

Optimal Conditions for Buy-and-Build Acquisitions

Preliminary version

Dyaran S. Bansraj[‡], Han T.J. Smit[§]

This article aims to provide new insights and present evidence on acquisition strategies by determining the optimal conditions when private equity investors execute buy-and-build serial acquisitions. Building on real options insights, we consider the buy-and-build strategy as an interacting portfolio of platform, follow-on, and exit options, of which moneyness and exercise depends on industry, company, and financing conditions. The anticipation of high exit and follow-on growth option value raises the platform value for the investor relative to the standalone value. We empirically confirm that these conditions increase the likelihood of buy-and-build strategies to occur. The availability of follow-on options (measured by industry fragmentation), their moneyness for the private equity investor (measured by asset turnover and profitability), and the exit opportunities (measured by public market valuations and by the number of large industry players) determine the prevalence of buy-and-build strategies.

June 2017

Keywords: Real Options, Industrial Organisation, Buy-and-Build, Serial Acquisitions

[‡] Dyaran Bansraj (corresponding author), Erasmus School of Economics, Erasmus University Rotterdam. Burgemeester Oudlaan 50, 3062PA, Rotterdam, Netherlands. E-mail: bansraj@ese.eur.nl.

[§] Han Smit, Erasmus School of Economics, Erasmus University Rotterdam. Burgemeester Oudlaan 50, 3062PA, Rotterdam, Netherlands. E-mail: jsmit@ese.eur.nl.

The acquisitions of non-listed companies by private equity investors has seen a tremendous growth in the recent decades. Between 2011 and 2015 the top 300 private equity investors raised almost \$1,100 billion¹, mostly allocated to leveraged buyouts (LBOs). Traditionally, corporate raiders use a highly leveraged capital structure, to take underperforming companies private in order to restructure and sell valuable assets separately within a time frame of three to five years. However, in the last decades, an opposite strategy has emerged, namely the buy-and-build strategy. In this strategy, the acquirer acts as an industry consolidator, following a serial acquisition strategy, with the aim of transforming several smaller companies into a large efficient scale network before exiting. This paper helps to explain their occurrence.

Extant acquisition theories in the management literature, have provided different motives for the occurrence of serial acquisitions, Execution of serial acquisitions has been explained through overconfidence (Billet & Qian, 2008; Malmendier & Tate, 2008), empire building and desperation for growth (Kim, Haleblian, and Finkelstein, 2011) and learning (Fuller, Netter & Stegemoller, 2002; Laamanen & Keil, 2008). However, these explanations do not apply to private equity.² The current literature provides little theory and guidance on how subsequent LBO acquisitions and exit opportunities interact, how the consolidation game in an industry is played by the private equity fund, and how these deals depend on financing.

To help fill this gap in the literature, we examine the optimal conditions for the occurrence of buy-and-build strategies. Specifically, this paper contributes to strategy research by answering the question: What can explain the occurrence and what are the optimal conditions for serial buy-and-build strategies? In this paper, we develop a real options view for buy-and-build strategies to provide new insights and propositions for their successes (and failures) and we provide evidence on the “optimal” conditions when buy-and-build strategies occur.

These 'ideal' growth option conditions for buy-and-build strategies both internally and externally to the firm are based on the logic of a parsimonious theory based on real options theory (McGrath, 1997; Merton, 1998) – and strengthened with strategic management variables (e.g. from dynamic capabilities and resource and knowledge based view), and industrial organisation/game theory (Camerer, 1991). From our real options perspective, we show that buy-and-build strategies can be seen as an interrelated chain of exit, follow-on, and platform options. We suggest that to be

¹ According to the PEI 300 May 2015 edition. In this report, the source of the data is PEI Research & Analytics. See: <https://www.privateequityinternational.com/pei300/>

² Our study contributes to the literature on serial acquisitions. From a real options perspective, we provide an additional motive for the occurrence of serial acquisitions next to current explanations for listed firms such as overconfidence (Billet and Qian, 2008, Malmendier & Tate, 2008), empire building (Kim, Haleblian & Finkelstein, 2011), learning (Fuller, Netter & Stegemoller, 2002; Laamanen & Keil, 2008).

effective, a buy-and-build requires certain *industry, company, and financing* conditions, that influence the option chain of available acquisition options in the industry, their moneyness (with a higher value for the investor compared to its standalone value), and exit opportunities, either to a strategic player or via an IPO. Thus, this multiple lens real option theory explains the underlying casual logic as to *why* serial acquisitions strategies occur (Merton, 1967; Sutton & Saw, 1995).

We confirm these implications with an empirical analysis using a database consisting of 1351 buy-and-build acquisitions from the United Kingdom between 1998 and 2015. Our findings show that there is a higher likelihood that a buy-and-build strategy will be executed in more fragmented industries, indicating a higher availability of acquisition options and exit opportunities. We find evidence that the probability of being a target in a buy-and-build strategy is positively related to the size of the target, providing a larger financial base, and to a lower asset turnover or profitability, indicating a higher growth (option) value. Finally, we show that high market values, leading to the anticipation of good exit opportunities via an IPO, and lower interest rates and high yield spreads, indicating favourable general debt market conditions, contribute to the execution of buy-and-build strategies.

Our study relates to two main strands of literature. First, we build on and extend a growing number studies in private equity and leveraged buyouts. This strand of literature has examined various sources of value creation in private equity investments, such as the alignment of incentives (Jensen, 1986; Kaplan, 1989), holding period effects (Kaplan & Strömberg, 2009), leverage effects (Guo et al., 2011), return implications of follow-ons (Nikoskelainen & Wright, 2007), and applications for the valuation of buy-and-build strategies (Smit, 2001). Smit (2001) discusses applications of real options and games for buy-and-build strategies. We extend this line of research by identifying the different real options and the interplay among industry, company, and financing conditions that motivate a private equity investor to adopt a serial buy-and-build strategy.

Second, we broaden the literature that combines real options and insights from industrial organisation and game theory (Smit & Ankum, 1993; Kulatilaka & Perotti, 1998; Smit & Trigeorgis 2004; Belderbos & Sleuwaegen, 2005; Chi & Seth, 2009), economies of scale (Lambrecht, 2004), divestments, (Lambrecht and Myers, 2007), and competition for deals (Morellec & Zhdanov, 2004). This article extends this strand of literature by adding an application and by considering testable conditions for (serial) buy-and build strategies.³

³ The real options view on acquisitions is consistent with general findings that mergers tend to occur in up-cycle periods and are positively related to stock prices, Tobin's q , and economic activity (as measured by GNP or industrial production) (Nelson, 1959; Gort, 1962; Melicher, Ledolter & D'Antonio, 1983; Beckett, 1986; Golbe & White, 1988). Consolidation has been identified as the driving force behind the acquisition and merger waves in the growth periods

1 Buy-and-Build Strategies as a Portfolio of Real Options

Buy-and-build strategies present a hybrid between serial acquisition strategies of strategic and financial players. A buy-and-build strategy can create value in several ways. First, similar to leveraged buyouts there is a *financial leverage* effect. The investor typically uses a significant amount of debt to finance the acquisitions. Besides creating valuable tax shields, the highly levered financial structure strengthens managerial incentives to improve operating efficiency and cash flow management. Second, a buy-and-build strategy unlocks *synergistic* benefits, including those attributable to increases in size and scope. As the firm becomes larger and the build-up matures, the private equity investor is likely to have more attractive exit opportunities. The value added by the consolidation ultimately equals the amount by which the future (exit) value of the consolidated firm exceeds the sum of the cost of the individual acquisitions and the cost of any organic growth in the component firms.⁴

A frequent source of value for non-listed companies' buy-and-build strategies are contributions from private equity investors, who can also provide expertise about acquisitions, financing, and exits. Entrusting these functions to investors allows a company's management to focus on growth, integration, and improving margins. Such investors, who typically use a significant amount of debt to finance acquisitions, often enjoy financial leverage effects; besides creating valuable tax shields, the resulting highly levered financial structure limits agency effects and thus strengthens managerial incentives to improve efficiency and cash flow (Jensen & Meckling, 1976).

A real options and industrial organisation methodology - with its ability to relate industry acquisition options on the growth path open to the firm, appropriation in a competitive environment and their direct relationships with company growth value in financial markets - provides a natural methodology via which the interacting conditions for serial buy-and-build

at the end of the 1990s and in the mid-2000s (Katz, Simanek & Townsend, 1997; Andrade, Mitchell & Stafford, 2001; Holmstrom & Kaplan, 2001): such mergers can also reallocate assets efficiently in response to industry shocks (Gort, 1962; Mitchell & Mulherrin, 1996) or when deregulation removes "*long standing barriers to merging and consolidation, which might have kept the industry artificially dispersed*" (Andrade et al., 2001).

⁴ Specialised private equity funds are focused on buy-and-build strategies. Among the various examples, HAL investments' strategy with Grandvision, created a global market leader in optical retail. Another example is the investment of Silverfleet Capital in The Astron Group that generated an IRR of 41%. Buy-and-build strategies implemented in industries related to retail business services, health services, and social services have been quite popular, while almost no buy-and-build activities are deployed in industries related to construction or to specific types of manufacturing processes.

acquisitions can be understood more fully. Developing insights and optimal conditions for a buy-and-build strategy requires introducing variables from industrial organisation (e.g. Grossman & Hart, 1980; Porter, 1980; Farrel & Shapiro, 1990) and the resource-based and knowledge-based views (Grant, 1991; Peteraf, 1993; Barney, 1995; McGrath, 1997) into the real option analysis. When industry conditions are met, the serial acquisition strategy typically resembles a series of multiple interacting options within an industry. The following sections lay out the ideal conditions and the interactions for acquisition options, for the appropriation game of companies and for the company value in financial markets.

1.1 Buy-and-Build Acquisitions Viewed as a Portfolio of Real Options

Real options reasoning is often based on call-option characteristics, i.e. making a small commitment now (the option price) to gain the right (but not the obligation) to exercise that option in the future, after which the firm monitors uncertainty in its environment to determine whether to hold, exercise, or abandon the option (e.g. see Baldwin, 1982; Kester 1984; Bowman and Hurry, 1993; Dixit & Pindyck, 1994; Trigeorgis 1996; McGrath, 1997, 1999; McGrath & MacMillan, 2000; Bowman & Moskowitz, 2001). These uncertainties affect the investor's decision to follow a particular strategy. Applied to acquisitions, the real options view indicates that minority stakes (Miller and Folta, 2002), joint ventures (Kogut, 1991; Chi, 2000) strategic alliances (McCarter, Mahoney & Northcraft, 2011), or platform acquisitions (Smit, 2001; Smit & Moraitis 2010a, b) can give firms distinctive advantages in pursuing or exploiting sets of follow-on opportunities.

The buy-and-build strategy is a type of serial acquisition strategy in which value is created through targeted industry consolidation in the longer term (Smit, 2001, Smit & Trigeorgis 2004). It is a multi-stage strategy in which an investor acquirers an initial platform that creates the option to execute future acquisitions (follow-ons). Value is created through synergistic acquisitions as operations become integrated, cost efficiencies are realised, and the market share increases. Investors then have several exit strategies available, including a sale to an industry buyer, to a larger financial buyer, or flotation via an IPO. The decision tree in Figure 1 shows the composition of a typical buy-and-build strategy, consisting of sequential investments in a platform and follow-ons. Flexibility in the strategy originates from staged investments, where the consolidator can continue to the next stage or abandon the strategy at each decision node as uncertainty on the value of the project is resolved over time. In a buy-and-build strategy, special acquisitions serve as platforms, which are not only externally centred on the resolution of uncertainty about product markets, but create preferential access to new real options. The follow-on options are non-exclusive to the holder of the option (Kester, 1984). However, the potential transfer of knowledge, capabilities, and resources make the follow-ons valuable to the holder of the platform.

A basic premise for using real option theory to develop new insights about the conditions for buy-and-build strategies is that the various strategic options over a certain buy-and-build period can be specified and readily identifiable by the acquirer at the strategy's inception (Adner & Levinthal, 2004; McGrath, Ferrier & Mendelow, 2004). Real options can provide insights into the interactions of the building blocks of serial acquisition strategies, such as platform acquisition options (Kester, 1984; Smit 2001), follow-up options in local and/or new geographies, as well as exit merger options or divestment options (Capron, Mitchell & Swaminathan, 2001).

[Insert Figure 1 about here]

i) Platform Options. In the first stage of the strategy, a platform company is acquired. A platform acquisition acts as a beachhead into a new industry or geography, and is a critical component in a serial buy-and-build acquisition strategy. The initial platform acquisition involves embedded growth options that include the value of identifiable new opportunities beyond the platform acquisition itself, either through follow-on acquisitions options or through internal growth opportunities. The platform acquisition can be considered as having an embedded *compound(-call) option*, since it opens up the option to invest in subsequent follow-on acquisitions options and to better execute an exit option.

ii) Follow-on Options. In the second stage, the investor has the option to invest in available *follow-on acquisition*. Follow-on options can be seen as (call) growth options created by the platform acquisition. These acquisition options are often smaller than the platform firm and are active in the same market as the platform. Benefits of such investment opportunities stem primarily from their underlying value - the earnings the firm can expect to appropriate along the path it has created - and the collection of a size premium as the consolidated entity grows with each acquisition. However, unlike the platform, they do not create further options. Besides external growth, additional sources of value stem from leveraging core competencies (such as brand name) or resources of the platform onto the expanded financial base (follow-ons). In the subsequent period, the platform, and follow-ons are integrated to form a large efficient consolidation. Typically, success in these initial stages opens the path in which the strategy is repeated in other geographical sectors⁵, ultimately leading to global industry consolidation.

iii) The Exit Option. In the third stage, the investor may look for exit opportunities. This could be a sale to a large industry player willing to merge, to another financial buyer, or as an initial public offering (IPO) on the public market. Before the end of the lifetime of the fund, the private equity investor has the option to exit the investment early (i.e. before maturity of the option). In a common limited partnership, the maturity of the exit option is determined by the lifetime of the private

⁵ In a cross-border buy-and-build strategy, additional value arises from increased operating flexibility (Kogut and Kulatilaka, 1994).

equity fund.⁶ For the execution of buy-and-build strategies, a longer fund lifetime will generate more option value as it enhances option maturity. The exit option can be considered as an exchange option where the consolidated company in the hands of the private investor is exchanged against its price to another player or to financial markets. The total added value of the strategy ultimately equals the amount by which the future (exit) value of the consolidated firm exceeds the sum of the investments in its individual acquisitions and in the firm's organic growth.

1.2 Value Analysis of the Option Portfolio

The value analysis of a buy-and-build strategy corresponds to the analysis of a portfolio of options, consisting of the option to invest in a platform, the option to invest in follow-ons, and the option to exit. At each stage of the strategy, various uncertainties are resolved, such as the uncertainty of the number of potential follow-ons, the uncertainty in consolidated company value, and the uncertainty in exit option value. Appendix A describes the valuation of the option portfolio using the binomial model of Cox, Ross, and Rubenstein (1979). The portfolio of options is valued through backwards induction, reasoning forward, and then stepping back through the steps from exit (stage 3), to build-up (stage 2), to platform (stage 1), determining the optimal decision at each point. We subsequently discuss each of the stages, starting with exit options, and working backwards in time to follow-on and initial platform investments.

A. Stage 3: The Value of the Exit Option

When the buy-and-build strategy matures, the consolidator has the option to exit the investment early (i.e. before maturity of the option). The consolidator will decide to exit when the underlying value (exit value) is higher than the continuation value (present value of future cash flows of the mature firm), for example when the fund receives a bid from a strategic player. Successively, since buy-and-build strategies are an interrelated chain of investment options, the anticipation of a high exit value increases the (option) value of the strategy, and will result in earlier exercise of acquisition options and the occurrence of the buy-and-build strategies.

Figure 2 presents the options embedded in the various stages of a buy-and-build strategy. Panel A shows the third stage exit option. The acquisition option can be analysed as an 'exchange' option - a kind of option in which the uncertain value to the buyer can be traded or exchanged

⁶ Some buy-and-build investors, however, work with an evergreen structure – a fund that is available for an unlimited time – allowing the investor to hold on to the investment indefinitely.

against an uncertain price in the future. In the figure, we assume a constant continuation value as exercise price, and for illustration purposes, we present all options as call options.⁷

Without uncertainty, the option pay-off at exit is represented by the dashed grey line in Panel A, which measures the difference between the exit value and the continuation value. However, the exit value is uncertain and equal to the price of the highest bid of a strategic buyer or to the value in the financial market through an IPO. Under uncertainty, the option value of the exit option is indicated by the blue curve. This is the current value (before maturity) of the exit option and is dependent on the moneyness (exit value - continuation value),⁸ and will be more valuable with higher moneyness (along the horizontal axis). We can view the exit option value as a combination of accumulated size, which is driven by past financing conditions that allow serial acquisitions, and of a possible market premium that depends on synergistic value to strategic buyers and financial market conditions. The moneyness is a function of the potential synergies for strategic buyers, the financial market conditions, and when there exists a size premium, also a function of the accumulated size.

[Insert Figure 2 about here]

B. Stage 2: The Value of the Follow-on Option

Stepping back in time, the resolution of valuation uncertainty also affects exercise decisions in the build-up (second) stage. The model for the valuation of this embedded option is presented in Appendix A.

Figure 2 present the value of the follow-on option in Panel B. The follow-on acquisition is like a call option in which the underlying asset (follow-on acquisition value) is equal to the value

⁷ The dimensionality of the presence of two (partially correlated) stochastic processes can be reduced by expressing target value relative to the price (as a numeraire). The option to exchange can be rewritten as a call option on this ratio with an exercise price equal to 1. Taking uncertainty into account in the exercise price, an acquisition opportunity can be considered a call-option on the value-to-price ratio, with the price equal to 1:

$$\text{Real Option to Acquire (as a ratio)} = \text{Max}[\text{Value as part of a buy-and-build/Price} - 1, \text{Hold}, 0]$$

The volatility is a function of the volatilities of the two processes for the target value (V) of and price (A) and their correlation. Even when the two uncertain variables (buy-and-build value and price) are correlated, this call (or exchange) option can be exercised, because their variances differ. Thus, in the option view, the value of a target as part of a buy-and-build strategy should be more uncertain than the price to make the option valuable.

⁸ Uncertainty has two opposing effects, a positive and a negative effect, on the exit option value. On the one hand, uncertainty leads to lower value due to an increase in the discount rate and thus a lower moneyness. On the other hand, it increases the up and down movements, and with that the flexibility value of the option, therefore increasing the exit option value and its moneyness.

of the acquired company (with synergies and including the additional increase in the embedded option value to exit). The exercise price of the follow-on option is equal to the price the investor has to pay, which can be close to the standalone value plus an acquisition premium.

The dashed line in Panel B shows that in absence of uncertainty, the consolidator will exercise his follow-on option if the net value is positive (follow-on acquisition value exceeds the follow-on price) and otherwise will not invest (zero). In the graph, the lower two lines correspond to the embedded exit option similar to Panel A. The orange curve indicates the total value of the follow-on option, including the embedded value from the exit option.

In this option view, we can see the serial acquisitions as the result of past demand growth enhancing the firm's merger values when profitability increases due to economies of scale, scope or brand name. In an up-cycle, the value of an acquisition increases more than the cost of merging (Lambrecht, 2004; Toxvaerd, 2008), and partly as due to the position of the acquirers' acquisition option portfolio. The moneyness of the follow-on option is therefore a function of the potential synergies for the private equity investor (and the increase in the exit option value), relative to its standalone value (which in turn depends on its standalone performance).

C. Stage 1: The Value of the Platform Acquisition and its Embedded Options

Continuing the backward induction process, the value of an intended buy-and-build strategy can be divided into two distinct value components: the standalone value of the platform and the value of its future growth through acquisition and exit opportunities (e.g. see also Myers, 1977; Pindyck, 1988; Kogut & Kulatilaka, 2001; Reuer & Tong, 2005, 2010; Tong & Reuer 2006; Tong, Reuer & Peng, 2008)⁹, i.e.:

$$\text{Platform Value} = (\text{Standalone}) \text{ Value of Assets} + \text{Growth Options Value of Synergistic Follow-on and Exit Opportunities} \quad (1)$$

During the life of buy-and-build, the accumulated *Value of Assets* are built up by the company's historical investments and acquisitions, which are outcomes of its past decisions and which are irreversible. By contrast, the *growth option value of synergistic follow-on and exit*

⁹ More generally, growth options values differ significantly across firms, industries, and countries (Kester, 1984; Tong, Alessandri, Reuer & Chintakanda, 2008; Tong & Reuer, 2008). Empirical results show that such values rise when firms engage in diversifying joint ventures and take smaller ownership positions in acquisition targets, particularly in international deals (Tong, Reuer & Peng, 2008).

opportunities (GOV) component is prospective and has decision flexibility, as it consists of investments the company may make in the future.

In Panel C, we exhibit the total value of the buy-and-build strategy.¹⁰ The bottom two dashed grey lines indicate the net value of the embedded options (respectively presented in Panel A and B). The value of the platform is equal to the platform value to the consolidator plus the value of the follow-on options and exit option. This value of the portfolio (without uncertainty) results in the dark grey line. With uncertainty, the total value of the buy-and-build strategy (including platform, follow-on and exit option) is presented by the red line. It is evident that the value of the initial investment in the platform depends positively on the value of the available follow-on and exit options.

In Panel D, we show the value of the platform for different levels of available follow-on options. To calculate the value of the platform, we must sum the expected present values of the number of the potential follow-ons acquisitions. The dotted grey line corresponds to the platform value as presented in Panel C. We have also plotted the value of the buy-and-build strategy without (and with) uncertainty for a low level of available follow-ons (corresponding to the dark grey and red line in Panel C). As the number of available follow-on options increases – to a medium or high level – the net follow-on value shows a steeper relation, resulting in an even stronger kink in the net buy-and-build value at the point at which it becomes valuable to expand (i.e. where the follow-on value is greater than the follow-on price).

Thus, the value of the buy-and-build strategy is positively influenced by the availability of follow-on options. Industry conditions, such as fragmentation and available midsized targets, are therefore generally attractive for consolidating acquisitions.¹¹ If the size premium increases for large companies, the exit values will show a steeper relation as well, which results in a stronger kink at the point at which it becomes valuable to exit (i.e. where the exit value is greater than the continuation value).

The moneyness of the platform therefore not only depends on the platform value (including potential improvements on a standalone basis) to the consolidator, but also on the availability of follow-on options and the respective exit option values. In this study, we use real

¹⁰ For simplicity, we take the platform as given, rather than depicting it as another call option (although this is valid as well).

¹¹ For private equity, retail chains are natural buy-and-build targets. Fragmented industries in which national companies are typically global players – for instance, mining, telecom, banking, steel, and airlines - normally experience consolidation pressures at some stage as demand and competition increase: considerations of market power, the rise of the emerging economies, and the global integration of financial and product flows have created imperatives for globalisation in all these settings.

options analysis by identifying the ideal conditions under which a consolidator can establish a self-reinforcing mechanism by exercising repeated acquisition options as part of a buy-and-build strategy. Focal points within serial acquisition theory are *industry conditions*, *company conditions*, and *financing conditions* that influence the portfolio of options. A self-reinforcing process between these focal points results in a virtuous acquisition cycle, where the acquirer follows acquisition paths as they become available to consolidate the fragmented market. The acquirer appropriates at least part of the value created, resulting in the larger firm gaining a higher exit valuation in financial markets, which then gives it better access to further acquisition options.

1.3 Industry Level Conditions

To enter the industry, the consolidator needs to acquire a platform which provides a foothold and a safe learning environment. Platforms are often larger than follow-on companies and may provide more stability. Industry characteristics, such as the fragmentation and availability of midsize companies increase the probability of successfully making follow-on acquisitions. A higher probability of being able to acquire many follow-ons will make it more likely that the consolidator can pursue its growth strategy and capture the associated value.

The consolidator will also benefit from possible exit opportunities to strategic buyers. The mature firm at the end of the buy-and-build strategies contains synergistic values to these strategic buyers, allowing them to pay a higher price, which in turn provides a higher return to the consolidator. For a consolidator to obtain part of these strategic buyer's synergies, a competitive bidding setting is required. Industries in which there are several strategic buyers of similar in size, which are large enough to acquire the mature firm, provide such a competitive bidding setting, and therefore increase the exit option value of the buy-and-build strategy.

The level of industry uncertainty also affects the likelihood of a successful buy-and-build strategy. In general, lower uncertainty causes earlier exercise (due to a lower investment threshold), but also a lower option value from waiting. Although low uncertainty may mitigate embedded growth option value, it also increases the underlying value (present value of operating cash flows) of the options, and thereby increases the total value of a buy-and-build strategy. This leads us to proposition 1:

***Industry level conditions.** The more geographically **fragmented** an industry structure is, with a few identifiable and **available platforms**, many sizable **follow-on targets** in local and new geographies, several **exit or merger options**, and less industry **uncertainty**, the more likely it is that an investor can successfully implement a buy-and-build strategy.*

1.4 Company Level Conditions

If other companies have comparable abilities to enhance a target's profitable growth, the target will capture this value in the premium it obtains from the successful bidder, so the acquisition may not generate a positive *growth option value (GOV)* for the consolidator (Kester, 1984; Singh & Montgomery, 1987).¹² When relative market power and asset bases of competitors differ, their investment timing strategies are likely to differ as well (see Spence, 1979; Dixit, 1989; Kester, 1984; Smit & Ankum, 1993; Smit 2001).¹³ Exercising an option to acquire is likely to be more valuable for a consolidator whose relative size, earlier acquisitions, and complementary assets have made it a market leader than for a smaller player. The asset portfolio creates a 'barrier' that allows the consolidator to further accumulate assets. Thus, to appropriate the value of its options, the firm aims to create a situation that makes these targets more valuable for them than the standalone company value of these companies. This can be accomplished through the strategic accumulation of its own assets and resources, built via systematic investments in the platform and follow-on acquisitions, plus its experience of success in making transactions and integrating companies, resulting in it gaining preferential access to new options.

Thus, the real options perspective on serial acquisitions and the resource-based and knowledge-based view both share the perspective that the combination of a bidder's accumulated resources and distinctive assets, and the corporate acquisition options inherent in its acquisition strategy provide a basis for the acquisition strategy (Dierickx & Cool, 1989) when industry demand

¹² In industries that are characterized by fierce competition for deals, the available acquisitions options are less proprietary and therefore less valuable (Kester, 1984; Chatterjee, 1992). In industries where competition is weak, it is not necessary to exercise options pre-emptively. Thus, in such an industry, the investor will be less concerned with pursuing a flexible strategy and keeping its options open. This is why the option analysis needs to be integrated with strategic considerations of early pre-emptive commitment (e.g. McGahan, 1993; Smit & Ankum 1993; Smit & Trigeorgis 2004; Grenadier, 1996; Kulatilaka & Perotti, 1998) and strategic positioning investments using variables from the resource-based and knowledge-based views (Barney, 1995; Grant, 1991; McGrath, 1997).

¹³ The proprietary nature of these options can depend on path conditions that are to some extent idiosyncratic (e.g. past platform investments, economies of scale and leverage of competences on a larger base) and financing conditions (for instance, the bidder's available funds or the valuation of its stock). Gaining a pre-emptive position over a rival (e.g. by buying a minority stake (Folta, 1998; Folta & Miller, 2002; Miller & Folta, 2002, Singh, 1998), or by setting up an equity alliance (Reuer & Tong, 2010) or a joint venture (Chi, 2000; Kumar, 2005; Reuer & Tong, 2005) increases the acquisition option's proprietary nature by strategically creating disincentives (and perhaps insurmountable entry costs) for competitor bidders, thus increasing an early part-acquirer's chances of appropriating the whole of the target firm in a subsequent move: such upfront investments can be seen as similar to the cost or premium of the compound option. Depending on their organisational capabilities, the bundle of corporate real options and expectations - like uncertainty itself - will be different for each firm, so the value of an acquisition may differ for each buyer, depending on its other resources and assets.

is uncertain.¹⁴ Each path in the strategy created by a platform acquisition can be seen as an investment in certain categories of assets or competencies, which in turn can increase the proprietary nature of the firm's chain of options if there are targets that can benefit from them. The exercise price, underlying value, or new expansion options for an early consolidator can be favourably affected by the effects of its experience (such as greater sectoral or geographic knowledge), or by economies related to size (lower financing costs, efficient scale of facilities, or increased market power). Subsequently this may lead to improvements in the cost position or 'best brand' identity.

The total growth option value of an intended buy-and-build strategy depends on company conditions including the moneyiness of the acquisition options and their size. Suitable follow-on targets – those which fulfil certain company conditions – should be in the money options. The value of the follow-on (Figure 2, Panel B) will be private, allowing the consolidator to appropriate more added value of the consolidated firm compared with the target on a standalone basis. When the follow-on underperforms on a standalone basis, the owners will be more willingly to sell, causing a lower exercise price. The investor or the platform company itself is a respected company, providing a secure foothold for future growth opportunities, and is a leader in quality or service, or in some other characteristic differentiating its production process or product terms, which can be successfully leveraged onto these further acquisitions.¹⁵ To generate value from an extended customer base, and from the unique resources, capabilities and knowledge of the platform or the investor, follow-on targets are typically less efficient than their peers. This increases the value of the follow-on investment, and thereby also the likelihood that exercising the option is favourable for the consolidator.

Eventually the group is reconfigured by transforming a series of middle sized companies into a more efficient larger-scale network. Targets that are significant in *size* create value by enlarging the accumulated financial base and contributing to the size premium, more so than very small

¹⁴ The idea that internal resources and capabilities may create valuable growth opportunities can be found in Penrose 1959; Wernerfelt, 1984; Rumelt, 1984; Teece, 1982, 1984; Barney 1986, 1988 and other proponents of the resource-based view of the firm. The knowledge and resource-based view also focus on internal growth through 'asset stock accumulation'. Dierickx & Cool (1989) coined the term 'asset stock accumulation' to refute Barney's (1986) argument that resources might be purchased via acquisitions.

¹⁵ Realising such efficiencies and cost reductions depends on corporate capabilities to adapt and change the new organisation, and the dynamic capabilities (Teece, Pisano & Shuen, 1997) arguments emphasise the role of firm learning (Bernardo & Chowdhry, 2002).

targets.¹⁶ In the perspective of real option theory, this entails that the distance between zero and the follow-on price in Panel B needs to be of a significant size. This brings us to proposition 2:

***Company level conditions.** Serial exercise of follow-on acquisition options is more likely when follow-on options have a high private value for the consolidator compared to their standalone values (i.e. the options are in the money). The moneyness of the option is influenced by low standalone performance, potential synergies, and by the size of the follow-on options.*

1.5 Financing Level Conditions

The moneyness of the exit option is higher during periods of “hot” IPO markets (Lowry & Schwert, 2002), when the exit values are relatively high compared to the continuation value (high multiples). To complete serial acquisitions, bidders need to marshal enormous sums of financing. Serial acquisition strategies are only likely to occur when improved external debt market conditions (general LBO conditions) allow the consolidator to tap into new finance sources of banks or institutional investors. Lower interest rates and a lower spread will allow the investor to increase the amount of leverage used in buyouts (Axelson et al., 2012), amplifying the total investment in buy-and-build strategies and increasing the number of acquisitions or the size of these acquisitions.

The mature firm, which is exited, is an accumulation of the previous platform and follow-on acquisitions. The consolidator’s value, relative to its (smaller) targets, its risk profile, and cost of capital may change as it increases in size (multiple expansion) through large serial acquisitions. This will give it better access to new opportunities and create the possibility of financing even larger transactions, continuing the acquisition cycle. As the buy-and-build matures, improved profitability and reduced risk may lead to multiple arbitrage (or an appreciated value in the financial markets) and to a market rerating of the consolidated entity compared to its separate smaller parts. This can also increase the company’s available internal financing and debt capacity - the amount it can borrow to finance acquisitions. In addition, in some instances, operational advantages and a lower risk of default can be a source of operating and financial synergies, which are difficult for smaller firms to match without making investments in multiple geographies or products. Additional market value can be created through consolidation, as size, scale and the

¹⁶ For follow-on acquisitions that are too small, the added (option) value can be neglected since their assets do not contribute much to the value of the consolidated entity, especially when costs associated with the deal making and merging firms are kept in mind (Lambrecht, 2004).

accumulation of high quality assets and capabilities change the consolidator's position in its industry. This leads us to proposition 3:

***Financing level conditions.** Serial exercise of acquisition options is more likely to occur when exit values are high relative to their continuation values and a high market premium is available (i.e. the moneyness of the exit option is high). The moneyness of the exit option is also positively related to the accumulation of assets (size premium), and general favourable debt market conditions are required to realise this accumulation.*

2 Empirical Results

2.1 Data Collection and Description

Data Collection

We collected deal level data on all buy-and-build deals in the UK from 2008 to 2014 from Zephyr, the database of Bureau van Dijk (BvD).¹⁷ Zephyr has an advantage over other databases as it provides a deal tag called 'build-up'.¹⁸ Accordingly, we can use their definition of a buy-and-build deal. Zephyr has a very strong coverage of the European private equity market. We restricted our sample to all majority stake buy-and-build deals involving a UK target company.¹⁹ A few companies in the deal sample were acquired more than once. To avoid any potential bias due to the influence of the previous private equity investor, we only included the first deal in which these firms were a first-time target in a buy-and-build deal. We required that the NACE Rev. 2 code and the BvD ID number of the target company should be available, since we needed to match the deals to the company financials and to assign each deal and company to the correct industry. Our initial

¹⁷ Within Europe, the UK private equity market for buy-and-build deals is by far the largest, providing a sufficient number of transactions. The total number of buy-and-build deals from 2008 to 2014 in the UK was 579 and includes completed minority and majority stake transactions, France comes second with 236 deals, followed by Germany with 159 deals. Sweden, Finland and Norway together accounted for 321 deals. The UK has strict disclosure requirements for both public and private firms, therefore providing us with financials for a relatively large sample. Especially since follow-on acquisitions are expected to be smaller private companies relative to the platform, we minimize our risk of non-random missing observations and with that possible selection bias.

¹⁸ The definition of the 'build-up' deal tag is almost equivalent to our definition of a buy-and-build strategy. Zephyr adds the tag as sub-deal type when a private equity investor builds up the company it owns by acquiring other companies to merge them into the larger firm, thus increasing the total value of its investments through synergies among its acquisitions.

¹⁹ We define a majority stake acquisition as a deal in which the acquirer holds less than 50% of the total shares before the deal and more than 50% after the transaction has been completed.

deal sample consisted of 527 buy-and-build deals, which we considered to represent follow-ons. In the majority of these deals, the acquirer, mentioned by Zephyr, was not a private equity investor, but a strategic acquirer that had been acquired earlier by a private equity investor. This follows from many deal comments which state that the acquisition followed an earlier buyout.²⁰ Thus from our initial list of deals, we backtracked whether the acquirers had been a target in a buyout, or if a PE firm had provided financing to the acquirer before the original build-up deal occurred. We found 212 of them and called these the platform acquisitions.²¹ Therefore, our total buy-and-build sample of platform and follow-on deals consisted of 739 deals.

We retrieved company financials from the Orbis database of BvD. Orbis provides company financials of both public and private firms. We considered all companies that were active in the UK between 2008 and 2014.²² In total, we collected the financials on 1,575,882 firm year observations. To compute proxies for the industry conditions, we aggregated the company financials on a four-digit NACE level. This left us with 4,262 industry year observations.

To create proxies for the company conditions (and controls), we additionally imposed that the *cost of goods sold* and *net profit* were available in the year before the deal.²³ We dropped company-year observations of buy-and-build targets after the year of the deal, since these observations concur with the holding period of the private equity investor and could be influenced by the practices of the private equity investor. For the company characteristics, we only focused on those industry-year observations in which a buy-and-build acquisition occurred (i.e. we dropped all companies from non-buy-and-build industries). This left us with 65,752 company-year observations. After matching the company financials with the deals, we had complete pre-deal information on 112 buy-and-build deals.

Finally, for the financing conditions, we collected the index values on the FTSE 350 Sector Indices via Datastream. We then manually matched the NACE Rev. 2 codes (4 digits) from the buy-and-build deals with the ICB codes used for the FTSE 350 Sector Indices based on their code

²¹ Similar to our follow-on sample, we required that the NACE code and BvD ID code should be available. We collected majority stake deals and minority stake deals in which the final stake was less than 50%. We then defined the platform acquisition as the first (majority) acquisition performed by the acquirer mentioned in the deal that was the closest to, but preceding the follow-on deal.

²² A company is defined as active if it reports its operating revenue for at least one of the years in our deal sample and if this value is non-zero.

²³ We further imposed that the operating revenue was not equal to zero.

descriptions.²⁴ The proxies for the *debt market conditions*, together with the other macro-economic indicators, were collected via Datastream as well.²⁵ For this analysis, we extended our deal sample, leaving us with a total deal sample running from 1998 – 2015.²⁶

Data Description

Table 1 presents the descriptive statistics of our proxies for industry conditions by regular industries (non-buy-and-build industries) and buy-and-build industries. The inverted Herfindahl measures show that the industry fragmentation is on average higher in buy-and-build industries, but that market volatility is lower in these industries. These statistics suggest that the availability of acquisition options and exit opportunities is important for buy-and-build strategies. On average, the top half of the industry (i.e. the largest 10% firms) is accountable for 70% to 75% of the market share in both types of industries, although it is on average higher in buy-and-build industries. On the other side of the spectrum, the bottom half of the industry (i.e. the smallest 50% firms) is on average only accountable for 2% to 3% of total industry revenue.

[Insert Table 1 about here]

Table 2 presents the descriptive statistics of our proxies for company conditions by regular companies, platforms, and follow-ons. In terms of *operating revenue*, platform acquisitions are on average larger. In terms of *profitability*, follow-on acquisitions seem to outperform platforms and the regular group. However, in terms of *operating efficiency*, both platforms and follow-ons seem to be less efficient, indicating that they both offer room for improvements (when acquired).

[Insert Table 2 about here]

Figure 3 plots the number of deals in each quarter and in the index value of the “Support Services” industry.²⁷ The left y-axis presents the number of buy-and-build deals in each quarter. The right y-axis provides the index value. The graph illustrates that when the market experiences

²⁴ We matched 1336 out of 1487 deals. We dropped deals without a fitting ICB code. An overview of the matching table is available upon request.

²⁵ Although we downloaded the variables via Datastream, the source of the data could differ for each variable. The *LIBOR* and *exchange rate* is provided by the Bank of England; *BofA ML EU High Yield* is provided by the Bank of America Merrill Lynch; *GDP* and *Inflation* is provided by the Office for National Statistics, United Kingdom.

²⁶ We left out 1997, which is also available in Zephyr, because the data collection on buy-and-build deals in the first year of the Zephyr database is quite poor. We also left out 2016, since information on deals is always collected with a lag.

²⁷ We choose to illustrate the relation between the financing conditions and buy-and-build strategies with the “Support Services” industry since this is a very buy-and-build intensive industry. The ICB code of the industry is 2790.

an upwards movement, the number of buy-and-build deals increases. This relation suggests that the high market valuation is a strong driver of buy-and-build deals.

[Insert Figure 3 about here]

Figure 4, plots the total number of deals together with our two proxies for the *debt market conditions*. From the graph, it appears that there is a strong negative relation between the spread and the number of buy-and-build deals. The spread proxies for the high-yield debt market conditions. Thus, when the spread is high, the high-yield debt market might be less liquid, making high-yield debt more expensive. Therefore, the negative relation suggests that during these periods, high-yield debt is expensive and acquisition option values are low, causing the consolidator to defer his option to the future. The relation between the *LIBOR* and the *number of buy-and-build deals* is however less clear, mostly due to the prolonged periods of relatively stable values.

Together the two figures provide some first insights into the importance of financing conditions for buy-and-build strategies. The relations suggest that both the *resolution of valuation uncertainty* and *debt market conditions* are important for the decision whether to continue with a buy-and-build acquisition.

[Insert Figure 4 about here]

2.2 Methodology and Results

Industry Conditions

Following from proposition 1, buy-and-build strategies are more likely in fragmented industries with a few large companies, because in these industries, both platform and follow-on acquisitions are more likely to be available together with sufficient exit opportunities for the private equity investor. These conditions increase the moneyness of the follow-on and exit options, and therefore enhance the value of the buy-and-build strategies.

For this analysis, we exploit the cross-sectional variation in industry characteristics between buy-and-build and non-buy-and-build industries. We regress the probability of a buy-and-build acquisition in an industry on current industry conditions, more specifically:

$$BB_i = \alpha + \beta_1 \text{Industry Conditions}_{it} + \beta_2 \text{Controls}_{it} + \eta_t + U_{it}, \quad (2)$$

where BB_i is a dummy variable that takes on the value one if in industry i at one point in time in our sample a buy-and-build acquisition is completed and zero otherwise.²⁸ *Industry Conditions* is a vector consisting of three industry characteristics, which present the acquisition options and exit opportunities. For this analysis, we run a linear probability model, but as a robustness check we also run a logit model, which shows comparable results.

Generally, acquisition options are more widely available in more fragmented markets. Therefore, the Herfindahl-Hirschman Index (HH Index) is an appropriate measure to proxy the available acquisition options. However, in most industries the HH Index is solely driven by the largest companies that are active in the industry. Therefore, in addition to the standard HH Index, we create two other concentration indices. First, we measure fragmentation only for the top half of the industry (HH Index Top). The index measures how equal the market shares are divided among the largest 10% of the firms and is used as a measure for the available exit opportunities to strategic investors.

Second, we calculate a similar concentration measure for the bottom half of the industry (HH Index Bottom). Buy-and-build acquisitions to proxy for the level of available acquisition options. We invert all HH Index measures for interpretation purposes (making them fragmentation indices). The indices are added in their natural logarithm.

The market volatility is calculated based on a 3-year moving window of the industry sales and measures the uncertainty. We further add the *yearly growth* in total sales of the industry and *industry size*, measured as the natural logarithm of the total industry sales, as additional industry controls and we add *year fixed effects* to the specification.

In Table 3 Panel A, we present the results of the model on industry conditions using two specifications. The results show that the HH Index is positively related to the probability of a buy-and-build strategy in an industry, thus buy-and-build strategies occur on average more frequently in industries with a higher level of fragmentation. Market volatility seems to be negatively related to the probability that a buy-and-build strategy occurs, indicating that buy-and-build strategies are on average executed in less uncertain industries.

In Panel B, we use the additional fragmentation indices. In specifications 3-5, we run the linear probability model. We run similar analyses in specifications 6-8, however now the

²⁸ We assume that these industry characteristics are relatively stable over time. Therefore, an industry that is suitable for buy-and-build strategies is likely to be so during the whole period. However, the actual execution and exercise of acquisition options depends on financing conditions, which is discussed later. We rerun the analysis with a dependent dummy variable that only takes on the value one for industry-year observations in which a buy-and-build acquisition was completed and zero otherwise. Results are similar as to those reported.

dependent variable is the *number of buy-and-build deals*.²⁹ Both the HH Index Top and Bottom are significant and positively related to the likelihood of buy-and-build strategies when added separately. When added simultaneously, only the HH Index Top is significant, except in specification 8, in which both variables are significant. These findings suggest that a higher availability of acquisition options and exit opportunities is related to a higher likelihood of buy-and-build deals, and to an increase in the number of deals completed in an industry.

Together the results provided in Table 3 are consistent with the industry condition. Buy-and-build strategies are more likely in *fragmented industries* in which both *platform* and *follow-ons* are present, together with several readily available *exit opportunities*. The *market volatility* seems to have a negative net effect on the occurrence of buy-and-build strategies.

[Insert Table 3 about here]

Company Conditions

Following from proposition 2, buy-and-build strategies are more valuable when a consolidator can establish an advantageous position to appropriate growth option value from acquisition options. Follow-ons are particularly valuable to a consolidator when these companies underperform on a standalone basis, but are easily improvable for the investor (i.e. their synergistic value relative to their price make them in the money). Furthermore, follow-ons of significant size provide a larger financial base and contribute to the collection of the size premium.

We test these implications by examining the cross-sectional variation between companies within buy-and-build industries. We set up the following specification to estimate the likelihood that a company will be bought in a buy-and-build strategy:

$$BB\ Target_{ct} = \alpha + \beta_1\ Company\ Conditions_{ct} + \beta_2\ Controls_{ct} + \eta_t + \eta_i + U_{ct} \quad (3)$$

where the *BB Target_{ct}* is a dummy variable, which equals to one if company *c* is a target in a buy-and-build transaction in year *t* and otherwise zero. The vector *Company Conditions* consists of our company conditions.

Buy-and-build strategies try to enhance the operating performance of a company as an additional source of value creation (Kaplan & Strömberg, 2009). The changes that are induced focus more around sales growth rather than on cost reduction, but both aim to increase profits. We measure the potential improvability of the operating performance by the *Asset Turnover (ATR)*, a common metric for operating efficiency. *ATR* is calculated as the ratio of the operating revenue

²⁹ We define the number of buy-and-build deals as the natural logarithm of the total number of deals plus one in industry *i* in year *t*.

divided by the total assets. Companies that have relatively low *ATR* compared to their industry peers show a strong potential for growth. We expect that a low *ATR* is associated with a higher probability of being a target in a buy-and-build strategy.

As an additional measure for synergistic value, we add the profitability of the company, measured as the *return on sales (ROS)*. Target companies that underperform compared to their peers have a higher potential to improve through restructurings and by being part of a larger entity. These companies are also more likely to be up for sale when they underperform on a standalone basis. We therefore expect that a lower (higher) *ROS* has a positive (negative) influence on the probability of being purchased as part of a buy-and-build.

We measure whether targets of buy-and-build acquisitions are *sizable* by including the (natural logarithm) *total operating revenue*. We prefer operating revenue over total assets, since the focus in buy-and-build strategies is more on increasing market share and less on increasing asset size. We expect that size is positively related to the probability of being acquired in a buy-and-build strategy. In addition, we add other operating metrics such as the *return on assets (ROA)*, *costs of goods sold ratio (COGS ratio)*, and we include *time* and *industry fixed effects*.³⁰

Table 4 provides the first set of results. In the first specification, we look at the probability of all types of buy-and-build deals. In the second and third specifications, we divide the deals into platform and follow-on acquisitions, respectively. Of our proxies for *improvability (ATR and ROS)*, *ROS* shows the most consistent results. The coefficient indicates that companies purchased in buy-and-build strategies are on average less profitable, and this result seems to be mainly driven by the follow-on sample. Regarding the *ATR*, the results are less conclusive, which is only significant and negatively related in the second specification. Overall, the findings provide some evidence that the *improvability* of a company is an important characteristic for follow-ons. However, the evidence is not conclusive for platform acquisitions. *Operating Revenue* is significant in all three specifications and is positively related to the probability of being a buy-and-build target, thereby indicating that both platforms and follow-ons should be *sizable*.

Together the results are to a large extent in accordance with company condition, and provide evidence that targets that are bought in buy-and-build strategies should be in the money options and of sufficient size.

[Insert Table 4 about here]

Financing Conditions

³⁰ Return on assets is measured as net income divided by the total assets. Asset turnover is measured as total operating revenue divided by total assets.

Following from proposition 3, we can expect that the number of deals completed increases during high industry market valuation, since exits options (e.g. via an IPO) become more valuable, and therefore the value of the buy-and-build strategy increases as well. Favourable debt market conditions allow the consolidator to complete more and larger deals, thereby bolstering the collection of a larger size premium by the consolidator. Hence, an increase in the favourableness of the general debt market conditions will lead to the exercise of acquisition options as well.

To test these expectations, we exploit the (quarterly) time-varying variation within each industry to find the relation between the number of buy-and-build deals completed and the respective industry conditions:

$$\text{Number of } BB_{it} \text{ Deals} = \alpha + \beta_1 \text{ Financing Conditions}_{it} + \beta_2 \text{ Controls}_t + \eta_i + U_{it}, \quad (4)$$

In Equation 4, *Number of BB_{it} Deals* stands for the natural logarithm of the total *number of deals* in industry i in time period t . The vector *Financing Conditions* consists of proxies for financing conditions, namely the natural logarithm of the *FTSE350 Sector Indices*, *LIBOR*, and the *Spread*.

We proxy the public market valuation of the private firms in a certain industry with the *FTSE350 Sector Indices*.³¹ Since the anticipation of high exit values increase the exit option, we expect that the market valuation and the number of buy-and-build deals are positively related.

To test whether general debt market conditions increase deal activity, we follow Axelson et al. (2013) and proxy the *debt market conditions* by the *LIBOR* and the *Spread*, where we measure the spread as the difference between the EU High Yield and the LIBOR. We expect that a lower interest rate and a lower spread will increase the number of buy-and-build acquisitions. We additionally add as controls the *Exchange Rate* (GBP to USD), *Inflation*, and *GDP growth* to control for the macro-economic environment. The term η_i describes the *industry fixed effects*.

Table 5 provides the results of our financing analysis. In specification 1, we only run the number of deals on our *FTSE350 Sector Indices*, including *industry fixed effects*. In the following specification, we add our proxies for *debt market conditions*. In the final two, we add the additional controls. We find that when the market experiences a positive *resolution of valuation uncertainty*, the *number of buy-and-build deals* increase in that industry, and that during times in which debt financing is relatively inexpensive, more buy-and-build acquisitions are executed.

³¹ The *FTSE 350 Sector Indices* consist of 41 industry sector indices, each composed of companies on the FTSE 100 and FTSE 250 indices. These companies are assigned to a specific industry sector based on the Industry Classification Benchmark (ICB). A detailed overview of the structure of the ICB can be found on: <http://www.icbenchmark.com/structure>

[Insert Table 5 about here]

3 Discussion: Suboptimal Exercise of Serial Acquisition Potions

Enhancing our understanding of how serial acquisition options play out, and whether they succeed or fail, requires more subtle considerations about the conditions under which a self-reinforcing acquisition cycle is likely to occur, but might also destroy value over the long term. For example, suboptimal exercise of options can be based on overconfidence and overestimation of growth options if variables from managerial hubris theory are involved (Roll, 1986; Lovallo & Kahneman, 2003; Malmendier & Tate 2005; 2008). We consider several mechanisms related to industry, company, and financing conditions.

Industry Conditions: Acquisitive Herding Instead of Organic Growth. Irrational herding behaviour and corporate mimicry on the part of competing acquirers can induce them to go on making acquisitions long after the optimal economic point in an industry has passed (Scharfstein & Stein, 1990). This can generate frenzied waves of consolidation mergers, with bidding wars involving multiple bidders, and lead to many mergers that are financially unsound.³² Thus, shifts in the industry growth appropriation paradigm from organic growth to acquisitions, when mimicry and herd behaviour lead competitors to follow a successful buy-and-build investor, result in suboptimal exercise, increase the intensity of rivalry for deals, and erode acquirers long-term growth option value.

Company Conditions: Acquisitions Based on Misperceptions of the Value of Growth Options. The 'hubris' theory of acquisitions (Roll, 1986; Seth, Song & Pettit, 2000) holds that successful CEOs risk suffering from overconfidence in their ability to land acquisitions, from being overly optimistic in their own valuation of a deal's potential synergies (Larwood & Whittaker, 1977; March & Shapira, 1987; Camerer & Lovallo, 1999), and from making valuation assumptions which confirm their preferred views.³³ Misperceptions can result in CEOs overvaluing and overpaying

³² Inter-organisational imitation may occur when rivals, noting the success of the consolidator, act rationally to imitate their acquisitions paradigm (Levitt & March 1988) or just mimic the consolidator (Brewster-Stearns & Allan, 1996). Extremely successful serial consolidation strategies can even create instability in industries. Firms faced with greater uncertainty and a breakdown of the normative industry order will tend to copy a consolidator's acquisition behaviour simply because they are successful, not necessarily because they have any concrete evidence that exercising acquisition options would be an economically efficient way for *their* firm to grow (DiMaggio & Powell, 1983).

³³ Although funds have governance mechanisms in the form of limited partners, these groups can suffer from *joint confirmation bias* (Jones & Sugden, 2001) and groupthink. Team decisions have been shown to accentuate the risks of unwarranted confidence in the acquisition decision and to underestimate the risks involved, and so lead to an illusion of 'control' over the targets that may not really reflect the realities of uncertain times (Kahneman & Lovallo, 1993).

for targets, and as a consequence, exercising options too early (Black, 1989; Haunschild, Blake & Fichman, 1994; Hietela, Kaplan & Robinson, 2003; Doukas & Petmezas, 2007). Particularly in serial acquisitions, success in earlier acquisition rounds can increase executives' self-confidence and lead them to underestimate the possibility of failure in later rounds (Malmendier & Tate, 2005; 2008; 2009) and/or to undertake too many acquisitions too quickly (Billet & Qian, 2008). These factors make the bidder's CEO and management team more likely to use their discretion to overinvest. Thus, managerial hubris, over-optimism, uncertainty neglect, confirmation bias, and empire building within organisations may result in investor serial acquisition strategies to be continued too long, leading to the destruction of long-term growth option value.

Financing Conditions: Suboptimal Exercise Based on Mispricing in Financial Market. For buy-and-build acquisition strategies, the growth option value gained from an equity analysis in financial markets can explain serial acquisitions by comparing the market appreciation (and cost of capital) of small firms versus large firms. However, when market values are mispriced, the market capitalisation of both small and large firms will include excess value.³⁴ Overvalued exit values and multiple arbitrage may cause irrational overinvestment in private equity, especially when overheated debt markets allow excessive leverage of acquisitions. Thus, increased leverage to excessive levels, irrational relative overvaluation of the exit option in financial markets, and overheated debt markets may cause a suboptimal exercise that is not based on fundamental (growth option) value.

Certain situations can cause a serial acquisition cycle to yield harmful outcomes for the firm, and these conditions for failure may interact to continue a flawed cycle. For instance, when acquisitions are based on mimicry or herding behaviour, rather than on true or fundamental growth options values, the resulting acquisition frenzies and excessive prices may strengthen financial markets' irrational overvaluation of stocks (Shiller, 2000). These problems may go along

Investment managers of funds and senior executives - supported by their business development teams, consultants and investment bankers (who are, after all, incentivised to complete, rather than abort, transactions) - often suffer from confirmation bias, and rarely seek (or are presented with) data that contradicts their preferred view of the value of a proposed transaction. Acquisition projects that can be financed internally (by the consolidated firm) are particularly vulnerable to overoptimism (Malmendier & Tate, 2005, 2008).

³⁴ When financial markets act irrationally, market-based assessments of small firms' growth options relative to those of acquisition bidders can be caused by the overvaluation of the latter's growth option value, which can allow leading companies to acquire serial targets relatively cheaply by taking advantage of their highly valued equity to finance their transactions. Indeed, takeover activity in general is strongly related to stock market valuations (Shiller, 2000; Rhodes-Kropf & Viswanathan, 2004;) and managers of overvalued firms usually tend to buy targets that are less overvalued (Rhodes-Kropf, Robinson & Viswanathan, 2005; Dong, Hirshleifer, Teoh & Richardson, 2006; Van Bakkum, Smit & Pennings, 2011).

with (or even be exacerbated by) managerial hubris (Baker, Ruback & Wurgler, 2007), leading to further overvaluation and the over-exercise of acquisition options, continuing a cycle of misperception of options and over commitment.

4 Conclusion

We aim to advance the strategic management theory by offering a dynamic view on serial buy-and-build acquisitions, and develop insights in the “optimal” conditions that determine how serial strategies play out. We consider a buy-and-build strategy as an interrelated chain of platform, follow-on, and exit options. The conditions allow consolidators to pursue optionality of the serial acquisition paths, continually seeking to position the firm so it is best able to capture opportunities and their associated value. As a consequence, the growth option value, rerating, and increased debt capacity can increase the pace and size of subsequent deals on the acquisition path.

In the empirical section of the paper, we test these optimal conditions empirically. We find that buy-and-build strategies are more likely in industries with more available platform and follow-on acquisition options, and with readily available exit opportunities. Specifically, we find that the availability of acquisition options and exit opportunities, measured by the industry fragmentation, is positively related to the probability of buy-and-build strategies. Although low uncertainty may mitigate embedded growth option value, it also increases the underlying value of the option, and thereby increases the total value of a buy-and-build strategy. Our empirical evidence shows that the market volatility, measured using a 3-year moving window of the industry sales, is negatively related to the likelihood of a buy-and-build strategy to occur. To add value, acquisition options should be of sufficient size and “in the money” (i.e. a high value for the investor relative to the standalone value). In particular, standalone value underperformance increases the moneyness of the option and the availability of the target. In our company analysis, we find that asset turnover and profitability are negatively related to the probability of being acquired in a buy-and-build strategy, whereas company size is positively related to the probability. Finally, we find evidence that high values in the financial market and low interest rates contribute to the execution of buy-and-build strategies.

REFERENCES

- Adner, R., & Levinthal, D.A. 2004. What is not real option: identifying boundaries for the application of real options to business strategy. *Academy of Management Review*, 29(1): 74–85.
- Andrade, G., Mitchell, M., & Stafford, E. 2001. New Evidence and Perspectives on Mergers? *Journal of Economic Perspectives*, 15(2): 103–120.
- Axelson, U., Jenkinson, T., Strömberg, P., & Weisbach, M. S. (2013). Borrow cheap, buy high? The determinants of leverage and pricing in buyouts. *The Journal of Finance*, 68(6), 2223–2267.
- Baker, M., Ruback, R., & Wurgler, J. 2007. Behavioral corporate finance: A survey. *In The Handbook of Corporate Finance: Empirical Corporate Finance*, edited by Espen Eckbo. New York: Elsevier/North Holland.
- Baldwin, C. Y. 1982. Optimal Sequential Investment When Capital is Not Readily Reversible. *Journal of Finance*, 37(3): 763–782.
- Barney, J. 1986. Strategic Factor Markets: Expectations, Luck, and Business Strategy. *Management Science*, 32(10): 1231–1241.
- Barney, J. 1988. Returns to Bidding Firms in Mergers and Acquisitions: Reconsidering the Relatedness Hypothesis. *Strategic Management Journal*, 9(Summer Special Issue): 71–78.
- Barney, J. 1995. Looking inside for competitive advantage. *Academy of Management Executive*, 9(4): 49–61.
- Beckett, S. 1986. Corporate Mergers and the Business Cycle. *Economic Review Federal Reserve Bank of Kansas City*, 71: 13–26.
- Belderbos, R., & Sleuwaegen, L. (2005). Competitive drivers and international plant configuration strategies: a product-level test. *Strategic Management Journal*, 26(6), 577–593.
- Bernardo, A. & Chowdhry, B. 2002. Resources, Real Options, and Corporate Strategy. *Journal of Financial Economics*, 63: 211–234.
- Bowman, E. H., & Hurry, D. 1993. Strategy Through the Option Lens: An Integrated View of Resource Investments and Incremental-Choice Process. *Academy of Management Review*, 18(4): 760–782.
- Bowman, E. H. & Moskowitz, G. T. 2001. A Heuristics Approach to the Use of Options Analysis in Strategic Decision Making. *Organization Science*, 12(6) (2001): 772–777.
- Billett, M.T., & Qian, Y., 2008. Are Overconfident CEOs Born or Made? Evidence of Self-Attribution Bias from Frequent Acquirers. *Management Science*, 54(6): 1037–1051.
- Black, B., 1989. Bidder Overpayment in Takeovers. *Stanford Law Review*. 41: 597–660.
- Brewster-Stearns, L. & Allan, K. D. 1996. Economic Behavior in Institutional Environments: The Corporate Merger Wave of the 1980s. *American Social Review*, 61(4): 699–718.
- Camerer, C.F. 1991. Does Strategy Research Need Game Theory? *Strategic Management Journal*, 12: 137–

- Camerer, C., & Lovallo, D. 1999. Overconfidence and Excess Entry: An Experimental Approach. *The American Economic Review*, 89(1): 306–318.
- Capron, L., Mitchell, W., & Swaminathan, A. 2001. Asset Divestiture Following Horizontal Acquisitions: A Dynamic View. *Strategic Management Journal*, 22(9): 817–844.
- Chatterjee, S. 1992. Source of Value in Takeovers: Synergy or Restructuring - Implications for Target and Bidder Firms. *Strategic Management Journal*, 13(4): 267–286.
- Chi, T. 2000. Option to Acquire or Divest a Joint Venture. *Strategic Management Journal*, 21(6): 665–688.
- Chi, T., & Seth, A. (2009). A dynamic model of the choice of mode for exploiting complementary capabilities. *Journal of International Business Studies*, 40(3), 365-387.
- Cox, J. C., Ross, S. A., & Rubinstein, M. (1979). Option pricing: A simplified approach. *Journal of financial Economics*, 7(3), 229-263.
- Dierickx, I., & Cool, K. 1989. Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science*, 35(12): 1504–1511.
- DiMaggio, P. J., & Powell, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48: 147–160.
- Dixit, A. 1989. Entry and Exit Decisions Under Uncertainty. *Journal of Political Economy*, 97: 620–638.
- Dixit, A. K., & Pindyck, R.S. 1994. *Investment under Uncertainty*. New Jersey: Princeton University Press.
- Dong, M., Hirshleifer, D., Teoh, S. H., & Richardson, S. 2006. Does Investor Misvaluation Drive the Takeover Market? *Journal of Finance*, 61: 725–762.
- Doukas, J., & Petmezas, D. 2007. Acquisitions, Overconfident Managers and Self-Attribution Bias. *European Financial Management*, 13(3): 531-577.
- Farrell, J., & Shapiro, C. 1990. Horizontal Mergers: An Equilibrium Analysis. *American Economic Review*, 80(1): 107–126.
- Folta, T. B. 1998. Governance and Uncertainty, the Trade-Off Between Administrative Control and Commitment. *Strategic Management Journal*, 19: 1007–1028.
- Folta, T. B., & Miller, K. D. 2002. Real Options in Equity Partnerships. *Strategic Management Journal*, 23: 77–88.
- Fuller, K., Netter, J., & Stegemoller, M. (2002). What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. *The Journal of Finance*, 57(4), 1763-1793.
- Golbe, D. L., & White, L. J. 1988. Mergers and Acquisitions in the US Economy: An Aggregate and Historical Overview. In: Auerbach, A. J. (Ed.), *Mergers and Acquisitions*. University of Chicago Press, Chicago: 25–47.

- Gort, M. 1962. *Diversification and Integration in American Industry*. Princeton, NJ: Princeton University Press.
- Grant, R. M. 1991. The Resource-based Theory of Competitive Advantage: Implications For Strategy Formulation. *California Management Review*, 33(3): 114–135.
- Grenadier, S. R. 1996. The Strategic Exercise of Options: Development Cascades and Overbuilding in Real Estate Markets. *Journal of Finance*, 51(5): 1653–1679.
- Grossman, S. J., & Hart, O. D. 1980. Takeover Bids, the Free-rider Problem, and the Theory of the Corporation. *Bell Journal of Economics*, 11(1): 42–64.
- Guo, S., Hotchkiss, E. S., & Song, W. (2011). Do buyouts (still) create value? *The Journal of Finance*, 66(2), 479-517.
- Kim, J. Y., Halebian, J., & Finkelstein, S. (2011). When firms are desperate to grow via acquisition: The effect of growth patterns and acquisition experience on acquisition premiums. *Administrative science quarterly*, 56(1), 26-60.
- Haunschild, P. R., Blake, A. D. & Fichman, M. 1994. Managerial Over-commitment in Corporate Acquisition Processes. *Organization Science*, 5(4): 528–540.
- Hietala, P., Kaplan, S. N., & Robinson, D. 2003. What is the Price of Hubris? Using Takeover Battles to Infer Overpayments and Synergies. *Financial Management*, 32(3), 1–32.
- Holmstrom, B., & Kaplan, S. N. 2001. Corporate Governance and Merger Activity in the US: Making Sense of the 1980s and the 1990s. *Journal of Economic Perspectives*, 15(2): 121–144.
- Jensen, M. 1986. Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, 76(2): 323-329
- Jensen, M. C., & Meckling, W. H. 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3(4): 305–360.
- Jones, M., & Sugden, R. 2001. Positive Confirmation Bias in the Acquisition of Information. *Theory and Decision*, 50: 59–99.
- Kahneman, D., & Lovallo, D. 1993. Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking. *Management Science*, 39(1): 17–31.
- Kaplan, S. (1989). The effects of management buyouts on operating performance and value. *Journal of financial economics*, 24(2), 217-254.
- Kaplan, S. N., & Strömberg, P. (2009). Leveraged buyouts and private equity. *The Journal of economic perspectives*, 23(1), 121-146.
- Katz, J., Simanek, A., & Townsend, J. 1997. Corporate Mergers and Acquisitions: One more Wave to Consider. *Business Horizons*, 1: 32–40.

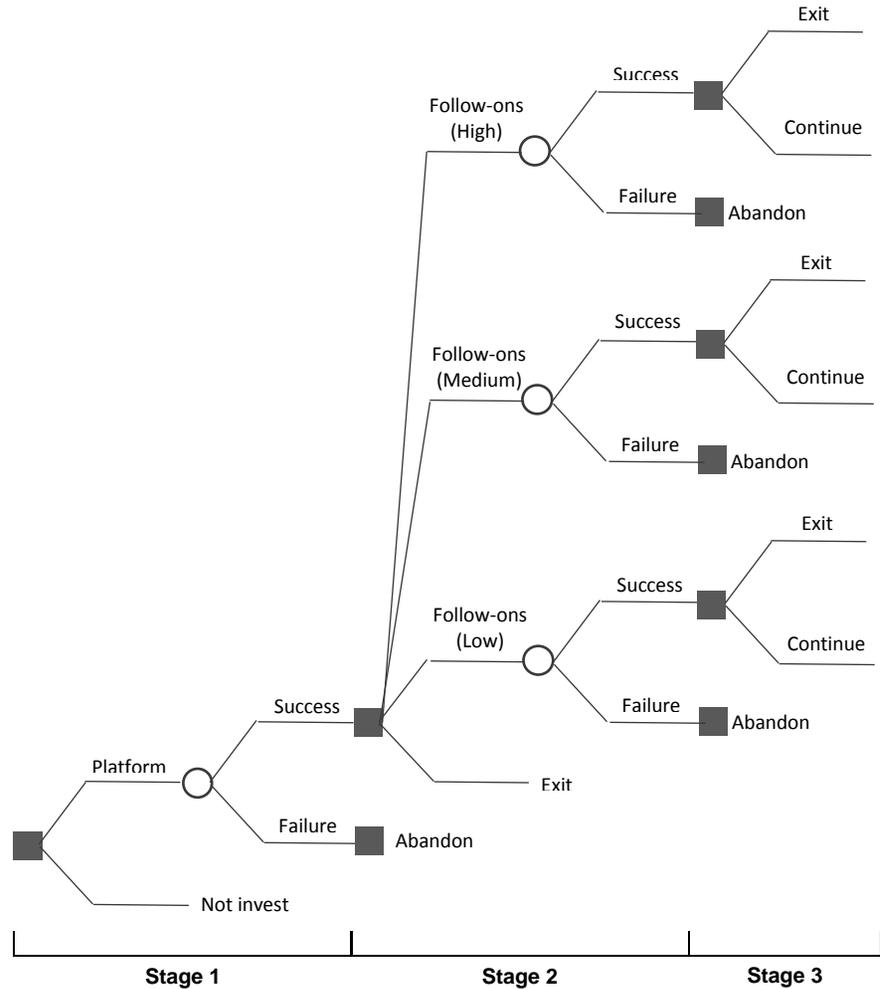
- Kester, W. C. 1984. Today's Options for Tomorrow's Growth. *Harvard Business Review*, 62(2): 153–160.
- Kogut, B. 1991. Joint Ventures and the Option to Expand and Acquire. *Management Science*, 37(1): 19–33.
- Kogut, B., & Kulatilaka, N. 1994. Operating Flexibility, Global Manufacturing, and the Option Value of a Multinational Network. *Management Science*, 40 (1): 123–139.
- Kogut, B., & Kulatilaka, N. 2001. Capabilities as Real Options. *Organization Science*, 12(6): 744–758.
- Kulatilaka, N., & Perotti, E. C. 1998. Strategic Growth Options. *Management Science*, 44: 1021–1031.
- Kumar, M. V. S. 2005. The Value from Acquiring and Divesting a Joint Venture: A Real Options Approach. *Strategic Management Journal*, 26 (4): 321–331.
- Laamanen, T., & Keil, T. (2008). Performance of serial acquirers: Toward an acquisition program perspective. *Strategic Management Journal*, 29(6), 663-672.
- Lambrecht, B. M. 2004. The Timing and Terms of Mergers Motivated by Economies of Scale. *Journal of Financial Economics*, 72(1): 41–62.
- Lambrecht, B. M., & Myers, S. C. (2007). A theory of takeovers and disinvestment. *The Journal of finance*, 62(2), 809-845.
- Larwood, L., & Whittaker, W. 1977. Managerial Myopia: Self-serving Biases in Organizational Planning. *Journal of Applied Psychology*, 67: 194–198.
- Levitt, B., and March, J. G. 1988. Organizational Learning. *Annual Review of Sociology*, 14: 319–340.
- Lovaglio, D., & Kahneman, D. 2003. Delusions of Success: How Optimism Undermines Executives' Decisions. *Harvard Business Review*, 81(7): 56–63.
- Lowry, M., & Schwert, G. W. (2002). IPO market cycles: Bubbles or sequential learning? *The Journal of Finance*, 57(3), 1171-1200.
- Malmendier, U., & Tate, G. 2005. CEO Overconfidence and Corporate Investment. *Journal of Finance*, 60: 2661–2700.
- Malmendier, U., & Tate, G. 2008. Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction. *Journal of Financial Economics*, 89(1): 20–43.
- Malmendier, U., & Tate, G. 2009. Superstar CEOs. *Quarterly Journal of Economics*, 124(4): 1593–1638.
- March, J. G., & Shapira, Z. 1987. Managerial Perspectives on Risk and Risk Taking. *Management Science*, 33: 140–418.
- McCarter, M.W., J. T. Mahoney & G.B. Northcraft. 2011. Testing the Waters: Using Collective Real Options to Manage the Social Dilemma of Strategic Alliances, *Academy of Management Review*, 36(4): 621–640.
- McGahan, A. M. 1993. The Incentive Not to Invest: Capacity Commitment in Compact Disk Introduction. *Research and Technology Innovation, Management and Policy*, 5: 177–197.

- McGrath, R. G. 1997. A Real Options Logic for Initiating Technology Positioning Investments. *Academy of Management Review*, 22(4): 974–996.
- McGrath, R. G. 1999. Falling Forward: Real Options Reasoning and Entrepreneurial Failure. *Academy of Management Review*, 24(1): 13–30.
- McGrath RG, Ferrier WJ, & Mendelow A.L. 2004. Response: Real Options as Engines of Choice and Heterogeneity. *The Academy of Management Review*. 29(1): 86-101.
- McGrath, R. G., & MacMillan, I. C. 2000. Assessing Technology Projects using Real Options Reasoning. *Research-Technology Management*, 43(4): 35–49.
- Melicher, R.W., Ledolter, J., & D'Antonio, L. J. 1983. A Time Series Analysis of Aggregate Merger Activity. *Review of Economics and Statistics*, 65: 423–430.
- Merton, R. C. 1998. Applications of Option-Pricing Theory: Twenty-Five Years Later. *American Economic Review*, 88 (3): 323-349.
- Merton, R. K. 1967. *On Theoretical Sociology*. New York: Free Press
- Miller, K. D., & Folta, T. B. 2002. Option Value and Entry Timing. *Strategic Management Journal*, 23: 655–665.
- Mitchell, M., & Mulherrin, J. H. 1996. The Impact of Industry Shocks on Takeover and Restructuring Activity. *Journal of Financial Economics*, 41: 93–229.
- Morellec, E., & Zhdanov, A. (2004). The dynamics of mergers and acquisitions. *Journal of Financial Economics*, 77(3), 649-672.
- Myers, S. 1977. Determinants of Corporate Borrowing. *Journal of Financial Economics*, 5(2): 147–175.
- Nelson, R. L. 1959. *Merger Movements in American Industry, 1895-1956*. NJ: Princeton University Press.
- Nikoskelainen, E., & Wright, M. (2007). The impact of corporate governance mechanisms on value increase in leveraged buyouts. *Journal of Corporate Finance*, 13(4), 511-537.
- Penrose, E. (1959). *The Theory of the Growth of the Firm*, London: Basil Blackwell.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource-based view. *Strategic management journal*, 14(3), 179-191.
- Pindyck, R. S. 1988. Irreversible Investment, Capacity Choice, and the Value of the Firm. *American Economic Review*, 78(5): 969–985.
- Porter, M. E. 1980. *Competitive Advantage*. London: Macmillan.
- Reuer, J. J., & Tong, T.W. 2005. Real Options in International Joint Ventures. *Journal of Management*, 31(3): 403–423.
- Reuer J.J., & Tong, T. W. 2010. Discovering Valuable Growth Opportunities: An Analysis of Equity Alliances with IPO firms. *Organization Science*. 21(1): 202-215.

- Rhodes-Kropf, M., Robinson, D. T., & Viswanathan, S. 2005. Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics*, 77: 561–603.
- Rhodes-Kropf, M., & Viswanathan, S. 2004. Market Valuation and Merger Waves. *Journal of Finance*, 59(6): 2685–2718.
- Roll, R. 1986. The Hubris Hypothesis of Corporate Takeovers. *Journal of Business*, 59: 197–216.
- Rumelt, R. P. 1984. Towards a Strategic Theory of the Firm, in R. B. Lambrecht (ed.), *Competitive Strategic Management*, Prentice-Hall.
- Scharfstein, D. S., & Stein, J. C. 1990. Herd Behavior and Investment. *American Economic Review*, 80: 465–479.
- Seth, A., Song, K., & Pettit, R. 2000. Synergy, Managerialism or Hubris? An Empirical Examination of Motives for Foreign Acquisitions of US firms. *Journal of International Business Studies*, 31(3): 387–406.
- Shiller, R. J. 2000. *Irrational Exuberance*. NJ: Princeton University Press.
- Singh, R. 1998. Takeover Bidding with Toeholds: The Case of the Owner's Curse. *The Review of Financial Studies*, 11(4): 679–704.
- Singh, H., & Montgomery, C. 1987. Corporate Acquisition Strategies and Economic Performance. *Strategic Management Journal*, 8(4): 377–386.
- Smit, H. T. J. 2001. Acquisition Strategies as Option Games. *Journal of Applied Corporate Finance*, 14(2): 79–89.
- Smit, H. T. J. & Ankum, L. A. 1993. A Real Options and Game-Theoretic Approach to Corporate Investment Strategy Under Competition. *Financial Management*, 22(3): 241–250.
- Smit, H. T. J. & Trigeorgis, L. 2004. *Strategic Investment: Real Options and Games*. New Jersey: Princeton University Press.
- Smit, H. T. J. & Moraitis, T. 2010a. Playing at Serial Acquisitions. *California Management Review*, 53(1): 56–89.
- Smit H. T. J. & Moraitis, T. 2010b. Serial Acquisitions Options. *Long Range Planning*, 43(1): 85–103.
- Spence, M. 1979. Investment Strategy and Growth in a New Market. *Bell Journal of Economics*, 10: 1–19.
- Sutton R. I. & Staw, B.M. 1995. What Theory is Not. *Administrative Science Quarterly*, 40 (3): 371-384.
- Teece, D. J. 1982. Towards an Economic Theory of the Multiproduct Firm. *Journal of Economic Behavior and Organization*, 3: 39–63.
- Teece, D. J. 1984. Economic Analysis and Strategic Management. *California Management Review*, 26(3): 87–110.
- Teece D. J., Pisano, G., & Shuen, A. 1997. Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18: 509–534.

- Tong, T. W., Alessandri, T. M., Reuer, J. J., & Chintakanda, A. 2008. How much does Country Matter? An Analysis of Firms' Growth Options. *Journal of International Business Studies*, 29: 387–405.
- Tong, T. W., & Reuer, J. J. 2006. Firm and Industry Influences on the Value of Growth Options. *Strategic Organization*, 4: 71–95.
- Tong, T. W., & Reuer, J. J. 2008. Real options in Multinational Corporations: Organizational Challenges and Risk Implications. *Journal of International Business Studies*, 38: 215–230.
- Tong, T. W., Reuer, J. J. & Peng, M. W. 2008. International Joint Ventures and the Value of Growth Options. *Academy of Management Journal*, 51: 1014–1029.
- Toxvaerd, F. 2008. Strategic Merger Waves: A Theory of Musical Chairs. *Journal of Economic Theory*, 140(1): 1–26.
- Trigeorgis, L. 1996. *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. Massachusetts: MIT Press.
- Van Bakkum, S., Smit, H.T.J., & H.P.G. Pennings, 2011. Buy Smart, Time Smart: Are Takeovers Driven by Growth Opportunities or Mispricing? *Financial Management*, 40(4): 911-940.
- Wernerfelt, B. 1984. A Resource-Based View of the Firm. *Strategic Management Journal*, 5(2): 171–180.

Figure 1: Simplified Structure of a Buy-and-Build Strategy as a Portfolio of Corporate Real Options



Stage 1: Acquisition of Platform

The ambition to grow through acquisitions depends on the evolution of demand, which in turn influences the value of future follow-on and exit option. The value of the platform is partially contingent upon these options and together they result in the total value of the buy-and-build strategy.

Platforms are businesses with reputation and competencies in products and geographies in a fragmented market.

Stage 2: Acquisition of Follow-ons

Follow-ons are conditional on the platform investment in stage 1. Building up scale depends on the level of available follow-ons resulting in the consolidation of local/global market.

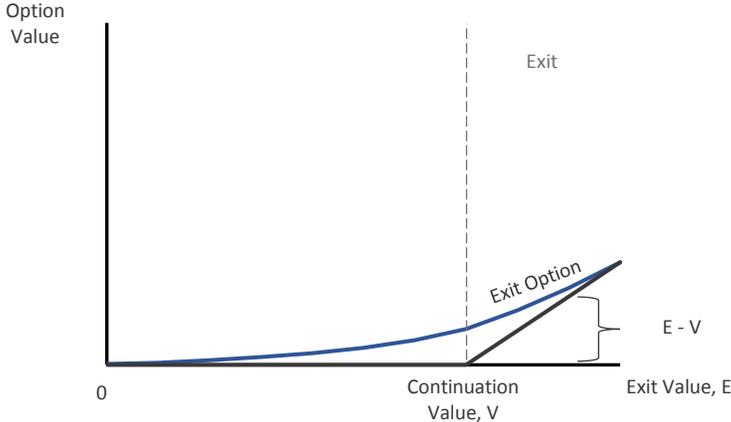
Follow-on options are targeted based on several company conditions, which jointly determine the growth option value.

Stage 3: Exit the Investment

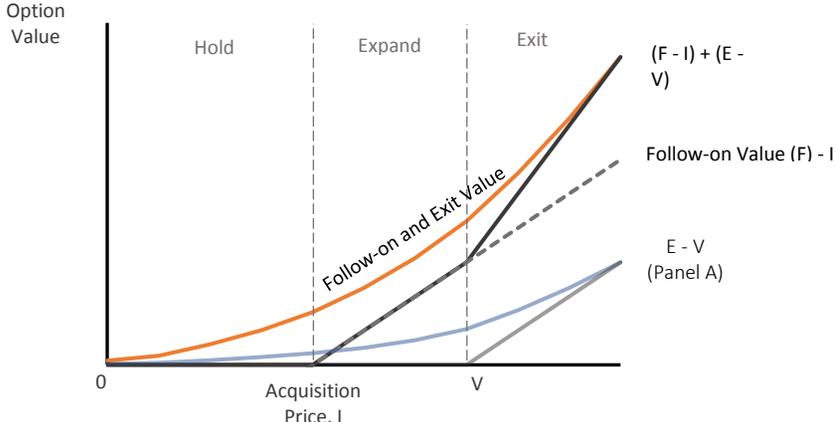
Exit or merger as the business has been built to the desired level. The exit option will be exercised if the resolution of uncertainty in the market increases the exit value more than the continuation value.

Figure 2: Embedded Options in a Buy-and-Build Strategy

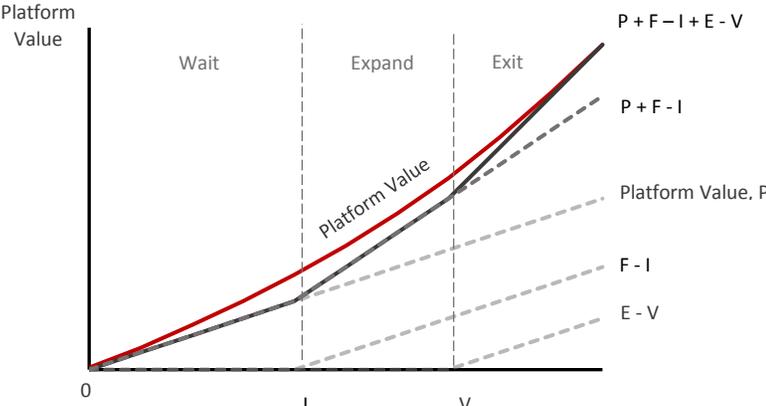
Panel A: Stage 3 - Exit Option



Panel B: Stage 2 - Follow-on and Exit Option



Panel C: Stage 1 - Platform with Portfolio of Follow-on and Exit option



Panel D: Stage 1 - Platform with Different Levels of Available Follow-ons

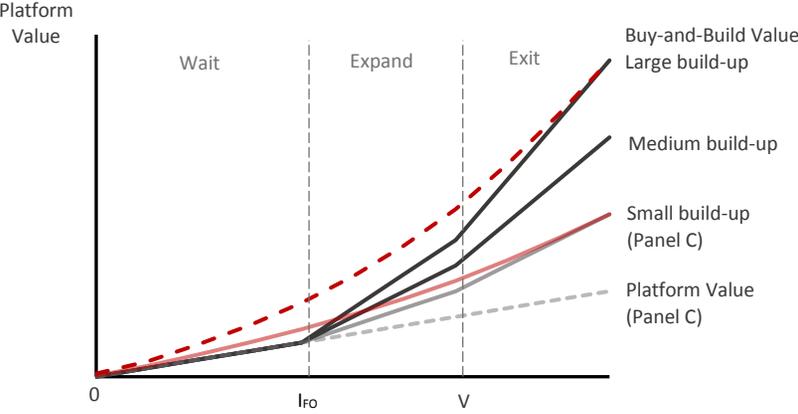


Figure 3: Number of Deals and Resolution of Uncertainty

This figure plots the yearly number of buy-and-build deals (left y-axis) in the “Support Services” industry (ICB code 2790) and the corresponding FTSE350 Sector Index value (right y-axis) to illustrate the relation between the resolution of valuation uncertainty and the exercising of acquisition options in buy-and-build strategies.

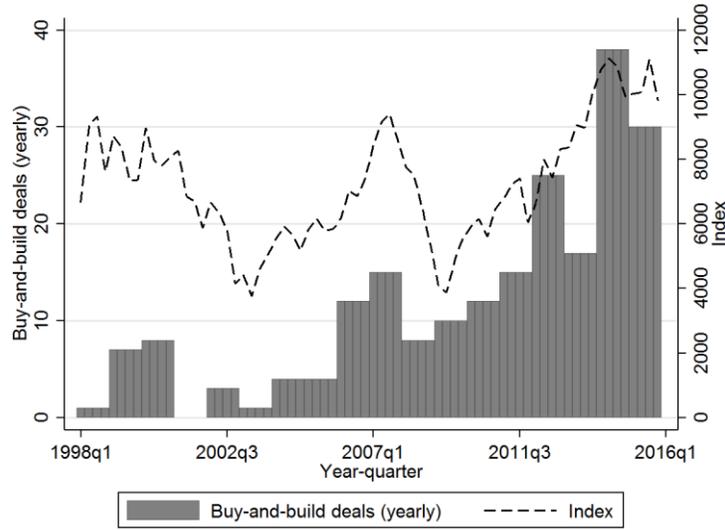


Figure 4: Number of Deals and Debt Market Conditions

This figure plots the number of buy-and-build deals over time in the UK (left y-axis), and the spread (EU high-yield rate minus LIBOR) and LIBOR (right y-axis) to illustrate the relation between debt market conditions and the execution of buy-and-build deals.

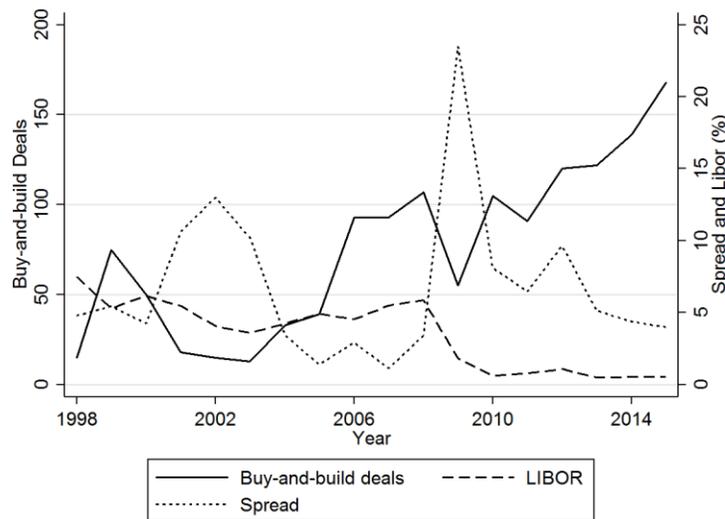


Table 1: Descriptive Statistics - Industry Level

This table presents the descriptive statistics of the level of fragmentation (Herfindahl measures), market volatility, combined market shares of the top 10 and of the bottom 50 industry players, the total market size of the industry, and the yearly growth in sales of the industry for the industry sample. The table is split by type of industry. Panel A presents the summary statistics of regular industries (in which no buy-and-build deal was completed during the sample). Panel B presents the summary statistics of buy-and-build industries. The variable 'Growth Market' is winsorized at a 10% and 90% level.

	Observations	Mean	Std. Dev.	Median	Min	Max
<i>Panel A: Regular Industries</i>						
Inv. Herfindahl	2,904	10.56	24.90	4.93	1.00	682.82
Inv. Herfindahl Top	2,904	58.09	312.61	11.29	1.00	8984.30
Inv. Herfindahl Bottom	2,904	11.59	24.19	5.33	1.00	557.69
Market Volatility	2,067	2.65	16.42	0.17	0.00	341.52
Top 10 (%)	2,336	68.95	20.42	72.90	15.48	99.77
Bottom 50 (%)	2,854	3.58	5.39	1.35	0.00	44.51
Market Size (\$millions)	2,904	14.08	61.65	1.04	0.00	885.03
Growth Market (%)	2,485	8.72	24.21	5.39	-24.26	56.04
<i>Panel B: Buy-and-Build Industries</i>						
Inv. Herfindahl	1,344	21.03	24.91	11.95	1.00	187.64
Inv. Herfindahl Top	1,344	170.40	392.07	60.59	1.00	6939.90
Inv. Herfindahl Bottom	1,344	25.91	33.43	14.05	1.00	341.97
Market Volatility	960	2.53	6.90	0.76	0.00	105.22
Top 10 (%)	1,320	76.07	17.02	80.40	16.45	99.60
Bottom 50 (%)	1,343	2.55	3.40	1.03	0.01	28.49
Market Size (\$millions)	1,344	20.13	46.89	6.58	0.00	512.38
Growth Market (%)	1,152	8.20	21.01	5.62	-24.26	56.04

Table 2: Descriptive Statistics - Company Level

This table presents the descriptive statistics on the operating revenue, net income, costs of goods sold, return on sales, asset turnover, return on assets, and costs of goods sold ratio for the company sample. The table is split by type of company. Panel A presents the summary statistics of regular companies (not involved in a buy-and-build transaction). Panel B and C presents the summary statistics of respectively platform and follow-on companies. All variables are winsorized at a 1% and 99% level.

	Observations	Mean	Std. Dev.	Median	Min	Max
<i>Panel A: Regular</i>						
Operating Revenue (\$millions)	64,377	24.10	67.28	2.37	0.00	446.62
Net Income (\$millions)	64,377	0.83	4.72	0.05	-10.80	35.53
Cost of Goods Sold (%)	64,377	18.53	59.36	1.09	0.00	444.96
Return on Sales (%)	64,377	-0.06	0.89	0.04	-8.23	1.53
Asset Turnover (%)	64,377	0.11	0.71	0.05	-3.85	3.60
Return on Assets (%)	64,377	2.67	3.73	1.72	0.00	29.50
COGS Ratio (%)	64,377	0.57	0.34	0.60	0.00	2.00
<i>Panel B: Platforms</i>						
Operating Revenue (\$millions)	40	84.22	116.79	32.20	1.44	446.62
Net Income (\$millions)	40	4.66	10.01	1.77	-10.09	35.53
Cost of Goods Sold	40	59.92	102.01	17.23	0.82	444.96
Return on Sales (%)	40	-0.10	1.13	0.06	-7.02	0.42
Asset Turnover (%)	40	0.08	0.12	0.09	-0.29	0.31
Return on Assets (%)	40	1.34	0.95	1.13	0.01	4.23
COGS Ratio (%)	40	0.59	0.18	0.58	0.16	0.94
<i>Panel C: Follow-ons</i>						
Operating Revenue (\$millions)	72	37.72	79.64	14.60	1.02	446.62
Net Income (\$millions)	72	0.78	4.17	0.53	-10.80	14.44
Cost of Goods Sold	72	29.83	77.35	9.22	0.07	444.96
Return on Sales (%)	72	-0.02	0.41	0.04	-2.49	0.50
Asset Turnover (%)	72	0.00	0.49	0.08	-2.66	0.60
Return on Assets (%)	72	2.29	2.37	1.56	0.12	17.82
COGS Ratio (%)	72	0.60	0.23	0.65	0.06	0.96

Table 3: Industry Conditions

This table shows the regression results of the probability of a buy-and-build deal occurring in an industry on fragmentation (Herfindahl) and market volatility. In specifications 1 and 2 (Panel A), we run a linear probability model (LPM) in which the dependent variable is a dummy indicating whether a buy-and-build deal has been completed in a particular industry. In specifications 3-5, (Panel B), we run a similar analysis, but with two other fragmentation measures (Herfindahl Top and Bottom) In specifications 6-8, we run ordinary least squares (OLS), in which the dependent variable is the natural logarithm of the number of completed buy-and-build deals plus one in industry i at time period t . In Panel A, we measure fragmentation using a standard Hirschman Herfindahl Index, using all companies in an industry. In Panel B, we calculate the fragmentation among the bottom 50% smallest companies (Herfindahl Bottom) and among the top 10% largest companies (Herfindahl Top) separately. The Herfindahl measures in these regressions are inverted to measure fragmentation instead of consolidation. The market volatility is calculated as a 3-year moving window of the industry sales volatility. All regressions include year fixed effects and variables are lagged by one period. T-statistics are provided in the parentheses below the parameters and are computed using standard errors clustered on a four-digit NACE level. ***, **, *, stand for a 1%, 5%, and 10% significance level, respectively.

<i>Panel A: Standard Hirschman Herfindahl Index</i>		
	Buy-and-Build (Always)	
	(1)	(2)
	LPM	LPM
Inv. Herfindahl (ln)	0.130*** (7.09)	0.096*** (4.78)
Market Volatility		-0.003*** (-3.09)
Top 10 (ln)	0.393*** (6.80)	0.298*** (4.81)
Bottom 50 (ln)	0.023 (1.51)	0.042** (2.53)
Market Growth (%)		-0.000 (-0.29)
Market Size (ln)		0.061*** (5.86)
Year FE	YES	YES
Observations	3,143	2,643
BB observations	945	945
R-Squared	0.121	0.171
F-Statistic	36.22	27.42

Table 3: - continued

<i>Panel B: Top and Bottom Hirschman Herfindahl Indices</i>						
	Buy-and-Build Industry (Always)			ln(Number of BB Deals +1)		
	(3)	(4)	(5)	(6)	(7)	(8)
	LPM	LPM	LPM	OLS	OLS	OLS
Inv. Herfindahl Bottom (ln)	0.097*** (5.05)		0.019 (0.70)	0.060*** (4.45)		0.024* (1.69)
Inv. Herfindahl Top (ln)		0.108*** (6.30)	0.095*** (3.93)		0.060*** (4.96)	0.044*** (3.48)
Market Volatility	-0.003*** (-3.18)	-0.003** (-2.52)	-0.003** (-2.54)	-0.001*** (-2.61)	-0.001** (-2.01)	-0.001** (-2.05)
Top 10 (ln)	0.254*** (4.09)	0.055 (0.81)	0.074 (1.05)	0.093*** (3.98)	-0.016 (-0.57)	0.009 (0.33)
Bottom 50 (ln)	0.043*** (2.64)	0.020 (1.21)	0.021 (1.22)	-0.003 (-0.49)	-0.014* (-1.78)	-0.014* (-1.77)
Market Growth (%)	-0.000 (-0.31)	0.000 (0.00)	-0.000 (-0.05)	-0.000 (-0.16)	0.000 (0.17)	0.000 (0.06)
Market Size (ln)	0.060*** (5.82)	0.041*** (3.59)	0.041*** (3.65)	0.014*** (3.47)	0.005 (1.16)	0.006 (1.36)
Year FE	YES	YES	YES	YES	YES	YES
Observations	2,643	2,643	2,643	2,643	2,643	2,643
BB observations	945	945	945	455	455	455
R-Squared	0.174	0.194	0.195	0.075	0.083	0.085
F-Statistic	27.76	28.16	24.60	9.673	10.34	8.950

Table 4: Company Conditions

This table shows the results from the linear probability models of the probability of being buy-and-build targets on operating revenue, return on sales, return on assets, asset turnover, and cost of goods sold ratio. In specification (1) the dependent variable is a dummy indicating whether a company was bought as either a platform or a follow-on. Specification (2) and (3) are linear probability models in which the dependent variable is a dummy indicator for respectively platform and follow-on companies. Variables are lagged by one period. All regressions include year and industry fixed effects. T-statistics are provided in the brackets. Standard errors are clustered on a NACE 4-digit level. ***, **, * stand for a 1%, 5%, and 10% significance level, respectively.

	BB	Platform	Follow-on
	(1)	(2)	(3)
	LPM	LPM	LPM
Operating Revenue (ln)	0.001*** (3.27)	0.000*** (3.23)	0.000*** (2.93)
Return on Sales	-0.000* (-1.77)	-0.000 (-1.31)	-0.000** (-2.08)
Return on Assets	-0.000 (-0.07)	0.000 (1.22)	-0.000 (-1.16)
Asset Turnover	-0.000 (-1.43)	-0.000*** (-2.79)	-0.000 (-0.59)
Cost of Goods Sold Ratio	-0.001*** (-2.98)	-0.000** (-2.02)	-0.001** (-2.03)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Observations	64,489	64,489	64,489
BB observations	112	40	72
R-Squared	0.008	0.006	0.008
F-test	6.778	4.199	1.587

Table 5: Financing Conditions

This table shows the results from panel data OLS regressions, in which the dependent variable is the natural logarithm of the total number of buy-and-build deals plus one in a FTSE350 Sector. All regressions include FTSE350 Sector fixed effects. Variables are lagged for one period. T-statistics are provided in brackets. Standard errors are clustered on a FTSE350 Sector level. ***, **, *, stand for a 1%, 5%, and 10% significance level, respectively

	ln(number of BB deals + 1)			
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Index (ln)	0.120*** (3.30)	0.070** (2.52)	0.065** (2.40)	0.061** (2.41)
LIBOR		-0.010*** (-3.79)	-0.007*** (-3.51)	-0.009*** (-3.84)
Spread (High Yield - Libor)		-0.029*** (-2.92)	-0.032*** (-2.91)	-0.031*** (-2.83)
Exchange Rate			0.146* (1.91)	0.127* (1.71)
Inflation			0.005 (0.62)	0.002 (0.20)
GDP growth				-2.316** (-2.49)
Industry FE	Yes	Yes	Yes	Yes
Observations	2,550	2,550	2,550	2,517
R-Squared	0.025	0.057	0.060	0.060
F-Statistic	10.88	6.641	4.472	3.786

Appendix: Binomial Option Model for Portfolio of Buy-and-Build Options

The Value of the Mature Company

In this section, we set up a valuation model for the staged acquisition decisions in a buy-and-build strategy. We follow Cox, Ross, and Rubenstein (1979) and assume that the underlying asset follows a lognormal process. We model the investment decisions in discrete time by a multiplicative binomial process. The underlying asset is the value of the mature firm (V), which depends on the size of the build-up and is a combination of the platform and follow-on acquisitions. The mature firm value, following a random walk with standard deviation σ_V over time t , and can move up with a binomial factor u and down with a factor d :

$$\Delta V = V_t \sigma_V \sqrt{\Delta t}, \quad (\text{A1})$$

$$u = \exp^{\sigma_V \sqrt{\Delta t}}, \quad d = \frac{1}{u} \quad (\text{A2, A3})$$

$$p = \frac{(1 + rf) - d}{(u - d)}, \quad (\text{A4})$$

where p is the risk neutral probability, and rf is the risk-free interest rate.

To value the portfolio of options, we start at the end of the event tree and work backwards in time to each decision node.

The Option to Exit

At the end of the investment horizon, i.e. the lifetime of the fund, the private equity investor has the option to exit the investment depending on whether the exit value (E) is higher than the continuation value of the mature firm (V). The exit value also follows a random walk, however its volatility is higher than the volatility of the continuation value of the firm.

$$\Delta E = E_t \sigma_E \sqrt{\Delta t}, \quad (\text{A5})$$

With:

$$\sigma_E > \sigma_V \quad (\text{A6})$$

The exit option can be written as an exchange option, in which the mature firm value is exchanged for the exit value that can be obtained by selling it to a strategic buyer or on the public market. The

exchange option has an exercise price of 1, the private equity investor will only decide to exercise the option at maturity (T) if the exit value is higher than the mature firm value. Alternatively, we assume that the firm can hold the asset indefinitely or that it can sell it to a secondary financial buyer against the mature firm value. We calculate the incremental exit option value for each separate acquisition. The mature firm consists of equally sized acquisitions. Using Equation A1 and A5, we can write the incremental exit option value at maturity as follows:³⁷

$$E_T^* = \frac{1}{n} \text{Max} \left[\frac{E_T}{V_T} - 1, 0 \right], \quad (\text{A7})$$

where E_T^* is the incremental exit option value at maturity of, and n is the maximum number of acquisitions (platform and follow-ons) that the investor could have acquired.

The Option to Invest in a Follow-on

In each period, during the build-up phase, the private equity investors may decide whether to invest in follow-on acquisitions (conditional on having invested in a platform). To acquire a follow-on (i.e. to exercise) the investor must pay the acquisition price (I_F) equal to the standalone value of the follow-on plus an acquisition premium. At one period before maturity ($t = T-1$), the investor receives the value of the follow-on company ($\frac{1}{n}V_{T-1}$), which is the standalone value of the follow-on including synergies, plus the risk neutral expectation of the incremental exit option value ($\frac{pE_T^+ + (1-p)E_T^-}{(1+rf)}$). The value of the follow-on option, expressed as an exchange option in a one period model, at $t = T-1$, therefore equals:

$$F_{T-1}^* = \text{Max} \left[\frac{\left(\frac{1}{n}V_{T-1} \right) + \left(\frac{pE_T^+ + (1-p)E_T^-}{(1+rf)} \right)}{I_{F,T-1}} - 1, 0 \right] \quad (\text{A8})$$

The values of follow-on options for earlier periods in a multiple period model, can be calculated using the following generalized equation, where the follow-op option value (F) is now state dependent on t and j :

³⁷ We could use the Magrabe Formula to calculate the volatility of the exchange option as a combination of volatilities of the individual components: $\sigma_{EO} = \sqrt{(\sigma_V^2 + \sigma_E^2 - 2\rho_{VE}\sigma_V\sigma_E)}$

$$\begin{array}{c}
\text{Standalone value including} \\
\text{synergies}
\end{array}
\quad
\begin{array}{c}
\text{Risk neutral expectation of} \\
\text{incremental exit option value}
\end{array}$$

$$F_{t,j}^* = \text{Max} \left[\frac{\left(\frac{1}{n} V_{t,j} \right) + \sum_{j=0}^k \left(\frac{\binom{k}{j} p^j (1-p)^{k-j} \text{Max}[u^j d^{k-j} E_{T,j}^*]}{(1+rf)^{T-t}} \right)}{I_{F,t,j}} - 1, 0 \right] \quad (\text{A9})$$

for t = 1, 2, ..., T - 1

where j and $(k-j)$ are respectively the number of upwards and downwards jumps the underlying asset will make during k steps, and k is the number of periods until maturity.

Platform Investment and the Value of the Portfolio of Options

Now we can consider the moment at which the investor makes the decision to acquire a platform plus the portfolio of options. The number of follow-on acquisition options exercised depends on the path and the value of the platform follows from our discussion in Section 1.2 and Equation 1:

Platform Value = (Standalone) Value of Assets + Growth Options Value of Synergistic Follow-on and Exit Opportunities

In our model, we can write this down as a part of the mature firm value $\left(\frac{1}{n}V\right)$ and the expected growth option value ($F_{t=0}^{**}$). The platform value (at $t=0$) is therefore:

$$P = \left(\frac{1}{n}V\right) + GOV_{t=0}^* \quad (\text{A10})$$

We can estimate the growth option value, which is the current follow-on option value to the consolidator including expected future follow-on acquisition options and exit opportunities discounted at the risk neutral rate. There are no expected future follow-on acquisitions for $t = T-2$, and therefore the growth option value is only the current follow-on option value:

$$GOV_{T-1}^* = F_{T-1}^* \quad (\text{A11})$$

For period $t = T-2$ (and earlier periods of the build-up phase) it equals:

$$GOV_{T-2}^* = F_{T-2}^* + \left(\frac{p F_{T-1}^+ + (1-p) F_{T-1}^-}{(1+rf)} \right) \quad (\text{A12})$$

The platform will be acquired, i.e. the buy-and-build strategy will be initiated, if the standalone value of the platform plus the value of the portfolio of options is worth more than the acquisition price (I_p) of the platform.