergies, cost (reduction) synergies, and balance-sheet synergies. These categories can all be divided into more precise sources of synergies and are presented in more detail for specific domains, e.g., in (Lewis & Webb, 2007) (bank mergers) and in (Weber & Dholakia, 2000) (marketing synergies).

As can be understood from the above, synergies are not made of a single value source, but are the sum of the added value from a number of sources. This is why the valuation of synergies may prove to be very difficult. When we consider synergies as real options we must accept that for the different kinds of synergies to be analyzed, we may have to perform a separate analysis for each of them, because the risks related to each one of them may be different (and the most often used RO valuation models assume only one risk level). Above we mentioned the three rough categories of synergies, but it may be necessary to go even further and evaluate single sources of synergy separately (within the broad categories). Looking at the most important sources of synergy separately may be actually very good for a better overall understanding of the synergies.

In the table below we discuss some inputs for the analysis of synergies (as real options):

t = time option available	In general, synergies are value generating possibilities that come from the acquisition, availability is thus connected to the availability of the acquisition option. Synergy-generating action can be started even years after the acquisition, however, in corporate acquisitions, the practice is likely to set some upper limit: e.g., a company board, most likely, has set a limit of, say, two to five years, when synergies should be achieved, and the options to create synergies after that are not seen relevant for the analysis of acquisition. Some types of synergies may take a very long time to materialize, e.g., synergies from R&D, but in concert with above, the investments in R&D that are made during the “synergy” time can be considered.
S = PV of revenues	Expected present value of the synergies that can be transformed to cash flow by the acquiring firm. This can be, e.g., the cost savings reached, enhanced sales, or the ability to reduce working capital. Also estimated non-cash-flow gains from synergies.
X = PV of costs	Costs of transforming (exercising) the potential synergies to cash flows include the costs that are needed in making the acquired company work better (to produce the synergies). This can include, e.g., costs of integrating the target company to the acquiring company, investments & costs of changes needed for cost reduction, sales increases, efficiency gains etc.

σ = standard deviation	Standard deviation of the underlying asset, in this case the synergies, is traditionally assumed to be the same for the revenues and for the costs. In practice, however, this is seldom the case. What actually takes place is that the costs to realize synergies usually are quite predictable, and often paid up front, but the revenues are variable, or more precisely said, the actual size of the expected revenues is uncertain. Furthermore the standard deviation is most likely to be different for each one of the different synergies, because the processes that cause the synergy to take place are different (e.g., different markets for costs and revenues).
δ = cost to keep option alive	The cost of keeping the option alive, needs to be considered case-by-case. Whether there are costs to keep an option alive depends on whether there are actions or threats that can kill the synergy generation option and whether that can be avoided by some (costly) actions. Just as an example, R&D synergies may not be available if the target's key R&D people leave the combined firm, or cross-selling synergy options can be destroyed if target's customers change their supplier. The former may require higher salary costs and the latter enhanced marketing efforts towards the target's customers.
r_d = selected discount rate	The discount rate, r_D , is often based again on corporate practice. The most common practice is to use weighted average cost of capital (WACC) with possible adjustment, or simply to use the risk free rate. The latter approach may suite for the very first analysis of the target, but the WACC or some other <i>risk-adjusted</i> discount rate is suggested.

3.3. Option to Split the Existing Business into Parts (③ in figure 2.)

We present the option to split an existing business into parts, because in cases where the target company is composed of parts, which are partly non-core for the acquirer the acquirer may want to divest these. In such situations the possibility to do so, the option to split the existing business into parts, is valuable – this possibility, however, may not always be available. Also the possibility to split is a prerequisite for a divestment, if a non-core business cannot be split to a business it can be quit as a business – split or quit. The issue is nothing more than that of business restructuring viewed as an option.

In a simple situation a target is already divided into separate businesses with separate leaderships however, this is most often not the case. In cases where the target has parts that are not of interest to the acquirer, and the acquirer wishes to separate the target into two (or more) parts there is an analysis to be made about the uncertain costs and the uncertain revenues. Sometimes business restructuring can be rational, because of societal factors, e.g., tax reasons that make smaller units more profitable.

Some assets are easier to split than others, e.g., inventories between two business are rather easily separable, whereas commonly used information systems will have to be duplicated or a new system may have to be installed for the parts to be able to operate separately. Splitting the management and personnel are probably the most risky operations, as persons are not divisible assets. We do not consider abandoning a part of business as splitting, but separately in the next section when we talk about abandonment.

In the table below we discuss some inputs for the analysis of splitting a business to parts:

Table 3. Analysis of splitting existing business into parts	
t = time option available	Options to rearrange the business are available to the owner of the business, the time that specific reasons for corporate restructuring are available may be limited (e.g. tax benefits may be available only for certain periods). If the reorganization is made with abandonment in mind

	the existence of a buyer / willingness of a buyer to buy may also be time dependent.
$S = \text{PV of revenues}$	Revenues of the option to split (rearrange) a business, come from the added value of the new corporate constellation vs. the old one. In cases where the split is done to divest a non-core part of a company, the revenues should include the value received over the value of the split unit for the acquirer. Some revenues may come from liquidating superfluous assets.
$X = \text{PV of costs}$	Costs of rearranging the business. Costs arising from establishing units that are operationally independent.
$\sigma = \text{standard deviation}$	Market factors are usually not in the background of the decisions to split, especially in the cases where the reason to rearrange the business is driven by core-business thinking. The standard deviation for these operations should be estimated from the outcomes for the costs and benefits arising from them.
$\delta = \text{cost to keep option alive}$	There is no relevant cost to keep the option alive, as the option is proprietary to the owner of the business.
$r_d = \text{selected discount rate}$	The discount rate used for the discounting of the revenues and costs should in this case be something else than the WACC or the risk free interest rate, due to the fact that rearranging corporate structure may be a very risky; what is being done is dismantling the way things have been in the whole company. We suggest that for the discounting a separately assessed rate be used.

The option to split an existing business to parts may be a prelude to a divestment, however, it can also be an action done to enhance efficiency in the company; if the parts are more profitable separately than as a whole, then such moves are justifiable.

3.4. Option to Abandon a Non-Core Part(s) of a Company and the Timing (4 and 5 in figure 2.)

The abandonment option is a right to sell, or stop the operations of the (acquired) business, fully or partly. When a company is acquired the acquiring company receives an option to abandon, however, the actions of the acquiring company affect its availability, e.g., total integration of the target with the acquiring company will destroy the option to abandon. In such cases the option to split will have to be exercised first to restore the option to abandon.

Option to abandon gives the acquiring company protection against an unsuccessful acquisition and a possibility to get rid of un-wanted assets. Using the abandonment option may depend on a number of reasons, but the reason, of most interest to us is the want to concentrate on core-business and to abandon non-core assets. Alternative ways to abandon a business (or a part of a business) include, e.g., IPO, MBO, LBO, direct sale, and asset liquidation & shut-down. Each type of abandonment requires different actions and carries different revenues and costs.

If the abandonment possibility (of non-core assets) has been considered already, before an acquisition, it has made possible the ex-ante analysis of the availability of (the different types of) options to abandon, which will be an important benefit in decreasing the risks involved in the abandonment.

In the table below we discuss some inputs for the analysis of abandoning (parts of) a business:

Table 4. Analysis of abandoning (part of) a business	
$t = \text{time option available}$	The different types of abandonment options (different types of sale/ liquidation) may be available at different times and for different periods. Their availability should be assessed

	separately for each situation.
$S = \text{PV of revenues}$	Revenue from abandonment is the proceeds of the sale of an abandoned part of business (IPO, MBO, LBO, asset liquidation), or other proceeds from the abandonment, e.g., the cost savings reached through discontinuation of operations.
$X = \text{PV of costs}$	The costs arise from the different actions that have to be made, in order to realize the abandonment, these vary according to the type of abandonment that is at hand. All types of abandonment carry costs, and these are not always easy to identify beforehand. Costs may be considerable, e.g., in the case of IPO.
$\sigma = \text{standard deviation}$	As the revenue received from the abandonment is usually a one-time cash flow the standard deviation may be an irrelevant factor. At least using the standard calculation methods may not be applicable – using fuzzy standard deviation derived from the supports of the expected cost and revenue cash-flows may, however, be usable, see, e.g., (Carlsson & Fuller, 1999).
$\delta = \text{cost to keep option alive}$	Costs to keep the abandonment option alive may arise, e.g., from keeping a separate management and support systems for the to be abandoned part of the business. When the option to abandon is “passive” the costs may be zero.
$r_d = \text{selected discount rate}$	The discount rate should be selected according to the risks involved, case by case.

As discussed above with option value of timing the acquisition, similar timing possibilities exist for the timing of the abandonment of (non-core) parts of the business (5 in figure 2.). Delaying abandonment may be beneficial if the question is about a sale of, e.g., a non-core business part of a company and market conditions make the expected sales price fluctuate over time (Smith et al., 1995). The optimal type of the abandonment may be different under different market conditions, e.g., IPOs are likely to be successful during high general market valuations and the likelihood of LBOs is affected by the liquidity in the markets. Price received through MBOs, or asset liquidations may also depend on market factors.

In the next section we will present an interesting case of the acquisition of Partek Inc. by Kone Inc. and the different dealings that were connected to the acquisition. The case is a good example of how high level strategic real options available to the acquiring company can be exercised.

4. Case: Acquisition of Partek Inc. by Kone Inc.

The 2002 acquisition of Partek Inc. (Partek) by Kone Inc. (Kone) is a good example of an acquisition of a company with non-core business parts and assets, which can be analyzed with real options. Kone made a profit by recognizing the option to split Partek and the sequential options to abandon. On the other hand, the sellers, i.e., the old owners (including the Finnish Government) of Partek, can be criticized for neglecting the development of, or not having given the proper attention to the available strategy level real options. Kone had business intuition, while Partek’s owners did not have the resolution to act. A story of the deal is available in (Optio, 2003) and is shortly discussed in (Alvarez et al., 2006).

Before the deal, Kone had already a long history of growing through acquisitions in a relatively mature and consolidating engineering industry (elevators and escalators) and it was actively looking for acquisition targets to restructure the industry. Partek, a conglomerate of engineering businesses with a stock price lower than the company’s substance value, had previously rejected bids on parts of its businesses, e.g., on Valtra, a tractor manufacturing unit, in 2001. In 2002, Kone started a hostile takeover of the whole Partek and ended up paying 1450M€ for the

company, acquiring the total personnel of 12447 and sales of 2740M€, i.e., about the same size as Kone itself (Talouselämä).

The parts of Partek that Kone perceived as core-business were valued at 960-1040M€ and integrated into a separate division within Kone, renamed in 2004 to Kone Cargotec. This includes Partek’s elevators, escalators, container and load handling businesses, i.e., Hiab (valued at 440-490M€) and Kalmar Industries (valued at 520-550M€). From this we can approximate that the core-business part had a paper worth of 960-1140M€.

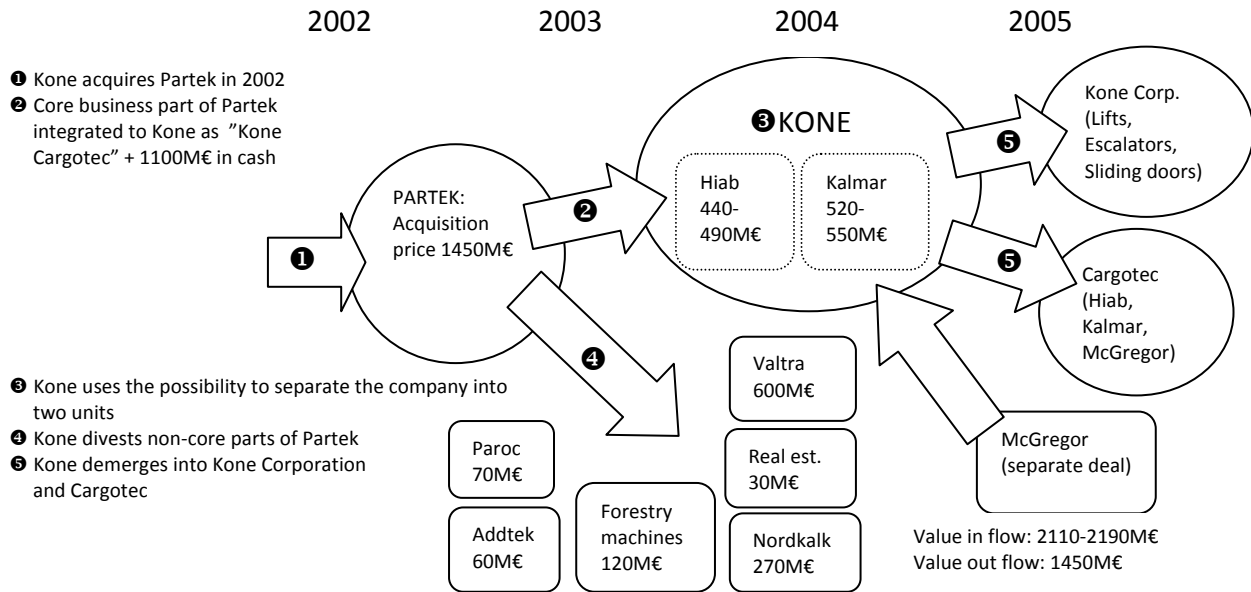


Figure 3. Kone acquisition of Partek and the exercise of the strategic level real options that followed the acquisition, 2002 - 2005

The divested parts included the, already mentioned, Valtra, Partek’s forestry machines business, and Nordkalk (lime extraction based business unit). Valtra, with total personnel of 2400 and sales of 762M€, had earlier been valued at € 250-300 million by Partek’s investment bank. Kone received some 600M€ for the divestiture through a bidding contest in 2003. Partek’s forestry machines business, with a personnel of 1008 and sales of 240M€ had been valued at 150-200M€; Kone received 120M€ in a deal closed the same year. Both these divestments represent exercise of options to abandon non-core businesses. Nordkalk, valued at 250-300M€ and sold for 270M€, had already been negotiated to be sold by Partek. Other parts acquired and to be divested were Addtek valued at 60M€, Paroc valued 70M€, and real estate at 30M€. We can see that the overall value of the non-core part was around 1150M€ (Optio, 2003; Talouselämä). In the end of 2004 Kone Cargotec acquired MacGregor Inc., focusing on marine cargo handling and maintenance services, with a total personnel of 935 and the sales of 370M€.

In November 2004 Kone released a demerger plan to split the company into two parts. The demerger was to be executed by transferring all Kone’s assets and liabilities to two new corporations. The new structure was such that the new Kone Corporation would get shares, assets and liabilities of the lift, escalator and automated doors businesses and Cargotec

Corporation would get the shares, assets and liabilities of the container and cargo handling business, i.e. Kalmar, Hiab, and the newly acquired McGregor. The stated purpose of the demerger was to form “two internally synergetic corporations [that] will make them more effective, provide them with growth potential and improve shareholders’ ability to evaluate them as investments“ (Kone, 2004) (with enclosed demerger plan). The demerger was executed on June 1, 2005. In 2007, Kone Corporation’s total number of employees was 32544 and sales were 4080M€ (Kone Corporation, 2007). The figures for Cargotec in 2007 were 11184 and 3020M€, respectively (Cargotec, 2007). Figure 3 shows these dealings in a graphical illustration.

As a commentary of the dealings described above, we can observe that the strong concentrated ownership of Kone that had previous experience in acquisitions made it possible to make quick and decisive moves on a strategic level, momentum that the partly state owned Partek did not have. In hindsight it is clear to see that the benefit from these dealings to the original Kone shareholders was massive, value inflow of over 2100M€ vis-à-vis acquisition costs of Partek (1450M€). For the internationalization and acquisition history of Kone see (Oksanen & Rilla, 2006) and www.kone.com.

5. Summary and Conclusions

This paper has focused on strategy level real options in corporate acquisitions that are available for the acquiring companies. We have discussed the total value concept for valuing companies, in our case the acquisition targets, and shortly reviewed selected literature on real options applied to corporate acquisitions. We have presented five strategic level real options in acquisitions with focus on the process level options available to the acquirer, i.e., the high level possibilities that the acquirer has to rearrange the target company. We have then shortly presented each of the real options in more detail, with a discussion about option value calculation methods available and the input variable values. We note that of the presented strategic level options, synergies and the possibility to split a business are issues that have seldom been discussed within the options framework, and these interestingly seem to be mirror images of one another – this is, to our knowledge, a novel approach. A case presentation was made, to illustrate the different presented strategic level real options in real life, about how Kone acquired Partek and consequently abandoned non-core parts of Partek’s business and ended up demerging into two more specialized companies, Kone Corp. and Cargotec.

Real options is a growing field of research, and there also seems to be a growing interest in modeling and analyzing real options connected to corporate mergers and acquisitions. The research has, so far, mostly concentrated on the single real options connected to M&A and we believe to be among the first to present a holistic view on the strategic process level real options available in corporate acquisitions.

Obtaining data for calculating real option values may be tricky due to a number of issues, of which one of the most important is the availability of data on the acquisition targets. This is especially true for cases where the target is a non-public company, with limited or no requirements for publicizing financial information. Even if the availability and quality of data for real option valuation (and numerical analysis in general) is a very important issue, from the point of view of the credibility of analysis results, it is a field that is most often not touched in the

literature regarding real options. We have felt it important to discuss the sources of data and methods for the generation of input variable values in the numerical analysis of acquisition real options.

We have also very shortly discussed the different models commonly available for analyzing real options; addition to the commonly used models there are novel methods that use fuzzy number inputs in numeric calculation. These methods have the advantage of being able to incorporate estimation inaccuracy present in the input variable values, also the results from the available fuzzy methods are fuzzy numbers, i.e., the results include information about the distribution of the possible results.

The presented acquisition case shows us that the type of holistic analysis of corporate acquisitions, presented in this paper, is relevant from the point of view of acquisition practice, and can be used to support strategic planning of acquisitions. What the case also shows is that the existence of strategic level real options alone does not create value, but for the value of the available real options to be realized, the owner of the real options (e.g., the acquiring company) must have the confidence and momentum to drive the large changes through the organization that will constitute the successful exercise of the process level real options.

All in all, it seems that when planning corporate acquisitions it may be very relevant to think about and analyze the strategic acquisition process level real options available, because understanding the options and the value that they may bring to the acquisition can enhance the potential benefit from corporate acquisitions. Smart and resolute managers can optimize value by timing of acquisitions and divestment and create value by selecting acquisition targets that bring synergies, as they are defined in this paper.

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