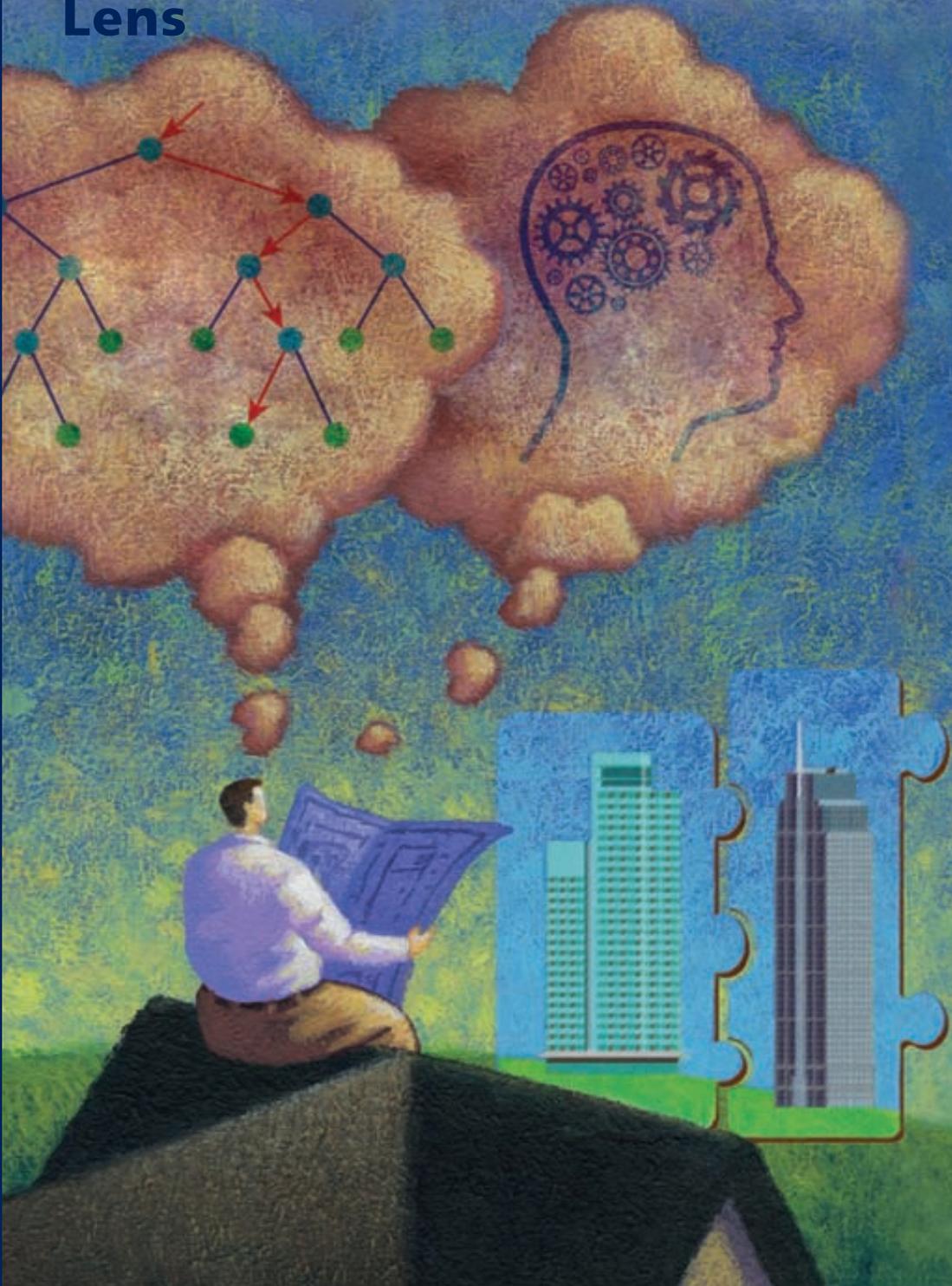


JORIS KIL

# Acquisitions Through a Behavioral and Real Options Lens



# Acquisitions Through a Behavioral and Real Options Lens



# **Acquisitions Through a Behavioral and Real Options Lens**

Acquisities door een gedragseconomische en reële optie lens

## **THESIS**

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*In memory of my grandfather,  
who unfortunately never knew about this choice*

# Voorwoord (Preface)

*An investment in knowledge pays the best interest*  
Benjamin Franklin (1706-1790)

This thesis concludes four years in which I have been privileged to be in a position to follow and deepen my own interests academically and travel the world attending numerous conferences while meeting interesting people. All this started when I first came in contact with the field of behavioral economics and finance almost 5 years ago, during the process of writing my master thesis. The introduction of psychology in corporate decision-making appealed to me as it considers a more “human” approach to economic decision-making, and provided me with a better understanding of my own decision-making, and its inherent flaws. As I got acquainted with the behavioral economics literature while writing my master thesis, I only touched upon a small part of this vastly interesting area in economics, and I felt eager to spend some more time gaining a better understanding of this particular research stream. This newfound interest eventually resulted in me applying for a PhD position at the Erasmus School of Economics. Looking back, I feel very privileged to have had the opportunity to follow and deepen my own interests and discover the many different aspects that exist within the behavioral finance field.

My journey into academia, of which this thesis is the result, could not have started with the initial support and belief from my then master thesis supervisor, and now promotor, Prof. Han Smit. Han, your ability to conduct practically relevant academic research was and still is a great inspiration, and you have provided me with great insights in structuring papers and creating novel research ideas. Also, your trust in me by placing me in front of a class of eager master students in the second year of my PhD is something I’m very grateful for, as it has provided additional value to the PhD track besides the research. When students interested in pursuing a PhD ask me what it takes to successfully make it through the 4 years, I always say “an interesting research area and a good bond with your promotor”. I feel fortunate to meet both these criteria, and the freedom and trust you gave me combined with the expertise you provided at difficult times is something I’m sincerely thankful for.

I’m also indebted to the other members of my doctoral committee, Dr. Tony Tong, Prof. Taco Reus and Prof. Patrick Verwijmeren. Tony, over the years we frequently met at conferences, and I greatly enjoyed my visit to you in Boulder, Colorado in December 2012. As one of the most respected real options management scholars, the time you made available for me and my papers over the years propelled my research to new levels, and I look back with great pleasure to our numerous encounters and meetings sharing insights

into academic life, publication processes and other interesting matters. Taco, although we met just recently, I hope our shared interest in acquisition and psychology research can be the subject of many more discussions in the future. Patrick, although we haven't been colleagues for long, your kind and accessible personality and impressive research skills have made our meetings enlightening, and I'm particularly thankful that you were willing to act as the secretary of this committee. Tony, Taco and Patrick, I thank you all for your help in providing your expert opinion on my work and hope to remain in close contact.

I would also like to thank Prof. Ian Macmillan, who has served as a wonderful host during my visit at the Wharton School in the fall of 2012. Mac, your insights and experience, both scientific and practical, were of unquantifiable value in providing new insights and advancing my research. I'm every grateful for the time you devoted to helping me with my research. Also, thanks to the other people at Wharton, Jim Thompson, Roz Cohen, Jackie Vrettos and Muriel Whiteside who made this visit an unforgettable and pleasant experience.

Also, I like to give a special thanks to Elie Matta. Elie, especially in the early years of my PhD you have provided me with insights into the strategy and management field and shown me what it takes to conduct high-quality research, while always amazing me with your knowledge of the literature. I look back with great pleasure on the many talks, lunches and meetings we had, discussing research, but also other, perhaps more important things. I thank you for the guidance and insights you provided, as without them I would probably have not been able to finish this thesis, and I look forward to finishing and submitting our joint paper.

As most of PhD life takes place on the university, I would like to thank all the people who made this work environment so pleasant. Thanks to all my colleagues at the finance department for helping me with research and educational matters in one way or the other and special thanks to the department chair, Prof. Willem Verschoor, for providing me with the opportunity to remain employed at the finance department after my defense. The people who I probably saw most on a day-to-day basis, my roommates, Yuri, Twan and Charlie (Erasmus), and Emanuel and Simon (Wharton), thanks for sharing laughs and discussing so many "important" subjects. Sebastian, Mariano, Ivana and Manuel; the first two (and Yuri) for talking me into the PhD council and the last two for making it a worthwhile experience. The ESE PhD's Saskia, Yun, Tiantian, Wim, Jairo and Justin for helping me co-read the numerous theses I supervised and the RSM PhD's Ruben, Manuel, Teodor, Teng, Pooyan, Dominik and Dimitrios for all the drinks and seminars we attended.

In my opinion the most important people in any large organization are the support staff and secretaries. I would like to state a special word of appreciation and thanks to Miho, Marisa and Tineke from the ERIM office, and Barbara, Trudy, Helene, Betty, Shirley, Kim, and Cia from the business economics department for all the help over the years. You're amazing!

Finally, I want to thank the people closest to me; my friends and family. I won't even try to name everyone individually, but thank you all for all your support and interest in my research and for providing me with much needed distractions and great memories over the years!

My last memory of my grandfather was just after Christmas 2008. I just graduated, was on my way to Rome and I was contemplating on going into business or starting my PhD. His final words before he left were "I'm curious on what you'll decide". He past away a week later. Irrespective of my choice I know he would have been supportive but I think he preferred the choice I eventually made. Opa, I dedicate this thesis to you.

Joris Kil  
Rotterdam  
August, 2013

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# Chapter 1: Introduction

## 1.1 Acquisitions, Real Options and Behavioral Economics

Acquisitions are a frequently used tool for corporations to grow or obtain access to new technologies, geographies and customer segments. The largely procyclical nature of acquisition activity shows acquisitions occur in wave-like patterns in line with economic growth (Mitchell and Mulherin, 1996). Figure 1.1 shows the total number of completed deals per year over the last decade, clearly illustrating the wave-like pattern in the early 2000s. Following current economic conditions, the 2008 financial crisis had a severe impact on acquisition activity worldwide, causing a halt to the acquisition wave that started in 2002. This picture becomes even clearer when considering the money spend on acquisitions in figure 1.2. Despite the worsening economic conditions acquisition activity in 2012 still totaled \$1.9 trillion. While a far cry from the peak in 2007, totaling \$3.8 trillion, acquisition activity seems to be on the rise again, especially in countries with positive economic forecasts and the emerging markets. Given the large cash reserves firms are currently holding in wake of the financial crisis, a new acquisition wave is bound to start, especially once the economic conditions settle again.

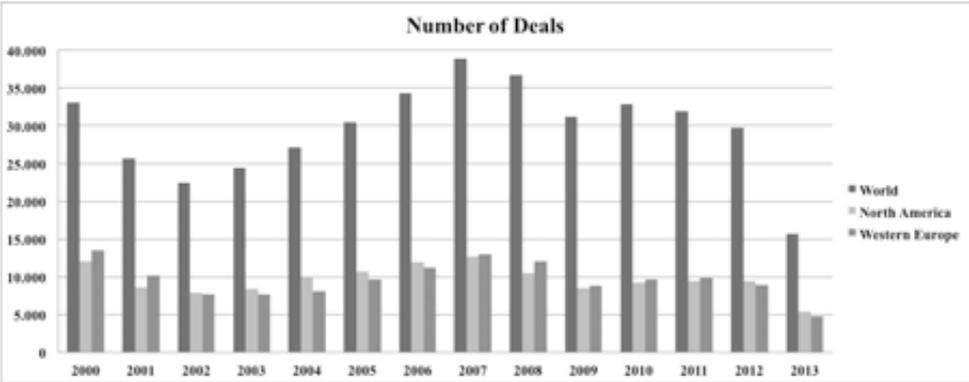
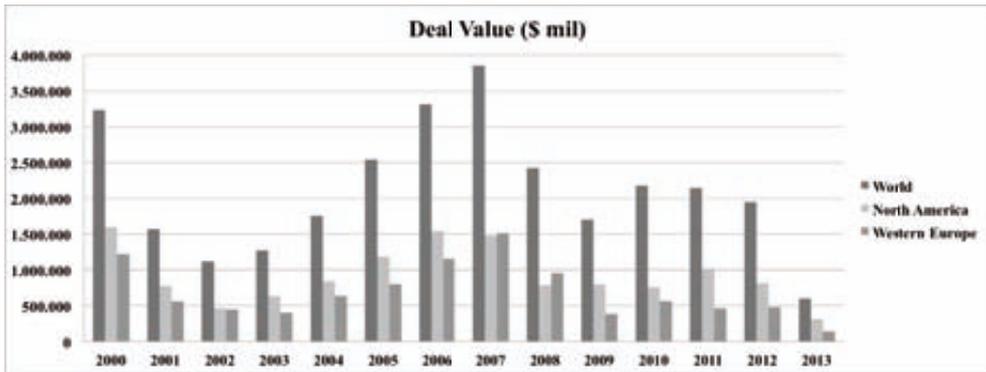


Figure 1.1: Number of completed acquisitions from 2000 until September 2013. Source: Thompson One Banker.



**Figure 1.2:** Deal value of completed acquisitions from 2000 until September 2013. Source: Thompson One Banker.

The neoclassical economic rationale to acquire follows from the idea that there lies added value, or synergies, in a combination of parts compared to the parts held in isolation. In this view, value-creation follows primarily from efficiency gains, like economies of scale and scope. Also, increases in market share, obtaining a competitive advantage (either by growth or through limiting competitors' options), gaining a foothold in a new region or replacing inefficient management can be sources of value-creation in acquisitions (Trautwein, 1990; Andrade, Mitchell and Stafford, 2001; Halebian et al., 2009).

Despite their widespread occurrence and apparent sources of value creation, the gains from acquisitions are not as straightforward as would be expected. Using shareholder value as a measure of acquisition performance, studies have shown that on average acquisitions destroy shareholder value for the acquirer (Jensen and Ruback, 1983; Weidenbaum and Vogt, 1987) and most of the value flows to the target shareholders (see Datta, Pinches and Narayanan (1992) and Bruner (2002) for reviews of research on shareholder returns in acquisitions)<sup>1</sup>. Explanations for undertaking value destroying acquisitions have focused on the executive level suggesting empire building and agency problems as well as behavioral factors like hubris and overconfidence to play a role (Roll, 1986; Malmendier and Tate, 2005ab).

In line with the executive level focus, acquisition premiums have received attention as they offer a clear observable output of executive bidding behavior and managerial forecasts of the perceived value creation in a deal (Aktas, de Bodt and Roll, 2011). Also, acquisition premiums provide insights into the transfer of benefits between acquirer and target shareholders. Establishing the size of the premium poses an interesting tradeoff as a high premium creates bigger chances for successfully appropriating the target

<sup>1</sup> Research on the moderating variables on acquisition performance has differentiated between types of deal, showing value creation is more apparent in domestic deals (Seth, Song and Pettit, 2002; Moeller, Schlingemann and Stulz, 2005), those involving private targets (Capron and Shen, 2007), or those of related firms (Singh and Montgomery, 1987).

yet decreases the eventual returns from the deal. Overstated and excessive premiums, for instance due to information asymmetry between target-acquirer fit or behavioral factors like hubris, empire building, overconfidence and overoptimistic growth perceptions (Roll, 1986; Malmendier and Tate, 2005ab), will lead to value destruction by the acquirer. Overall, acquisition premiums are useful in explaining and predicting acquisition outcomes.

With their widespread occurrence, high visibility in the business media and countering results, acquisitions serve as fruitful research ground and remain one of the most researched corporate decisions, with over 2,687 acquisition related publications in the last decade<sup>2</sup>. This vast research has increased our understanding of acquisitions by considering value creation (Moeller et al., 2005), prices paid (Diaz Diaz, Azofra and Gutierrez, 2009), post-merger integration (Datta, 1991), and timing of acquisitions (Morck, Shleifer and Vishny, 1990; Schleifer and Vishny, 2003; van Bekkum, Smit and Pennings, 2011). However, judging from the differing results and lack of coherence between studies, there still remain a lot of unexplained and unanswered elements within the acquisition process. This thesis provides new insights into acquisitions, and the prices or acquisition premiums paid in particular, by considering two highly influential economic perspectives: real option theory and behavioral theory.

Real option theory was founded in the late 1970s, when academics started to consider the shortcomings of traditional valuation methods, like discounted cash flow analysis, with respect to the inconsideration of the (potential) changes in the economic environment when making investment decisions. Based on the Nobel Price winning Black-Scholes model to value stock options, real option theory considers option elements in capital budgeting decisions. The influence of uncertainty on corporate investment decisions is pivotal to real options, and the theory shows how to account and deal with investment situations characterized by uncertainty on the potential outcomes, when there is option value to defer the investment until part of this uncertainty has resolved. Contrary to traditional valuation methods, real option theory provides an analytical decision structure that deals with uncertainty in an appropriate manner (Dixit and Pindyck, 1994; Trigeorgis, 1996). Real option theory acknowledges and values future uncertainty and places a premium on flexibility in design and execution of corporate strategy. Through objective exercise points or threshold values, timing of investment decisions is optimized depending on the evolution of uncertainty. As real option theory combines financial assessment of investment opportunities with a descriptive framework that aids decision-making under uncertainty, the field attracted attention in both the strategy and finance literature. While the finance literature provides quantitative models for strategic decisions (Lambrecht, 2004; Lambrecht and Myers, 2007; Toxvaerd, 2008), the strategy literature provides insights into the specific situations and necessary requirements in which the real option

---

<sup>2</sup> Number of scientific articles returned when searching for “acquisitions” in business related publications in JSTOR.

methodology can be applied (McGrath, 1997, 1999; Adner and Levinthal, 2004; Miller and Arikian, 2004).

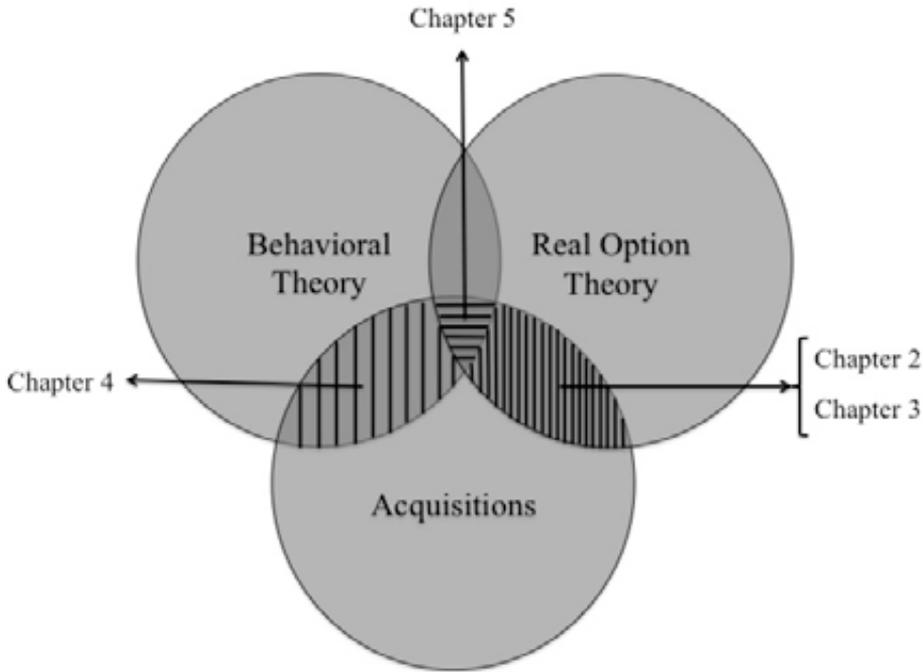
A more recent, and perhaps more fundamental influence on economic theory is the incorporation of psychological elements to account for agents' deviations from (economic) rationality. Fueled by awarding the Nobel Prize in Economics to a psychologist, Daniel Kahneman, in 2002, the finding that in real life people's choices often deviate from economic logic introduced the incorporation of "human" elements in economic models. The field of behavioral economics deals with considering the factors that influence people's economic decisions and how these decisions are actually made, rather than how they (economic) optimally should. Generalization of some of the most frequent occurring pitfalls in decision-making has created awareness of numerous personal level cognitive or behavioral biases (Kahneman and Tversky, 1972, 1973; Tversky and Kahneman, 1974). These general biases have been translated to corporate practice showing executive level decisions are also susceptible to these biases and cognitive shortcomings, negatively impacting corporate performance. Within acquisitions it has been shown that overconfident executives tend to acquire more and pay higher prices for their targets (Malmendier and Tate, 2005a). Also, overconfidence evolves throughout an acquisition program, where a successful first deal fuels overconfidence in subsequent deals (Billett and Qian, 2008).

While both real option theory and behavioral theory have greatly impacted economic and finance research, the research in this thesis aims to extend their application in acquisitions. Traditionally, real option theory has been largely applied in infrastructure or staged investment opportunities and has suffered from claims of lacking practicality when applied to corporate decisions (Busby and Pitts, 1997). Focusing on an acquisition context can highlight the practical relevance as well as extend the domain in which real options have been traditionally considered. The fundamental insights provided by behavioral theory are still tested in different economic situations to update, where applicable, traditional theory to incorporate behavioral elements, as well as offer new explanations to existing problems. Using real option and behavioral theory in an acquisition context will increase our understanding of the potential boundaries and implications of both theories as well as offer additional insights into acquisitions in particular.

## **1.2 Thesis Structure**

The research in this thesis can be broadly divided in two sections: a rational and bounded rationality, or behavioral, view on acquisitions. The first, rational, section assumes acquisitions are undertaken following neoclassical economic motives and combines acquisitions with real option theory showing the effect of different option elements on acquisition premiums. In the second section of this thesis, behavioral factors are

considered to influence acquisition considerations and are used to explain the risk firms take in their acquisitions. The final chapter combines acquisitions, real option theory and behavioral theory and opens a door for future research in this area. Figure 1.3 graphically states the three main theoretical pillars used in this thesis and their consideration in the subsequent chapters.



**Figure 1.3:** Theoretical framework and corresponding chapters of this thesis.

Chapter 2 considers the differences in premiums paid between different types of real options that exist in acquisitions. We compare single and compound options by considering single acquirers versus serial acquirers and find the first group pays lower premiums. This finding is in line with real option theory stating compound options are more valuable than single options as they can incorporate the value of future growth options. Focusing on the nature of the acquisition options it appears that both single and compound shared options (measured by the number of bidders) require higher premiums. In both single and compound proprietary options (measured by the presence of a minority stake) no evidence of lower premiums is found, suggesting proprietary option holders bid more aggressively. Despite this premium indifference the market does react more positive to proprietary compound options, suggesting option nature can be considered a source of value creation.

Chapter 3 considers the serial nature of consolidating acquisitions to explain premiums paid. Based on real option theory, the first acquisition within a sequence can incorporate the future value creation of the serial consolidation strategy, and as such can justify payment of a higher premium. On average serial consolidators pay a 22% higher premium for their first acquisition compared to single consolidators. The serial acquisition intention mitigates the negative effects public acquisitions have on market returns, as the market reacts more favorable to serial than to single consolidators. Although corporate learning does not seem apparent throughout the acquisition sequence, as there is no continuous declining trend in the higher order acquisition premiums, in line with the acquisition strategy's rationale higher order deals show lower premiums compared to the first deal.

Chapter 4 analyzes acquisitions from 1990 to 2010 to identify the influence of reference points on acquisition risk. Using the 52-week stock price high as a reference point we find that, following prospect theory predictions, an acquirer's deviation from the reference point (i.e. position in the loss space) influences acquisition risk measured as relative deal size. On the market level the influence of the reference point is dependent on the method of payment used in the acquisition. Finally, we extend prospect theory by introducing a temporal dimension, and find acquirer risk-taking increases in time since the reference point occurred for cash paid deals, while the opposite occurs in stock paid deals. These findings show firms optimally choose their method of payment in light of their position compared to the 52-week high.

Chapter 5 considers the influence of behavioral elements on decision-makers' perception of uncertainty and the implications for real option based acquisition considerations. Behavioral theory suggests behavioral biases can cause a disparity between perceived and actual uncertainty in the distribution of potential acquisition outcomes. Contrary to staging investments in situations of uncertainty as prescribed by real option theory, behavioral induced uncertainty neglect will lead to inconsideration of a sequential investment strategy. The two views of decision-making under uncertainty are integrated and new propositions are developed to specify the influence of behavioral induced uncertainty neglect on real options, specifically in acquisition decisions. Combining behavioral theory and real option theory provides an alternative explanation for the normative - empirical observed inconsistency in acquisitions, which is labeled the "minority stake paradox".

Finally, chapter 6 states the main conclusions as well as shortcomings and managerial implications of the research presented in this thesis.

# Section I: Rational Acquisitions



## Chapter 2: Real Options in Acquisitions: Effects of Acquisition Type and Competition on Premiums<sup>3</sup>

*This chapter considers the differences in premiums paid between different types of real options that appear in acquisitions. We compare simple and compound options by considering single vs. serial acquirers and find that acquirers in the first group pay lower premiums. This finding is in line with real options theory that considers compound options more valuable than simple options as they can incorporate the value of future growth options. Focusing on the nature of the acquisition options involved, it appears that both simple and compound shared options (measured by the number of bidders) command higher premiums. There is no evidence of lower premiums in either simple or compound proprietary options (as measured by the presence of a minority stake), suggesting proprietary option holders bid more aggressively. Despite this lack of difference in premiums, the market does react more positive to proprietary compound acquisition options, suggesting option nature can be considered a source of value creation.*

---

<sup>3</sup> This chapter is based on Kil and Smit (2013a). This research benefitted greatly from suggestions by Tony Tong, Jon Morgan from Paraphrase and attendants from the 2013 Academy of Management annual meeting.

## 2.1 Introduction

As firms face increasingly uncertain futures, the search for growth will force them to evaluate increasingly uncertain projects (van Putten and McMillan, 2004). Real option reasoning and valuation can deal with the strategic challenges of growth opportunities by linking current actions to uncertain future opportunities. In contrast to traditional valuation methods, the real options approach considers the dynamic nature of the business environment and its potential influence on investment decisions. Real options are particularly valuable in situations of high uncertainty, when deferring investment decreases the chance of losses and adds flexibility to the firm's resource commitments (Anderson, 2000). By modeling uncertainty, real options improve management's ability to capitalize on favorable investments and to respond effectively to unexpected or undesirable developments (Smit and Trigeorgis, 2004).

This chapter considers acquisition opportunities as real options and provides insight into the premiums paid for different types of acquisition options. More specifically, this chapter investigates to what extent competitive pressures influence the prices paid for two types of acquisition options; simple and compound (Kester 1984, Trigeorgis 1996). Simple acquisition options are undertaken for immediate synergetic gains, or to obtain a specific technology or capability that the acquirer does not want to develop in-house and can be easily added to the existing resource base. For instance the acquisition of Boxee, a video-streaming and applications designer, by Samsung can be considered a simple acquisition<sup>4</sup>. Compound acquisition options are serial in nature and derive much of their value from the possibility of future add-on acquisitions (Smit and Trigeorgis, 2004). An example of a compound acquisition option series can be found in Colorado based Zayo group, which since 2007 has acquired over 20 firms to become a global bandwidth-infrastructure provider. Both types of acquisition options can either be shared or proprietary in nature, depending on competitive pressures in the bidding environment. Following auction theory, prices in competitive, or shared, bidding situations will be higher than those in situations without such pressures (Bulow and Klemperer, 1996), and lower competitive pressures (i.e. making the option more proprietary) will decrease the final price paid (Bulow, Huang and Klemperer, 1999).

Real options have been considered in acquisitions preceded by minority equity stakes (Folta, 1998; Folta and Miller, 2002; Miller and Folta, 2002), in equity alliances (Reuer and Tong, 2010), greenfield investments (Brouthers and Dikova, 2010) and joint venture formations (Chi, 2000; Reuer and Tong, 2005; Kumar, 2005; Tong, Reuer and Peng, 2008), which include the divestment of unsuccessful collaborations. This chapter

---

<sup>4</sup> Samsung acquired Boxee to "improve overall user experience across Samsung's connected devices". <http://www.bloomberg.com/news/2013-07-03/samsung-acquires-startup-boxee-to-add-connected-tv-set-top-boxes.html>

adds to the existing real options acquisition literature by specifying an option categorization (Kester, 1984; Trigeorgis, 1996) for acquisitions based on different option elements in acquisitions and considering the influence of the level of competition in bidding contests on the premiums paid (Folta and O'Brien, 2004<sup>5</sup>)<sup>6</sup>. The categorization is empirically validated on a large sample of acquisitions to strengthen its practicality. The results show real option elements exist and can be identified in acquisitions, showing the classification is relevant and can be helpful for practitioners in their acquisition considerations. The categorization can assist executives of acquiring companies by helping to identify the type of acquisition they pursue, and providing insight into the influence of option type on the acquisition's value. Categorizing acquisitions based on specific real option characteristics also extends the research on acquisition premiums<sup>7</sup>. Considering premiums in acquisition options is of particular importance, given the negative relationship between the premiums paid for a firm's strategic options and its corporate financial performance (Anderson, 2000).

The findings confirm that there are significant differences in premiums paid depending on the type of acquisition option (simple or compound) and the nature of the option based on the level of competitive pressure (shared or proprietary). There is strong empirical support for the predictions of real option theory when acquisition options are shared, but less obvious results when they are proprietary. But, although the proprietary benefits - in both simple and compound options - might be less directly observed in terms of lower premiums paid, suggesting aggressive bidding, the market's positive reaction to announcements of proprietary compound acquisition options suggests the benefits are apparent on the investor level.

This chapter is structured as follows. The following section provides the theoretical categorization and our proposals about the influence of acquisition option types and competition on acquisition premiums, after which the data and variables used to test the theoretical predictions are discussed. The fourth section presents and discusses the results of the analysis, and finally we elaborate on the broader interpretation of the findings as well as the limitations of the current study.

---

<sup>5</sup> The authors confirm empirically that the non-monotonic relationship between uncertainty and entry is moderated by early mover advantages, which increase the value of growth options at entry.

<sup>6</sup> Although other studies have considered the effect of competition on the timing of option exercise (Kulatilaka and Perotti, 1998; Folta and Miller, 2002), and the prices paid from a theoretical perspective (Smit and Moraitis, 2010ab), this chapter empirically show the consequences of the level of competition in an acquisition context.

<sup>7</sup> As the main idea in this paper departs from real option theory, we don't elaborate on the previous acquisition premium literature, but do refer to the recent contribution in this field by Reuer, Tong and Wu (2012), who provide an overview of prior studies explaining acquisition premiums.

## 2.2 Theory and Hypotheses

### 2.2.1 Acquisitions as real options

Procedures which have traditionally supported investment decisions have been criticized for being static and not considering the levels of uncertainty in the investment environment adequately (Krychowski and Quelin, 2010). Real option theory extends traditional investment decision-making by incorporating environmental uncertainties that influence investment outcomes, and providing insights into the value of deferring them in light of contemporary (market or industry) uncertainties. A real options view considers the notion of staging an investment, where the partial, first stage investment limits the potential loss and provides valuable information about the target's future prospects, aiding the decision about whether and when to commit in the second stage (Bowman and Hurry, 1993; Folta and Miller, 2002; Adner and Levinthal, 2004; Zardkoohi, 2004). The real option methodology does not treat growth-related investments as static scenarios, but can instead be adjusted according to uncertainty. Real options aid investment decision-making by indicating whether to undertake, alter or defer investments depending on the evolution of the external environment and relative to explicit threshold values.

In acquisitions, firms hold the option to defer acquiring (Trigeorgis, 1996), which gets its value from the possibility to postpone the acquisition and avoid the opportunity costs associated with making an irreversible investment (McDonald and Siegel, 1986). Each opportunity to bid for a target can be viewed as an option on the target's company value, with the initial bid as the exercise price and time to maturity equal to the horizon of the acquisition opportunity. This is similar to a call option on the value of synergistic benefits, where the exercise price is the cost of the acquisition (Smit and Moraitis, 2010a). As multiple firms have access to an acquisition option, they all share the option to defer acquiring – but, in reality, firm level differences will influence their ability to appropriate and exercise those acquisition options. For instance, where the sizes and asset bases of firms in the same industry differ considerably, the top-level firms are more likely to hold options on acquiring smaller industry players than vice versa. Differences in firm-specific resources and capabilities shape a firm's acquisition options, making them path dependent, the outcomes of prior investments and decisions that have shaped and developed the firm to its current position (Peteraf, 1993; Teece et al., 1994; Barnett, 2008). These differences in acquisition options will be reflected in higher market values for industry leaders than for smaller or medium-sized competitors (Smit and Moraitis, 2010a).

Acquiring a minority equity stake serves to decrease the shared nature of the option (Folta, 1998; Folta and Miller, 2002). Here, instead of committing the total investment directly (buying the firm outright), the minority stake can restrict downside losses from ill-timed or overpaid acquisitions, as the investment is only fully made when uncertainty about potential synergies has decreased and a more accurate estimate of the payoffs can be made. Minority stakes are valuable when exploring distant domains,

subfields with high growth potential, or in periods of high exogenous uncertainty (Folta, 1998). The small initial investment needed to secure a minority stake not only lowers potential downside risk, but also allows firms to explore multiple opportunities for the cost of a single (full) acquisition (Folta, 1998). In the case of public targets, costs are even further contained as market liquidity allows such stakes to be sold easily<sup>8</sup>.

Considering the real options parameters in acquisitions, the variables of interest are the value of the target ( $V_t$ ) and its associated volatility ( $\sigma$ ), the estimated synergies ( $S$ ) or acquisition payoffs - which together constitute the exercise or bid price ( $B$ ) that can rationally be paid, where  $V_t \leq B \leq V_t + S$ . The time to maturity equals the horizon of the acquisition opportunity, and is influenced by the number of competitors who might potentially bid for the same target. The cost of buying a minority stake can be considered as the option premium<sup>9</sup>, and as a necessary investment prior to making a full bid<sup>10</sup>. The decision to acquire will then represent a trade-off between the option value of waiting - influenced by the level of uncertainty - and the value of synergies from an immediate acquisition.

### 2.2.2 Simple acquisition options

Simple acquisition options are acquisition opportunities whose benefits follow primarily from exploiting synergies or efficiency improvements through layoffs, consolidation and disinvestment (Lambrecht and Myers, 2007). The distinguishing aspect of simple acquisition options is that they provide no potential for synergistic follow-on acquisitions, and are thus considered in isolation (Smit and Trigeorgis, 2004). The simple acquisition option can be considered as analogous to an American call option on a dividend paying stock, with an infinite time to maturity<sup>11</sup>. Synergies missed during deferment - for instance foregone cash flows - act as dividends creating an optimal moment to strike the option before maturity. Since an early investment commitment would sacrifice the value of the option to wait, this lost option value can be considered an additional investment opportunity cost, justifying investment only if the additional value of cash flows due to early exercise exceeds the value of the lost option(s). A threshold value can be estimated, which can be used to discipline the timing of the full acquisition when the profits foregone and costs incurred from exercising before maturity exceed the option value from delaying paying the price of exercising the acquisition option.

<sup>8</sup> Anderson (2000) considers this type of decision as consisting of two option perspectives; the abandonment option relates to the possibility of abandoning the initial investment, while the deferral option relates to subsequent exercise of already developed options.

<sup>9</sup> Integrating this into the equation would result in a discount factor constituting the remaining part of the firm to be acquired (e.g. in the equation, a 20% minority stake would reduce the value of the firm (the remaining cost of the acquisition) to 80%).

<sup>10</sup> The minority stake also provides an exit option, which increases in value with an increase in  $V_t$ . For now, we consider an acquirer who buys a minority stake has the intention of gaining full control of the target in a latter stage, rather than considering the exit option as an investment approach to be sold with a profit.

<sup>11</sup> In contrast with European style options, American options can be exercised before maturity.

### 2.2.3 Compound acquisition options

Certain acquisitions have significant growth option value at the time of the initial deal because they create possibilities of follow-on investments that were previously non-existent. In contrast to simple acquisition options, these multi-stage or compound acquisition options represent the first, and often prerequisite, link in a chain of synergistic investment opportunities, deriving most of their value from the future growth opportunities they open up (Smit and Trigeorgis, 2004). In compound acquisition options, the first acquisition can act as a platform, creating prospective growth opportunities such as increasing market access, strengthening of core capabilities and attaining advantageous strategic positions (Nikoskelainen and Wright, 2007; Smit and Moraitis, 2010a). Compared to simple acquisitions, compound acquisitions look further into the future, where consolidation of entire industries or access to new geographic regions are potential outcomes of the process. Here, an initial acquisition can be regarded as providing an option on future options, where the value depends on uncertain market developments, benefits from consolidation or growth strategies, and the synergistic opportunities of other players (Smit and Trigeorgis, 2004). The platform acquisition<sup>12</sup> can be viewed as providing a call option on the follow-on investment opportunities, with the exercise price equal to the costs of the follow-on target(s), and time to maturity equating to the investment horizon(s). The valuation of a series of parallel compound options is thus more complex, as it may involve a collection of interacting sequential options (Smit and Moraitis, 2010ab).

As compound acquisition options represent an option on future growth options, their value exceeds that of simple acquisition options. The first acquisition will reflect the strategic value of the entire future sequence of potential acquisitions, and so carries a higher (option) value than that of a simple acquisition option. The additional (growth option) value in compound acquisition options will be reflected in the price paid, so that:

*Hypothesis 1: Premiums paid for compound acquisition options are higher than for simple acquisition options.*

### 2.2.4 Shared versus proprietary acquisition options

The presence of rivals and a stochastic exercise price mean that acquisition options are not completely analogous to call options<sup>13</sup>. Competitive forces may severely decrease the value of underlying growth opportunities, and reduce the time-period in which to acquire, as a rival bid could result in the acquisition opportunity being lost, along with its potential

<sup>12</sup> The platform acquisition target should be a respected company to provide a secure foothold for future growth opportunities. It should preferably have a leadership role or some other differentiating, competitive characteristic, which can be successfully leveraged onto further acquisitions (Smit and Trigeorgis, 2004).

<sup>13</sup> When the exercise price is uncertain the acquisition can also be considered as an exchange option (Margrabe, 1978).

growth benefits and synergies (Folta and Miller, 2002). Taking competitors into account will invariably lead acquirers to pay for at least part of the potential synergies and strategic value of the acquisition (via the premium paid) and thus lower the option value. Given this decrease, competitive pressures can make the early exercise of options a rational choice. Alternative factors warranting early option exercise are the level of preemption - for instance, when exercising the option enlarges market power compared to competitors, whether the option is simple or compound, or when learning would be sacrificed by not exercising the option (Kester, 1984; Trigeorgis, 1991; Smit and Ankum, 1993; Miller and Folta, 2002; Folta and Miller, 2002).

A minority stake increases the acquisition option's proprietary nature by creating strategic disincentives and (perhaps insurmountable) entry cost barriers for competitors (Folta, 1998; Miller and Folta, 2002)<sup>14</sup>. Gaining a blocking stake can even result in creating an exclusive call option. Differences in private valuations and information asymmetry between potential acquirers can still lead to a minority stake holder being outbid, and rivals may also post higher bids to avoid reputational losses from rejected bids (Staw, 1976) or as preemptive moves to avoid bidding wars, potentially leading to even higher bids driven by hubris (Hurry, 1993). But being outbid by an irrational competitor can still be beneficial, as selling the minority stake will deliver a positive return to the holder. An acquirer can estimate the competitive threats to entering a bidding contest by considering rivals' strategic and financial positions. Smaller rivals, or those low on cash or with high debt levels, are unlikely to constitute serious threats, especially in industries with many players. Also, some firms will have idiosyncratic value drivers or unique resources and capabilities, which make it impossible for competitors to duplicate their value-creating strategies, increasing their probability of appropriating their desired targets (Smit and Trigeorgis, 2004).

In a context where competitive bidders are likely to post counter-bids the acquisition option is said to be 'shared', so bidders are forced to take competitors into account, and will ultimately have to pay for (at least part of) the synergetic value a competitor could have realized. In contrast, where the investment opportunity is 'proprietary', a single bidding buyer can acquire the target perhaps without having to pay a premium at all (Smit and Trigeorgis, 2004). Based on this distinction between shared and proprietary acquisition options, we hypothesize the following effects on premiums paid in simple and compound options:

*Hypothesis 2: The more shared an acquisition option – whether simple or compound – is, the higher the premium paid by the acquirer.*

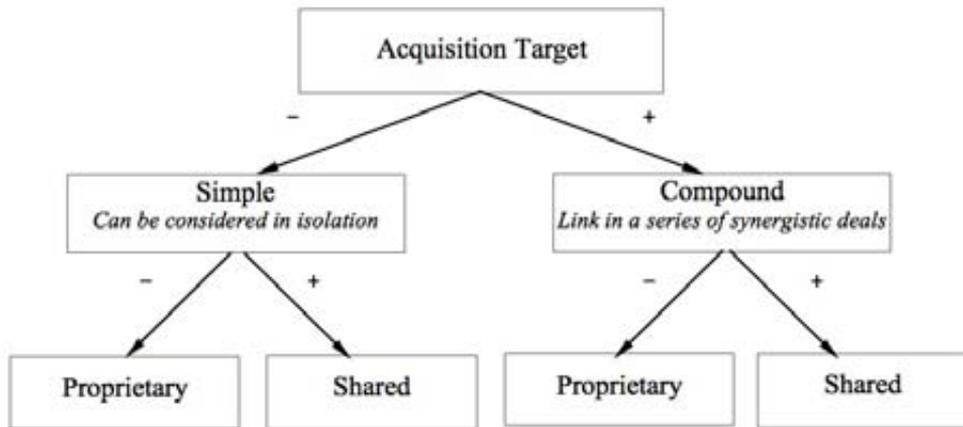
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<sup>14</sup> Although the strategic rationale for this assumption appears valid, empirical findings have proved contradictory (Miller and Folta, 2002), probably (as the authors acknowledge) due to an insufficient sample size.

*Hypothesis 3: The more proprietary an acquisition option – whether simple or compound – is, the lower the premium paid by the acquirer.*

The shared and proprietary effects might differ between option types. For now, we refrain from hypothesizing on these potential differences, as they depend on many different factors and assumptions beyond the current scope of this study. In the empirical analysis we will explore whether differences exist between the shared and proprietary nature of simple and compound options.

Figure 2.1 provides an overview of the categorization of acquisition options and the proposed effects on the premium paid.



**Figure 2.1:** Real option categorization of acquisitions and proposed influence on premiums paid. Source: Smit, 2001.

### 2.3 Data and Methodology

We collect from the Securities Data Company (SDC) database all public-to-public deals between 1980 and 2010 for which premiums are available. We only include acquisitions where the acquirer is a US based firm and the percentage owned after the transaction is at least 51%, i.e., a controlling stake, and exclude financial acquirers based on the industry classification provided by SDC<sup>15</sup>. This leads to an initial sample of 3,165 deals conducted by 2,073 different acquirers. The analysis only considers the first deals done by each firm, to avoid including firm-specific effects - such as learning or overconfidence - that might influence the premiums in subsequent deals (Billett and Qian, 2008; Aktas, de Bodt and

<sup>15</sup> Although this omitted most of the financial firms, 41 acquirers with primary SIC codes between 6000-6999 remain in the sample.

Roll, 2009; 2011). This restricts the final sample to 916 deals of which 597 are single acquisitions, and 319 the first deals of serial acquirers.

**Dependent variable.** The dependent variable is the acquisition premium, calculated as the price of the deal divided by the target's market value four weeks before the announcement of the deal (Hayward and Hambrick, 1997). In line with prior research, acquisition premiums as reported in the SDC database are used (Reuer et al., 2012). Using the target share price four weeks prior to the announcement decreases the effects of stock price run-ups in anticipation of acquisitions (Jarrell, Brickley and Netter, 1988). As some of the premiums obtained seem either excessively high or low, potentially influencing the results, all premiums are winsorized at the 1 and 99% levels, in line with related research on acquisition premiums (Baker, Pan and Wurgler, 2012).

**Independent variables.** In order to test the hypotheses we consider several variables to specify different acquisition options. The first separation - between simple and compound options - is made by considering single vs. serial acquirers. In contrast to simple acquisitions, the first deal in compound acquisition options is part of a larger acquisition program and provides access to future growth options. To separate single from serial acquirers, a dummy variable is constructed for firms that only acquire once within the sample period, as opposed to those that are frequent acquirers<sup>16</sup>. In constructing the acquisition option separation we depart from the assumption that firms can clearly distinguish simple from compound acquisition options prior to the acquisition, and see the value differences between both. Considering the specific factors that allow firms to separate between option types is beyond the current scope of this research.

Acquisition options are shared options when several potential acquirers consider going for the same target. Such competition means the timing of the acquisition involves a tradeoff - timing too late can mean losing the acquisition opportunity to a competitor who exercised its option earlier, while committing too soon can lead to foregoing option value. The entry of a competitive bidder can induce a bidding war, where prices increase and the outcome resembles an auction. A dummy variable indicating the presence of more than one bidder is used to signal shared acquisition options. The number of multiple bidder acquisitions seems small given the generally shared nature of acquisitions (only 6% of all deals in our sample involve more than one bidder). However, private values will differ between option holders, and in case a first bid exceeds competitors' reservation prices, competitors are unlikely to enter.

The purchase of a toehold or minority stake prior to a full-scale acquisition can be advantageous as it will decrease the final purchase price and increase the chances of winning (Eckbo, 2009). A minority stake makes an acquisition option more proprietary, as it creates a threshold for competitors seeking to acquire the target (Folta and Miller, 2002).

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<sup>16</sup> In the current analysis we place no time-restriction on the deal sequence. Since the timing of follow-up acquisitions is influenced by uncertainty, large time-windows between successive deals could be related to high levels of uncertainty. Elaborating on the timing issues involving acquisition decisions goes beyond the current focus of this paper.

If a bidding war ensues, a minority stake holder will be able to buy the target for a lower overall price, since the purchase of the minority stake was made prior to the bidding-war price run-up. Indeed, minority stake owners bid more aggressively and post higher bids for the remaining interest, subsequently increasing their chances of winning an acquisition (Bulow et al., 1999; Eckbo, 2009). Purchasing a minority stake can also signal an acquirer's future intentions to competitors, and shows greater commitment to acquire, while keeping real-option flexibility about future acquisition decisions intact. We use the existence of a minority stake prior to the full acquisition as indicating that the acquisition option is proprietary, and create a dummy variable indicating the presence of such a minority stake by deducting the percentage of shares acquired from the percentage of shares owned after the transaction. A difference between these two indicates the acquirer held a minority equity stake prior to the controlling acquisition.

As an alternative measure of the proprietary nature of an acquisition option, we consider the acquirer's market share. If a firm establishes a dominant industry position, it will face a lower threat of preemption by smaller competitors, and targets will become proprietary (or at least semi-proprietary) acquisition options (Smit and Moraitis, 2010a). The company can safely postpone its investment until later if the market develops favorably, or enter after a weaker competitor bids first (Smit and Trigeorgis, 2004). Larger acquirers can use their market power to win deals over smaller competitors as they are likely to have more slack resources, and so can match and exceed a smaller competitor's offer (Chen and Hambrick, 1995). Especially in intra-industry acquisitions, acquirers with greater market power who enter bidding contests can demotivate smaller competitors, while an industry leader making an initial bid is likely to discourage smaller competitors from entering a bidding contest altogether. We use market power as an alternative proxy for proprietariness, by dividing the acquirer's sales by the sum of sales of all firms in its industry, defined by comparable NAICS numbers in Compustat. As the acquirer's market share might not be influential in diversifying acquisitions - where the target's industry will have a different market leader - we only consider market share as an indicator of proprietariness in related acquisitions<sup>17</sup>.

**Control variables.** Other factors have been identified in the literature as influencing acquisition premiums. We control for cross-border acquisitions, method of payment (cash) and deal attitude (tender offer) as well as time-variation between acquisition premiums by including year-fixed effects (Slusky and Caves, 1991; Haunschild, 1994; Reuer et al., 2012). As large firms offer higher premiums and are more likely to complete an offer (Moeller, Schlingemann and Stulz, 2004), we control for both acquirer and target size by taking the logarithm of the market value of each, where market value is calculated by multiplying the shares outstanding by the stock price four weeks before the deal's announcement, using market value data taken from CRSP. Next to absolute size

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<sup>17</sup> However, a market leader in a certain industry acquiring in a highly fragmented unrelated industry might still benefit from some of the industry leader characteristics such as financial resources and scale (Keil et al., 2013).

values, we also consider relative acquisition size, calculated as total target assets over total acquirer assets. Relative size, or level of risk, of the deal can lead to integration concerns (Sirower, 1997), can influence acquisition performance (Fuller, Netter and Stegemoller, 2002; King et al., 2004), and has been shown to be negatively related to acquisition premiums (Bargeron et al., 2008; Kim, Haleblan and Finkelstein, 2011). We also control for acquirer and target book-to-market value by dividing the book value of equity (Compustat: book value per share times shares outstanding) by the market value of equity. The book-to-market ratio has been considered as a measure for a target's growth option value, as it encompasses the market's assessment of the future value creating potential beyond its current assets in place (Reuer and Tong, 2007).

Finally, we control for the acquirer's industry concentration, calculating the sales-based Herfindahl index by summing the squares of sales of all firms in its industry (defined by the NAICS code) in the year prior to the acquisition (Song and Walkling, 2000; Shahrur, 2005). Low-concentration industries are likely to have more competitors, so acquisition options are more likely to be shared than in industries with distinct market leaders (Folta and Miller, 2002)<sup>18</sup>. On the other hand, low-concentration industries also offer more acquisition opportunities, and acquiring in fragmented industries can increase the acquirer's presence and position in those industries. Increased firm size can also serve as a defense mechanism, decreasing the chance of becoming a future target (Baradwaj, Dubofsky and Fraser, 1996).

## 2.4 Results

Table 2.1 shows the descriptive statistics and correlations of the sample and the variables used. The average acquisition premium in our full sample is 49%, which roughly resembles the premiums used in related studies using the same acquisition premium data (Reuer et al., 2012)<sup>19</sup>. The single and serial acquirer subsamples show average premiums of 47% and 53% respectively. This initial observation provides preliminary evidence of differences between such acquirers' premiums.

<sup>18</sup> In case of a greater number of rivals, joint ventures are preferred over minority stakes (Folta, 1998). However, as the author notes, growth option values in joint ventures will be lower than minority equity stakes, as the joint venture only encompass a portion of the target growth captured in the venture (Folta, 1998).

<sup>19</sup> However, Reuer et al. (2012) do consider a much smaller time window (i.e. 1991 to 2000).

Variables	N	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1 Premium	916	49.07	46.19											
	597	46.95	48.31											
	319	53.03	41.72											
2 Cross-border acquisition	916	0.05	0.23	0.011	1									
	597	0.04	0.20											
	319	0.08	0.26											
3 Minority stake	916	0.03	0.18	-0.045	-0.044	1								
	597	0.04	0.20											
	319	0.02	0.14											
4 Competition	916	0.06	0.25	0.109***	0.127***	0.015	1							
	597	0.06	0.24											
	319	0.07	0.25											
5 Cash deal	916	0.30	0.46	0.052	0.042	0.076**	0.103***	1						
	597	0.30	0.46											
	319	0.28	0.45											
6 Tender offer	916	0.24	0.43	0.098***	0.082**	0.100***	0.256***	0.538***	1					
	597	0.24	0.43											
	319	0.25	0.44											
7 LN(acquirer marketvalue)	916	6.71	1.79	-0.023	0.046	0.072**	0.019	0.048	0.083**	1				
	597	6.41	1.76											
	319	7.27	1.69											
8 LN(target marketvalue)	916	4.72	1.73	-0.196***	0.027	0.037	0.057*	-0.120***	-0.004	0.647***	1			
	597	4.63	1.78											
	319	4.88	1.64											
9 LN(TTA/ATA)	916	-1.72	1.52	-0.102***	-0.026	-0.087***	0.069**	-0.202***	-0.078**	-0.421***	0.265***	1		
	597	-1.49	1.39											
	319	-2.14	1.67											
10 Industry concentration (sales)	916	0.21	0.23	-0.020	0.057*	0.032	0.020	0.086***	0.058*	-0.017	0.006	0.039	1	
	597	0.22	0.24											
	319	0.19	0.23											
11 Acquirer BM	916	0.48	0.34	-0.042	-0.005	0.042	0.105***	0.102***	0.084**	-0.290***	-0.168***	0.026	-0.020	1
	597	0.50	0.36											
	319	0.43	0.29											
12 Target BM	916	0.61	0.60	0.093***	0.076**	0.002	0.093***	0.125***	0.118***	-0.197***	-0.211***	0.133***	-0.024	0.322***
	597	0.64	0.64											
	319	0.56	0.53											
13 Acquirer CAR (0,+1)	857	-0.01	0.08											
	554	-0.01	0.09											
	303	-0.01	0.07											
14 Acquirer market share	612	0.10	0.19											
	393	0.09	0.19											
	219	0.12	0.20											

**Table 2.1:** Descriptive statistics and correlation of variables. \*\*\*, \*\* and \* indicates significance on the 10%, 5% and 1% level respectively.

We run a series of OLS regressions to test our hypotheses. Model 1 in Table 2.2 considers the deviation in the sample between simple and compound acquisition options to test hypothesis 1, and shows that single acquirers on average pay 6% lower premiums than serial acquirers. The results from Model 1 also provide some initial confirmation for hypothesis 2, as competition in acquisitions leads to higher premiums, as would be expected based on prior literature (Haunschild, 1994). The presence of a minority stake does not seem to cause lower prices to be paid, which is contrary both to our expectations and to the findings of previous research (Eckbo, 2009). Larger acquirers also appear to pay higher premiums, while larger targets receive lower premiums - this latter finding is in line with prior research (Beckman and Haunschild, 2002). Tender deals also involve higher premiums, which might be needed to offset managerial resistance to the deal (Comment and Schwert, 1995).

We next consider the single acquirer subsample in order to test hypotheses 2 and 3. Model 2 shows that, although the coefficient for proprietary simple options (i.e. where the acquirer holds a minority equity interest prior to the acquisition) is in the right direction (i.e. negative effect on premiums), the presence of minority stakes does not seem to have a significant effect on the premiums paid. As such hypothesis 3 - that proprietary simple acquisition options lead to lower prices paid - cannot be confirmed. We do, however, find strong support for hypothesis 2, as appropriating targets in shared options (i.e. where multiple bidders are involved) requires 28% higher premiums on average. Except for tender offers, the effects of the control variables in our single acquirer subsample are in line with those in Model 1. Since the majority of deals considered are single acquisitions, these findings are to be expected.

Model 3 shows the results when considering the compound acquisition option subsample. Again, we find support for hypothesis 2, as shared compound acquisition options command (on average) 17% higher premiums. However, we again also find minority stake ownership has no significant influence on the premiums paid. For both simple and compound options subsamples, it appears the competitive advantage of holding a minority stake is not directly reflected in paying a lower price, but can perhaps be found in increasing the chance of appropriating a certain target. Minority stake owners have been shown to bid aggressively, as their bid also serves to set an ask-price for their minority share (Eckbo, 2009). Especially in compound options, the higher value and importance of appropriating the first platform deal in a sequence to open up future acquisition possibilities can warrant more aggressive bidding to increase the chances of appropriating the target. However, our insignificant findings could also be data driven, as only 3% of all sample deals involve a minority stake.

Regarding the control variables, we find similar results for target size and deal attitude in the compound acquisition option subsample as in the overall sample, while the influences of acquirer book-to-market and cross-border deals on premiums become significantly negative. The lower premiums in cross-border deals could be attributed to the

higher risk involved (Shimizu et al., 2004) or the higher levels of valuation uncertainty. This finding contrasts with real option logic - that platform options which open new growth opportunities for firms to expand into new geographies have high growth option value - suggesting we would observe higher premiums in these deals (Smit and Moraitis, 2010a). However, the platform nature of cross-border acquisitions in our sample (i.e. a first step in a new geography) is difficult to establish, as prior foreign market knowledge and learning could explain the lower premiums in subsequent cross-border deals.

While the results in Model 2 and 3 suggest differences exist between the proprietary and shared option nature of simple and compound options, we further investigate these differences through inclusion of interaction terms in Model 1 between the single acquirer variable and respectively the competition and minority stake presence variable. Neither of the interaction terms provides a significant outcome, suggesting these differences are not statistically strong (results not reported).

Given the insignificant influence of the presence of minority stakes on premiums paid, we change the proprietary level variable in Model 4 from a dummy to the continuous variable (the size of the minority stake) to investigate its effect on the premium paid. We find larger minority stakes lead to lower premiums, suggesting that minority stakes can indeed be advantageous. As such advantage might depend on the size of the stake<sup>20</sup>, we can question the linear relationship between minority stake size and acquisition premium. To investigate if this relation is non-linear, we introduce the squared term of minority stake size into Model 4, but find no evidence for a non-linear relationship or the existence of a minority stake threshold (results not reported).

We use market share as an alternative proprietary measure, and consider the simple and compound option subsamples only for related, intra-industry acquisitions, using three different definitions of acquirer-target relatedness; the 4-digit SIC level, the 3-digit SIC level and the secondary SIC level. As firms can report up to 12 SIC codes of industries in which they operate, the latter provides the broadest definition of target-acquirer economic relatedness. In these models we focus strictly on market share (calculated as acquirer sales as a proportion of total industry sales on the 4- or 3-digit SIC level, depending on the relatedness restriction) as a measure for increasing the proprietariness of an acquisition option, and don't consider our previous proxy. To avoid collinearity issues, we also exclude industry concentration, as market share is used to construct this variable. The results of our analysis (not reported) show market share has no significant effect on acquisition premiums for related deals, either simple or compound, and market share shows none of the benefits associated with option proprietariness in industry related acquisitions.

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<sup>20</sup> Eckbo (2009) shows the minimum stake required to obtain an advantage is around 9%.

Dependent variable: Acquisition premium	1 All deals	2 Single deal	3 Compound deals	4 All deals
Single acquirer	-6.247** (3.17)			-6.434** (3.16)
Cross-border acquisition	-2.878 (7.99)	3.347 (9.09)	-37.200*** (12.67)	-2.960 (8.00)
Minority stake present	-5.862 (6.08)	-6.885 (8.59)	-4.801 (8.83)	
Minority stake size				-0.559** (0.25)
Competition	22.330*** (7.66)	27.995*** (10.55)	17.207* (10.42)	21.933*** (7.65)
Cash deal	-0.863 (4.02)	1.201 (4.86)	-6.785 (6.61)	-0.860 (4.02)
Tender offer	8.680* (4.49)	7.873 (5.72)	13.306* (7.38)	8.478* (4.47)
LN(acquirer marketvalue)	6.122*** (2.38)	6.064** (2.94)	6.038 (4.26)	6.037** (2.37)
LN(target marketvalue)	-10.263*** (2.38)	-10.084*** (2.95)	-10.819** (4.38)	-10.169*** (2.38)
LN(TTA/ATA)	-1.210 (5.42)	-0.003 (7.04)	-5.469 (8.52)	-0.834 (5.40)
Industry concentration (sales)	3.092 (2.22)	2.926 (2.74)	2.949 (3.57)	2.925 (2.22)
Acquirer B/M	-7.329 (5.86)	-5.125 (7.42)	-19.954*** (9.25)	-7.508 (5.86)
Target B/M	2.230 (4.40)	2.756 (5.32)	2.255 (8.56)	2.259 (4.40)
Constant	50.670*** (9.90)	75.405*** (22.54)	87.127*** (32.76)	50.837*** (10.03)
Time effects	YES	YES	YES	YES
Observations	916	597	319	916
R-squared	0.144	0.149	0.214	0.147
Adjusted R-squared	0.109	0.095	0.120	0.118
F-value	4.54***	2.92***	7.93***	4.66***

**Table 2.2:** OLS output explaining the influence of option type and nature on acquisition premiums. Standard errors are in parentheses and heteroskedastic robust. \*\*\*, \*\* and \* indicates significance on the 10%, 5% and 1% level respectively.

In order to rule out alternative explanations for the higher premiums paid in compound acquisition options (e.g. behavioral factors like overpayment, hubris or empire building (Hayward and Hambrick, 1997)), we consider the market's reaction to acquisition announcements. When the market reacts negatively to higher premiums, behavioral factors can be considered as alternative explanations for the premium size: when market reactions are neutral or positive, premiums seem justified from the market's perspective, and as reflecting accurate estimates of the deals' future value potential. Considering market reactions also shows the effects of the shared and proprietary nature of acquisition options on shareholder value creation. We run a series of regressions using the acquirer's Cumulative Abnormal Returns (CARs) as the dependent variable, calculated in Eventus using a market model based on the CRSP value-weighted index. In calculating the benchmark parameters we use a minimum 3-day and maximum 255-day time window starting from 46 days prior to the announcement, in line with prior literature (Crocchi and Petmezas, 2009). We consider the (0,+1) event-time window around the announcement day and include the same independent and control variables as in the previous regressions. Table 2.3 shows the models with findings of interest. Model 5 shows that the market perceives large premiums as negative - as signaling overpayment - but, as Models 6 and 7 show, this relationship only appears in the simple option subsample<sup>21</sup>. Despite the higher premiums, we find no negative effects in the compound subsample. This suggests that option type influences the market's value perceptions: higher premiums are likely associated with value destruction (especially in single deals - Model 6), but the market acknowledges the higher value of compound acquisition options.

Furthermore, Table 2.3 shows evidence that the market favors proprietary compound options (Model 7), as the presence of a minority stake has a significant positive effect on the market returns ( $p$ -value = 0.07). While the minority stake does not show an observable advantage in the price paid, the market's positive reaction does indicate a competitive advantage or preference for acquisitions involving minority stakes. This finding strengthens our initial idea that option elements can benefit a firm at an earlier stage of its acquisition consideration by increasing its chances of acquiring certain preferred targets, allowing acquirers to bid aggressively to secure their appropriation. We also see the market values cash deals and acquirers with high growth option value positively - in the latter case, it could be acquirers are capitalizing on their growth options.

Finally, Model 8 considers the market's reaction to market share. It seems that, for related deals, the market reacts positively to acquirers with high market shares, possibly expecting a further increase in market power or related benefits from large industry players acquiring their peers. Thus, although minority stakes in compound deals and high market share in related deals do not lower premiums paid, they can increase the proprietariness of an acquisition option, and are considered valuable from the market's perspective.

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<sup>21</sup> The coefficients for acquisition premium are multiplied by 100 in order to show the effects more clearly.

Dependent variable: Acquirer CAR	5	6	7	8
	All deals	Single deals	Compound deals	Single, 4-digit related
Acquisition premium (x100)	-0.014** (0.00)	-0.020** (0.00)	0.002 (0.00)	-0.017 (0.00)
Single acquirer	-0.005 (0.01)			
Cross-border acquisition	-0.008 (0.01)	-0.009 (0.01)	-0.013 (0.02)	-0.039 (0.03)
Minority stake present	0.001 (0.00)	-0.003 (0.01)	0.020* (0.01)	
Competition	-0.013 (0.01)	-0.018 (0.02)	0.003 (0.01)	
Cash deal	0.027*** (0.01)	0.029*** (0.01)	0.019 (0.02)	0.021 (0.02)
Tender offer	0.012 (0.01)	0.016* (0.01)	0.007 (0.02)	0.020 (0.02)
LN(acquirer marketvalue)	-0.001 (0.00)	0.002 (0.01)	-0.008 (0.01)	0.002 (0.01)
LN(target marketvalue)	-0.006 (0.00)	-0.010* (0.01)	0.004 (0.01)	-0.011 (0.01)
Industry concentration (sales based, 4-digit SIC)	0.012 (0.01)	0.011 (0.02)	0.017 (0.01)	
LN(TTA/ATA)	-0.001 (0.00)	0.001 (0.01)	-0.009 (0.01)	-0.011 (0.01)
Acquirer B/M	0.026** (0.01)	0.034** (0.01)	0.007 (0.01)	0.040* (0.02)
Target B/M	0.004 (0.01)	0.002 (0.01)	0.015 (0.01)	-0.017 (0.02)
Acquirer market share (sales based, 4-digit SIC)				0.299*** (0.08)
Constant	-0.002 (0.01)	-0.003 (0.02)	-0.019 (0.02)	-0.017 (0.03)
Time effects	NO	NO	NO	NO
Observations	857	554	303	162
R-squared	0.090	0.103	0.088	0.222
Adjusted R-squared	0.076	0.083	0.055	0.167
F-value	6.47***	5.37***	2.28***	3.52***

**Table 2.3:** OLS output explaining the influence of option type and nature on acquirer CARs for the (0,+1) window around the announcement date. Standard errors are in parentheses and heteroskedastic robust. \*\*\*, \*\* and \* indicate significance on the 10%, 5% and 1% level respectively.

## 2.5 Discussion

The absence of evidence on lower premiums for proprietary options suggests the benefits of this type of option are perhaps observed in other elements of the acquisition consideration. Real option logic would suggest resolution of idiosyncratic firm-level uncertainty influences the choice to acquire a minority stake, but - in light of the shared nature of acquisition options - constructing the (partial) exclusive right to acquire preferential targets can also be considered. Here, firm-level differences between potential targets could influence the decision to acquire a minority stake, and we would expect to see more minority stakes being acquired in more attractive targets. The effect of using minority stakes on premiums paid might also be indirectly observed through safeguarding against a too high price in multi-bidder situations, rather than decreasing the price paid. While aggressive bidding in proprietary options offers one explanation for our findings, it would be interesting to further investigate the characteristics of minority stake acquisitions to gain insights into potential alternative factors that influence the decision to obtain a minority stake.

One of the key assumptions in this chapter is that compound acquisition options involve well thought-out plans of sequential building blocks (of follow-on acquisitions), whose future outcomes can be valued and considered at the start of the acquisition sequence. However, the competitive pressures in acquisitions are likely to increase the difficulty of executing an envisioned acquisition strategy successfully. For example, acquiring a target could have the opposite effect of discouraging would-be competitors, and might instead trigger a series of acquisitions by competitors (Smit and Trigeorgis, 2004; Keil, Laamanen and McGrath, 2013), so preventing the firm from carrying out the sequence of follow-on acquisitions as it intended. Considering the serial acquirer's reaction when a competitor acquires a firm that was part of its envisioned sequence provides an interesting direction for future research on the execution of compound acquisition options. The choice of targets within a sequence remains largely endogenous to the firm, making it difficult to observe how unwanted changes to its strategy are dealt with. While the exact sequence of compound acquisitions might be difficult to specify, and will be subject to unexpected changes, the strategy can, alternatively, be considered as a way to grow a firm through a sequence of (related) acquisitions, where future targets are perhaps not identified ex-ante, but considered (or re-considered) as the sequence progresses.

Although the view that all firms in an industry share the option to defer acquiring (Trigeorgis, 1996) can be considered quite general<sup>22</sup>, it has gained a strong position in both

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<sup>22</sup> Single, full-scale acquisitions can reflect the real option notion more closely if we consider the possibility for a firm to internally stage an acquisition, by following a target closely and acquiring when the time is right. The firm-level irretrievable idiosyncratic costs associated with the decision to stage the acquisition (i.e. target-firm monitoring costs otherwise not incurred) could then be seen as the option premium. Note that costs such as legal

the theoretical (Dixit and Pindyck, 1994) and empirical real option literature. For instance, in their research on acquisition thresholds, Folta and O'Brien (2007; 2008) consider the option to acquire is present in all the firm's 3-digit related industries. In essence, they consider all firms have the option to acquire - but the value of the option will vary per firm (e.g. between a target-related acquirer and unrelated acquirer (Folta and O'Brien, 2007)).

Our findings show that a real option categorization of acquisitions can help explain acquisition premiums and market reactions to specific acquisition options. The clear support for differences between simple and compound options and the influence of competition validates the use of this classification. The lack of evidence as to the proprietary benefits of compound acquisition options calls for further investigation, which may help shed new light on the differences between managers' and investors' valuations. While our findings could be interpreted as managers' incapability of capitalizing on favorable option elements, it may be that they are perfectly aware of such opportunities, but are operating within the boundaries deemed acceptable (i.e. not value destroying) by the market. In contrast to Folta and O'Brien (2007), who consider that information-asymmetry as to the value of future growth options between managers and the market favor the former, our findings suggest the value of certain option elements are more apparent at the market level. We encourage future research directed towards increased understanding of the valuation differences between markets and managers in general, and the visible results of capitalizing on competitive advantages in acquisitions in particular.

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and investment banking fees are incurred by every acquirer and therefore should not be considered as part of the option premium.



## Chapter 3: Value Perception in Serial Acquisitions: Premiums Paid and the Market's Reaction<sup>23</sup>

*This chapter considers the serial nature of consolidating acquisitions to explain premiums paid. Based on real option theory, the first acquisition within a sequence can incorporate the future value creation of the serial consolidation strategy, and as such can justify payment of a higher premium. Serial consolidators pay on average a 22% higher premium for their first acquisition compared to single consolidators. The serial acquisition intention mitigates the negative effects public acquisitions have on market returns, as the market reacts more favorable to serial than to single consolidators. Although corporate learning does not seem apparent throughout the acquisition sequence, as there is no continuous declining trend in the higher order acquisition premiums, higher order deals show lower premiums compared to the first deal.*

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<sup>23</sup> This chapter is based on Kil (2013a). This research benefitted greatly from suggestions by Tony Tong and seminar attendants at the Leeds Business School (University of Colorado) and the 2013 Real Options Group annual meeting.

### 3.1 Introduction

As an industry matures, consolidation seems inevitable (Deans, Kroeger and Zeisel, 2002), with major players emerging, buying up competitors and forming empires (Kim and Park, 2006). Examples of such consolidation trends can be found in the automotive, banking, brewing, telecom and mining industry where a limited number of firms control the majority of the market. Common factor among the successful consolidators in an industry is that they adopted sequential growth paths through a series of interconnected, related acquisitions (Smit, 2001; Nikoskelainen and Wright, 2007). While traditional research has mostly considered acquisitions in isolation, the serial nature of acquisitions within a consolidation program suggests acquisitions are to be studied within the broader context in which they occur.

Following the notion that acquisitions are often part of a larger program (Barkema and Schijven, 2008a), acquisition research has increasingly paid attention to sequences of acquisitions (Schipper and Thompson, 1983; Malatesta and Thompson, 1985; Hayward, 2002; Klasa and Stegemoller, 2007), either on a firm level (Fuller, Netter and Stegemoller, 2002; Laamanen and Keil, 2008) or on the executive level (Billett and Qian, 2008; Malmendier and Tate, 2008). Serial acquisition research has primarily adopted either a behavioral or learning perspective. Behavioral explanations for firms' engagement in serial acquisitions consider hubris and empire building (Jensen, 1986; Doukas and Petmezas, 2007; Billett and Qian, 2008), while the learning perspective has considered whether acquirers learn from their prior experience and become better in identifying and valuing targets (Barkema and Schijven, 2008b; Aktas, de Bodt and Roll, 2009; 2011). Overall, serial acquisition research has offered different theoretical explanations for the decreasing returns to shareholders throughout a sequence as well as the decision to undertake multiple acquisitions in succession (Crocchi and Petmezas, 2009).

While prior research focused on differences between acquisitions within a sequence, firm level differences between single and serial acquirers as well as target-acquirer relatedness have received much less attention. This chapter aims to fill this gap by considering the differences in market circumstances and value perception between single and serial acquirers. Furthermore, given the inevitability and importance of consolidation within an industry's lifecycle (Deans et al., 2002), we focus our analysis on acquisitions aimed at horizontal industry consolidation. The focus on consolidating acquisitions suggests the value drivers (i.e. benefits from consolidation) between different acquirers are ex-ante more comparable than in diversifying deals<sup>24</sup>, and potential value differences can mostly be attributed to strategic intentions.

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<sup>24</sup> In acquisitions aimed at diversification, different target-acquirer combinations will have different values based on for instance degree of transferability of different organizational capabilities and resources (Matsusaka, 2001). Also, potential mispricing risk will be higher in diversifying acquisitions due to valuation uncertainty in unrelated industries (Malmendier and Tate, 2008).

This chapter considers whether the potential value of a serial consolidation strategy is apparent at initiation on both the firm and market level. As measure for future value creation we consider the acquisition premium paid, and we consider the market's reaction to obtain an investor perspective of the envisioned value creation. As the benefits from consolidation will increase with the level of consolidation that can be achieved, a serial strategy carries a higher value potential than a single consolidating acquisition. If the discounted future benefits from the consolidation series are reflected in the first acquisition in the sequence, we expect to observe a higher premium at the initiation of a serial consolidation strategy. To the best of our knowledge, this research is first in considering whether acquisition premiums transcend the focal deal and can be used to explain future value creation<sup>25</sup>.

The theoretical base for this research lies in the real option literature, which shows that given the path-dependency in acquisition trajectories, where prior acquisitions make future deals more attractive, a sequence of related acquisition opportunities can be modeled and valued as a real option (Smit, 2001). Following real option theory, when considering the entire sequence, the first acquisition within the larger consolidation framework can warrant paying a higher (option) premium reflecting the future value creation. In line with real option based expectations we find that serial consolidators indeed pay on average a 22% higher premium for their first deals compared to single consolidators. Despite the higher premiums paid, the serial nature of the acquisition strategy mitigates the negative market reaction in public acquisitions (Fuller et al., 2002; Croci and Petmezas, 2009), as the market reacts more favorable to serial consolidators indicating the rationale of the strategy. However, given the overall negative market reaction, there exists no short-term added value of initiating such an acquisition strategy in terms of shareholder value creation. Finally, we consider whether organizational learning is evident by investigating the premiums paid throughout the serial acquisition track. Although acquisition premiums decrease between the first and higher order deals, this decrease is not continuous between higher order deals suggesting organizational learning is only partially observed in serial consolidating deals.

This chapter proceeds as follows. We start with an overview of the related literature on industry consolidation, acquisition premiums and the real option view in serial acquisitions. We highlight the most important focal points in acquisition research in light of our research and develop a way to empirically test the assumptions from the theory. Next, we discuss the data and results and draw conclusions from our empirical results. Finally, we discuss shortcomings and potential directions for future research.

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<sup>25</sup> Ahern (2008) states the market's reaction to the initial deal of a sequence can incorporate the value creation of the serial strategy. Our focus on acquisition premiums will consider whether this future value is also apparent at the executive level.

## 3.2 Background Theory

### 3.2.1 Industry consolidation

Consolidation occurs through horizontal and related acquisitions of firms exhibiting similar strategic characteristics, such as direct competition, common customers, and common geographic markets (Ramaswamy, 1997). While industry consolidation can be depicted following a normal industry lifecycle (Deans et al., 2002), excess capacity in an industry can initiate a consolidation trend aimed at survival (Anand and Singh, 1997; Bower, 2001). One of the key synergistic drivers in a consolidation strategy is building size in a fragmented market, when increased industry concentration and individual firm size change the industry structure (Kim and Park, 2006), while potentially improving the overall economic environment for all firms in the sector (Pilloff, 1999). Successful firms will be those able to position themselves advantageously to enjoy a disproportionate share of these returns (Smit and Moraitis, 2010a).

Compared to diversifying strategies consolidation strategies show a high likelihood of success, as related acquisitions are less likely to suffer from incompatibility between the acquiring and acquired firm (Anand and Singh, 1997), make it easier to assess the strategic (Kusewitt, 1985; Fowler and Schmidt, 1989) and organizational (Datta, 1991) fit (from Laamanen and Keil, 2008), and have shown to be among the only type of deals where expected synergies materialize (Mueller and Sirower, 2003). Also, issues of bounded rationality, absorptive capacity and the compatibility of organizational routines will be less influential in related acquisitions (Anand and Singh, 1997). The lower costs and risks of transformation of the firm and larger value creation make consolidation strategies preferred compared to diversification (Singh and Montgomery, 1987; Anand and Singh, 1997).

### 3.2.2 Acquisition premiums and value of serial acquisitions

The sources of value creation in a serial consolidation strategy include increased efficiency (scale and scope economies, buying power, and transfer of resources), synergies from future add-on acquisitions and market power (Ramaswamy, 1997; Anand and Singh, 1997; Fee and Thomas, 2004; Nikoskelainen and Wright, 2007; Smit and Moraitis, 2010ab)<sup>26</sup>. The benefits of consolidation will depend on the similarity of competencies (Ramaswamy, 1997), and the degree of consolidation that can be achieved. As such, the benefits of consolidation are increasing in the number of related deals that can be undertaken, conditional on degree of competence similarity.

As a measure for the value creation in acquisitions we consider the premium paid as this reflects the potential value extraction or creation within a target (Hayward and Hambrick, 1997). Premiums have been explained by looking at synergies (Slusky and

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<sup>26</sup> Empirically, the market power argument does not show the suggested benefits. See Anand and Singh (1997) for a discussion and overview of the literature.

Caves, 1991), competition for the target, board interlocks (Haunschild, 1994), hubris (Hayward and Hambrick, 1997), firm level desperation (Kim, Halebian and Finkelstein, 2011), resistance to takeover (Sinha, 1992), investment advisors (Haunschild, 1994) and interlock partners (Haunschild, 1993; Beckman and Haunschild, 2002). Also, information asymmetries on the target's value between the acquirer and target shareholders<sup>27</sup> will result in higher premiums as the target shareholders are not willing to give up their shares against the prevailing (market) price (Laamanen, 2007). Consolidating deals will suffer lower levels of target-acquirer information asymmetry as the value drivers of the industry are less ambiguous to the acquirers, allowing for better envisioned forecasts on the target and industry's future compared to unrelated industries (Laamanen and Keil, 2008).

Overall, the economic benefits of consolidation are assumed to be equally likely among acquirers, where the benefits increase with the level of consolidation that can be achieved. Differences in value between single and serial acquirers flows predominantly from the additional intra-target value and increased consolidation benefits, which will be reflected in the premium paid. In light of alternative explanations for acquisition premiums, consolidating deals are less likely to suffer from overvaluation and excessive premiums, as the target-acquirer information asymmetry is small.

### **3.3 Research Hypotheses**

#### **3.3.1 Conditions for serial consolidation**

Initiating a consolidation strategy might not be suitable in all industries as consolidation is bounded by the availability of potential targets. The most attractive of these targets may be expected to be acquired sooner, and firms that postpone action risk losing these attractive opportunities (Anand and Singh, 1997). As the success and the value creation of the serial strategy is increasing in the level of consolidation that can be achieved by the initiator, a large pool of potential targets should be available at the start in order to successfully conduct follow-on acquisitions. As such, highly fragmented or low-concentrated industries are a prerequisite for successfully conducting a consolidation strategy, and more serial consolidating deals are expected in these types of industries.

*Hypothesis 1: Serial consolidation strategies are more likely to occur in low-concentrated industries.*

#### **3.3.2 Real options and premiums paid in serial acquisitions**

Acquisitions as a component of a larger acquisition strategy require more sequential organizational structuring to fully realize the benefits from multiple acquisitions (Barkema

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<sup>27</sup> As Laamanen (2007) states information asymmetries may also exist on a target-market and acquirer-market level. Given this research's focus on acquisition premiums, and therefore public deals, these information asymmetries are likely to be lower compared to deals involving private targets or acquirers (see Capron and Shen (2007) on private information in acquisitions with public targets.)

and Schijven, 2008a). Real option intuition can serve as a helpful valuation and structuring tool in this matter. In case of a series of interrelated acquisitions the sequence can be valued as a real option, where much of the future value stems from the option to leverage additional comparable competencies and assets through follow-on acquisitions onto the first acquisition, eventually transforming several smaller firms into an efficient large-scale network (Smit, 2001; Smit and Moraitis, 2010a)<sup>28</sup> which maximizes the benefits associated with consolidation. Real option analysis is implicitly based on expected synergies assuming the firm follows a (predetermined) path of future follow-on acquisitions, which is executed in light of the resolution of uncertainty surrounding attainment of future targets (Smit, 2001). Compared to single acquisitions, a serial acquisition option<sup>29</sup> involves a higher growth option value, since it involves an option on the underlying call options, here the subsequent, future acquisitions (Smit and Moraitis, 2010b).

To quantify the value of a consolidation strategy in a real options framework, acquisitions are no longer viewed as stand-alone investments but rather as links in a chain of interrelated investments in which the early investments set the path for the ones to follow (Smit, 2001). In the serial option view, the first acquisition reflects the (discounted) future benefits of the entire acquisition strategy, which will be reflected in the acquisition premium. Following the real option view, we expect serial consolidators to pay higher premiums for their first deals compared to single consolidators.

*Hypothesis 2: Serial consolidating acquirers pay higher premiums for their first deal compared to single consolidating acquirers.*

### 3.3.3 Market reaction to serial consolidation strategies

Acquisitions within the same sector will have a smaller risk of overpayment as the value drivers of the industry are less ambiguous to the acquirer, allowing for better envisioned forecasts on the industry's future and its firms compared to unrelated industries. Indeed, premiums of related acquisitions tend to be lower than those of unrelated acquisitions (Slusky and Caves, 1991)<sup>30</sup>, and the potential gains in related acquisitions are higher compared to unrelated deals (Singh and Montgomery, 1987). In line with the higher value creation, first deals of serial acquisition strategies will show higher stock returns as to reflect the capitalized value of the entire, future sequence (Crocchi and Petmezas, 2009). In

<sup>28</sup> For an example of deducting the value of a serial acquisition strategy we refer to Smit and Moraitis (2010b) who also introduce potential competitive responses to earlier actions and the subsequent effect on acquisition payoffs.

<sup>29</sup> The defining characteristic of these initial acquisitions in the sequence is that they provide a powerful step into a new environment or access to a new array of future investment opportunities, perhaps including new geographies (Smit and Moraitis, 2010b).

<sup>30</sup> The average premium for related deals in Slusky and Caves (1991) is 46% compared to 53% for unrelated deals. Related research controlling for the effect of firm-relatedness on premiums does show negative coefficients (Haunschild 1994; Laamanen, 2007; Eckbo, 2009; Kim et al., 2011) but the outcomes are not significant. Slusky and Caves (1991) do find a significant negative effect of firm-relatedness (labelled FIT by the authors) when rivals are present, suggesting bids are inflated in related deals when rivals appear.

considering the future value that the serial strategy will generate, the size of the stock market's reaction will be affected by the premium paid, as paying a large premium will amount to already paying for (part of) the future value creation (Sirower, 1994; Hayward and Hambrick, 1997; Beckman and Haunschild, 2002; Krishnan, Hitt and Park, 2007). Given the higher future value creation of the consolidation strategy compared to single deals, the premium that can rationally be paid in serial acquisitions (i.e. still resulting in a positive market reaction) will be higher compared to single deals. The market reaction is suggested to be higher for serial acquirers than for single acquirers as to reflect the rationale of the consolidation strategy and the perceived future benefits to be obtained.

Although serial consolidators can rationally pay higher premiums compared to single consolidators for their first deals, serial consolidator deal premiums can still be influenced by hubris and optimism, leading to overpayment and a negative market reaction in line with the perceived value destruction. However, as issues of bounded rationality will be less apparent in related acquisitions (Anand and Singh, 1997), the effects of hubris, overconfidence<sup>31</sup> and optimism in valuations on premiums paid are likely lower in industry-related acquisitions. As such, the high premiums paid in consolidating serial acquisitions are more likely to reflect suggested value creation than behavioral influences. When these behavioral influences are apparent, and the premiums paid in serial acquisitions are deemed excessive, the market's reaction to serial consolidators can be assumed to be more negative compared to single consolidators.

*Hypothesis 3: Compared to single consolidating acquirers, the market reaction to first deals of serial consolidating acquirers will be higher.*

### **3.3.4 Learning in serial consolidation strategies**

Serial acquisitions have been considered from a corporate learning perspective in order to see whether frequent acquirers learn from their prior experience (Barkema and Schijven, 2008a; Aktas et al., 2009; 2011). The real option view on serial acquisitions suggests the entire future benefits of the serial acquisition strategy are incorporated in the first deal. In following a predetermined acquisition path, successive deals independently don't have additional value in excess of the serial strategy value. Given the pre-payment of future benefits in the premium of the first deal, successive deal premiums should therefore be lower.

At this point the real option notion coincides with the classical learning curve perspective, where acquirers become better in establishing prices in acquisitions with experience (Barkema and Schijven, 2008a). Learning effects are especially likely to occur in a consolidating strategy as deal similarity on both the industry and country level provides a strong learning environment (Barkema and Schijven, 2008b). In case learning

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<sup>31</sup> Doukas and Petmezas (2007) show that 64% of the acquirers they label overconfident undertake diversifying acquisitions.

increases with experience, a continuous decline in premiums throughout the sequence can be expected. In light of the consolidation sequence and bounded number of targets, an increasing premium trend could also be envisioned. The importance to acquire subsequent targets in order for a successful serial strategy suggests competitive pressures might increase, potentially driving up prices. Also, target price run-ups following market anticipation when the first acquisition leads to an industry-wide increase in firm prices (Song and Walkling, 2000) can make higher premiums inevitable (Schwert, 1996; Betton, Eckbo and Thorburn, 2008; Eckbo, 2009). The effect of market anticipation on the premium paid in subsequent deals is likely not consistent throughout a serial acquisition path. For instance, in highly fragmented industries market anticipation might initially be lower as it is difficult to correctly identify the future targets from the larger pool. As the consolidation sequence evolves, and the pool becomes smaller, market anticipation effects can become stronger as it becomes easier to identify potential future targets. In line with behavioral learning predictions, the premiums for subsequent targets will be smaller compared to the initial deal. The trend in subsequent premiums will show whether learning or market anticipation effects are stronger.

Finally, an increasing premium trend after the initial deal could signal the influence of behavioral factors like overconfidence and hubris (Doukas and Petmezas, 2007; Billett and Qian, 2008). However, given the consolidation's rationale and high chances for learning within related acquisitions, we suspect behavioral factors to be less of an influence, and subsequent deals are likely to show lower premiums compared to the initial deal.

*Hypothesis 4: Following the strategy's rationale, serial consolidators' higher order deal premiums will be lower than their first deal premium.*

### **3.4 Data and Methods**

#### **3.4.1 Sample**

Organizational outcomes are influenced by the preferences and style of the people in charge (Hambrick and Mason, 1984; Bertrand and Schoar, 2003) and executives influence corporate decisions such as mergers and acquisitions (Aktas et al., 2009). Especially in acquisition premiums, the executive influence will become visible and provide a clear observable output of CEO bidding (Aktas et al., 2011). As premiums are susceptible to human, interpretive, and social processes and are not strictly the result of economic calculations (Haunschild, 1994), research on acquisition premiums should use the decision-maker as the unit of analysis (Hayward and Hambrick, 1997). Therefore, our subsequent analysis will be conducted on the executive rather than the firm level. Focusing on the executive level is in line with the knowledge-based view stating that individuals within an organization possess valuable knowledge which can serve as a competitive advantage (Grant, 1996). Also, from a learning perspective the CEO level offers richer

grounds for research as it allows to consider CEO acquisition experience during his tenure at a firm, while decreasing noise from corporate strategic changes surrounding CEO turnover<sup>32</sup>.

In order to test our predictions we first need to identify serial consolidators from single ones. We start by considering all deals from 1986 until 2009 of which premiums are available in Thompson SDC. Given the executive's influence on acquisition premiums, we consider only those deals of which corresponding CEO data for the acquiring firms is available from Execucomp. This leads to a sample of 1,668 acquisition-CEO matches. As learning can be evident in serial acquisitions, influencing premiums paid in latter stage deals (Aktas et al., 2009; 2011) we consider only first deals done by a CEO during his tenure in the acquiring firm, and we allow each firm and CEO to be present in our sample only once.

We define consolidating acquirers as those acquirers who engage in *at least* two successive, public acquisitions in the same industry (measured by primary 4-digit SIC code relatedness), and preferably more. Studying acquisition couples has been considered in related studies considering the effects of market feedback and learning in acquisitions (Aktas et al., 2011). This results in a sample of 78 serial consolidators of which 26 did 3 or more subsequent intra-industry deals. The single consolidators are acquirers who during their tenure at a firm make a first acquisition within the same 4-digit SIC industry, but don't follow a consolidation strategy as they are single acquirers or their second acquisition is in an unrelated industry. This constraint results in 275 acquirers whose first industry-related deal is not followed by a second (related) deal.

### 3.4.2 Variables

**Dependent variable.** The dependent variable is the acquisition premium paid calculated as the value of the deal divided by the pre-announcement target market value measured 4 weeks prior to the deal announcement (Hayward and Hambrick, 1997). Calculating the premium four weeks prior to the announcement will decrease the effects from stock price run-ups prior to and in anticipation of the acquisition. Since there are some outliers all premiums are winsorized at the 1 and 99% level, in line with recent acquisition premium research (Baker, Pan and Wurgler, 2012).

The dependent variable used to answer hypothesis 3 is the Cumulative Abnormal Return (CAR) to the bidder's acquisition announcement. The calculation of the CARs is done in Eventus using a market model based on the CRSP value-weighted index. In calculating the benchmark parameters a minimum 3-day and maximum 255-day time window starting from 46 days prior to the announcement is used, which is in line with prior literature (Crozi and Petmezas, 2009). We consider several short-term event windows surrounding the announcement day (i.e. -1,+1; 0,+1, -5,+5; -10,+10)

<sup>32</sup> If a second deal is done by a newly appointed CEO, learning effects are likely not present. Here, learning effects are assumed to exist on the individual level, rather than on the firm level.

**Independent variable.** The main variable of interest is whether an acquirer follows a serial consolidation strategy. A dummy variable is constructed indicating whether an executive meets the definition of a serial consolidating executive, i.e. at least 2 successive deals in the same industry.

**Control variables.** Other factors have been found to influence acquisition premiums. We control for length of the tenure of the CEO measured in log of days, since CEOs with more time between instatement and their first deal are more aware of the market they operate in and better able to establish prices for the target. We also control for deal experience by counting the number of private related deals the CEO has been involved in during his time with the firm prior to the focal (public) acquisition.

Acquirer characteristics we control for are slack resources and acquirer size as these can increase premiums paid. Bruner (1988) found acquirers have significantly more financial slack in the 2 years prior to an acquisition. Iyer and Miller (2008) show high unabsorbed slack has a significant influence on the probability of acquiring. While abundant slack resources can be used to increase the breadth of search and risk in acquisitions, by considering unrelated targets, slack can also influence the height of the premium paid and cause potential overpayment. Following Bourgeois (1981) we use two measures for slack: unabsorbed slack measured by the current ratio (current assets divided by current liabilities), and absorbed slack, measured as selling, general and administrative expenses divided by sales (Iyer and Miller, 2008). All variables used to construct the slack measures are obtained from Compustat from the fiscal year prior to the acquisition.

As large firms offer higher premiums and are more likely to complete an offer (Moeller, Schlingemann and Stulz, 2004), we control for size by taking the logarithm of acquirer and target total assets<sup>33</sup>. Also, the presence of advisors has shown to influence acquisition premiums, and we therefore control for acquirer and target advisor presence (Haunschild, 1994).

Deal characteristics that have shown to influence premiums paid are the method of payment (Travlos, 1987; Ghosh and Ruland, 1998; Slusky and Caves, 1993) and type of deal. All-stock financed deals can lead to higher premiums, as the value of the stock is uncertain compared to cash. Also, paying in stock can signal the acquirer is using its overvalued shares to pay for acquisitions, resulting in target shareholders requiring higher premiums in all-share offers. We control for method of payment with a dummy indicating all stock deals. Dummy variables indicating tender offers, presence of a minority stake prior to the acquisition (by subtracting shares purchased from shares owned after the transaction) and cross-border deals are also added. Finally, we identify deals where competition is present, as competitive threats and counterbids can drive up prices (Varaiya and Ferris, 1987; Varaiya 1988; Slusky and Caves, 1991).

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<sup>33</sup> We prefer the use of SDC data for our control variables as this allows for the largest possible sample to be used in our analysis, as alternative databases (like Compustat) might not have data available for all firms, limiting the sample size.

We also control for the level of industry concentration prior to the deal. Low-concentrated industries might be better suited to conduct a consolidation strategy, however the effects on premiums paid can be twofold. On one hand the larger the number of firms in an industry, the larger the potential number of competitors for a target, increasing premiums paid. On the other hand, already being a large player in a highly fragmented industry can provide a strong position to successfully conduct an industry consolidation strategy. By controlling for industry concentration, number of bidders and acquirer size we cover all these scenarios. We calculate the industry concentration by constructing the Herfindahl index of industry sales by summing the squares of sales of all firms in the same industry (defined by the NAICS code linked to the acquirer's 4-digit SIC code) in the year prior to the acquisition (Song and Walkling, 2000; Shahrur, 2005).

Finally, we control for year and industry fixed effects as premiums paid are influenced by time-variation and industry characteristics (see Doukas and Petmezas, 2007). Whenever possible, the firm specific variables are obtained from Compustat from the fiscal year prior to the acquisition.

### 3.5 Results

Table 3.1 shows the descriptive statistics and correlations of the variables used in the analysis. The average acquisition premium in the sample is 47%, which is in line with other studies who report 40% (Datta et al., 2001), 49% (Hayward and Hambrick, 1997), 52% (Haunschild, 1994) and 53.5% (Laamanen, 2007). From Table 3.1 we see that serial consolidating acquirers are positively correlated with premiums, suggesting preliminary evidence of higher premiums paid by serial acquirers.

We run a probit regression in order to test whether differences exist between serial and single consolidating acquirers. Considering deal, firm and target level characteristics can show alternative factors influencing the serial consolidation strategy. Model 1 in Table 3.2 shows, in line with hypothesis 1, serial consolidation acquisitions are more likely to occur in low-concentration industries. Other findings are serial consolidating acquirers are more likely to have a minority stake in their first acquisition target. As minority stakes increase the likelihood of winning a deal and create a competitive advantage (Eckbo, 2009), their presence can indicate a potential preference for certain targets at the start of a consolidation sequence. The presence of a minority stake can also be related to the lower likelihood of serial consolidators to make tender deals. Owning a minority stake in the target can increase target awareness and influence by the acquirer. Stakes of a sufficient size can even lead to board positions, increasing both the target and acquirer's comfort with one another, resulting in less target board resistance when the acquisition is initiated and decreasing the necessity for a tender offer.

Variables	(N = 275)	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1 Premium		47.27	45.88																
2 Serial consolidator		0.22	0.42	0.150**															
3 Cross-border deal		0.10	0.30	-0.013	0.056														
4 Minority stake		0.08	0.27	-0.087	0.104	0.138***													
5 Multiple bidders		0.65	0.22	-0.034	-0.048	-0.063	-0.004												
6 Payment (stock)		0.33	0.47	-0.014	0.076	-0.093	-0.048	-0.122**											
7 Tender deal		0.25	0.44	0.042	-0.120	0.203***	0.115***	0.131	-0.344***										
8 Acquirer advisor		0.81	0.39	-0.175***	-0.107**	-0.012	-0.172***	0.071	0.075	0.074									
9 Target advisor		0.95	0.23	-0.119*	-0.001	-0.277***	-0.065	0.052	0.004	-0.067*	0.239***								
10 LN(acquirer total assets)		7.02	1.63	-0.118*	-0.079	0.091*	0.138**	0.071	-0.128***	-0.021	0.134**	0.089*							
11 LN(target total assets)		5.38	1.80	-0.247***	-0.083**	0.033	0.069	0.137***	-0.137***	-0.052	0.352***	0.138	0.660***						
12 LN(acquirer unsuberbed slack)		0.65	0.73	0.196***	-0.021	-0.056	-0.065	-0.126**	0.089**	-0.065	-0.079	-0.004	-0.276***	-0.340***					
13 LN(acquirer asberbed slack)		-1.64	0.95	0.199**	0.036	-0.094	-0.014	-0.147**	0.138	0.069	0.001	-0.010	-0.329***	-0.340***	0.308***				
14 Industry concentration (sales)		0.16	0.18	-0.014	-0.142*	-0.003	-0.012	0.035	-0.023	0.078	-0.097**	-0.016	-0.052	-0.038	-0.010	-0.034			
15 CEO related acquisition experience		1.55	2.95	-0.114	-0.023	0.108*	0.042	-0.030	0.008	-0.015	-0.054	0.020	0.022	-0.056	-0.068	0.010	-0.043		
16 LN(days CEO before acquisitions)		7.35	1.18	0.019	-0.050	-0.142**	-0.052**	-0.038	-0.047	0.005	0.003	0.008	-0.007	-0.050	0.029	-0.057	0.059	0.273***	

**Table 3.1:** Descriptive statistics and correlation matrix. \*\*\*, \*\* and \* indicate significance on the 10%, 5% and 1% level respectively.

Dependent Variable:	1	2	3
	Probit Serial Consolidator	CLS Acquisition Premium	OLS Acquirer CAR (-10,+10)
Premium	0.006*** (0.00)	21.874*** (7.24)	0.049** (0.02)
Cross-border deal	0.600* (0.33)	3.084 (9.38)	-0.041 (0.04)
Minority stake	0.771** (0.30)	-24.926** (9.74)	-0.050 (0.04)
Multiple bidders	0.098 (0.40)	-4.166 (11.83)	-0.084* (0.04)
Payment (stock)	0.160 (0.20)	-7.785 (6.90)	-0.001 (0.03)
Tender deal	-0.488** (0.24)	5.233 (7.42)	0.089*** (0.03)
Acquirer advisor	-0.233 (0.23)	-12.356 (9.09)	0.007 (0.03)
Target advisor	0.607 (0.44)	-16.192 (14.14)	0.038 (0.04)
LN(acquirer total assets)	-0.091 (0.07)	2.612 (2.02)	0.002 (0.01)
LN(target total assets)	-0.011 (0.07)	-2.444 (2.69)	-0.004 (0.01)
LN(acquirer unabsorbed slack)	-0.183 (0.14)	3.106 (5.23)	-0.007 (0.02)
LN(acquirer absorbed slack)	-0.047 (0.11)	3.470 (3.41)	-0.018 (0.02)
Industry concentration (sales)	-1.679*** (0.55)	12.470 (11.32)	-0.014 (0.05)
CEO related acquisition experience	-0.034 (0.04)	-1.984** (0.96)	-0.001 (0.00)
LN(days CEO)	-0.003 (0.07)	1.001 (2.43)	0.015 (0.01)
Constant	-0.412 (0.82)	85.556*** (29.51)	-0.365*** (0.12)
Year fixed effects	NO	YES	YES
Industry fixed effects	NO	YES	YES
Observations	275	275	257
R-squared		0.332	0.211
Adjusted R-squared		0.190	0.029
Wald Chi-squared	34.67		
Prob Wald Chi-squared	0.003		
Pseudo R-squared	0.106		
Log pseudolikelihood	-134.41		

**Table 3.2:** Probit output explaining serial consolidating acquirers (Column 1), OLS regression output explaining acquisition premiums paid (Column 2) and OLS regression explaining market reaction to acquisition announcement (Column 3). Standard errors are in parentheses and heteroskedastic robust. \*\*\*, \*\* and \* indicate significance on the 10%, 5% and 1% level respectively.

In order to test the second hypothesis we run an OLS regression. Model 2 in Table 3.2 shows serial consolidators pay on average a 22% higher premium for their first deals compared to single consolidators. This finding is in line with our prediction that serial consolidating acquirers acknowledge the future value of their strategy and correspondingly adjust their offer prices upward for the first acquisition in this chain. We also find acquirers holding a minority stake and with bigger experience with related private deals pay lower premiums. Presence of a minority stake lowers premiums paid since the overall price paid for the target will be lower for an acquirer who already purchased a minority stake at a prior lower price than the current controlling bid price (Eckbo, 2009). The negative effect of experience on premiums paid is in line with what would be expected from organizational learning theory.

In order to test the market reaction to the serial consolidation strategy, we run a series of regressions using different event-time windows for acquirer Cumulative Abnormal Returns (CARs). Model 3 in Table 3.2 shows the outcomes of our analysis<sup>34</sup>. Our findings indicate the market attaches more value to serial consolidators' strategy than to single consolidators. Although this finding shows the rationale in the acquisition strategy, the overall negative CAR for serial consolidators does not fully reject overpayment following behavioral factors (Morck, Schleifer and Vishny, 1990) as a potential explanation for the higher premiums paid, as this could have been concluded if the market reacted favorable to the serial consolidators. However, the finding of negative or negligible CARs in public transactions is not surprising as public deals within serial acquisitions lead to negative announcement returns (Fuller et al., 2002; Croci and Petmezas, 2009). As the size of the market reaction for serial consolidators is negligible (-0.2% in the (+10,-10) window), the price paid can be considered fair from a market perspective.

Finally, we consider the premiums paid throughout the sequence to answer hypothesis 4. Table 3.3 shows the acquisition premiums paid by serial consolidating acquirers for their subsequent targets decreases. However, the decrease is not apparent throughout the deal sequence, as would be expected following organizational learning theory.

We proposed two alternative explanations for the decreasing premiums between the first and second deals; acquirer learning and market anticipation. As acquisition premiums don't show a constant decrease throughout the sequence, acquirer learning seems less evident. To further test the potential learning effects in acquisition premiums we follow the acquisition-learning model as proposed by Aktas et al. (2009). Aktas et al. (2009) consider learning in sequential acquisitions as a feedback-mechanism where acquirers learn from the market's response to the first deal, and adjust their bidding

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<sup>34</sup> Although we consider several short-term event windows surrounding the announcement day (i.e. -1,+1; 0,+1; -5,+5; -10,+10), we find significant results only for the larger time windows. Although the smaller time windows show the envisioned effect (i.e. positive reaction to successful consolidating acquirers), they lack significance.

behavior in subsequent deals accordingly to the prior market reaction. A negative market reaction will decrease executives' bidding aggressiveness resulting in lower premiums in subsequent deals (Aktas et al, 2009; 2011). We use a student T-test to test for mean differences in acquisition premiums between first and second deals from acquirers receiving a positive market reaction to their initial deal, and those receiving a negative market reaction. Although the difference in premiums is larger (i.e. lower premiums for second deals) for the group receiving a negative market reaction, the premium differences between the two groups lack statistical significance (results available upon request).

Deal number	1	2	3	> 3
Average premium	59.41	42.14	47.53	41.68
S.D.	51.65	34.64	43.41	25.95
Min	-42.95	-53.87	6.47	-5.11
Max	255.53	140.84	180.00	92.27
Observations	78	78	26	17
<i>Mean difference</i>				
2	17.27***			
3	11.88**	-5.39*		
4	17.73***	0.46	5.85	

**Table 3.3:** Premium trend throughout the serial consolidation acquisition sequence. \*\*\*, \*\* and \* indicate significance on the 10%, 5% and 1% level respectively.

As a robustness check we consider two alternative consolidation definitions based on target-acquirer relatedness. The first considers relatedness at the 3-digit SIC level, the second considers broader economic relatedness by considering secondary SIC codes. Firms can report up to 12 SIC codes of business segments and industries they operate in. Although these industries might be of only marginal importance to firm operations, it does give the broadest definition of industry experience, which can also be considered as a measure of related diversification (Markides and Williamson, 1994)<sup>35</sup>. Alternatively, the time period in which the acquisitions need to be undertaken is restricted to 5 years. The 5-year limitation provides a higher likelihood of deliberately following a serial consolidation strategy. As the 5-year limited sample is a subsample of our initial consolidation sample the number of useful observations decreases. Our results regarding premiums paid and the market's reaction remain robust over the different relatedness definitions used (results

<sup>35</sup> For the 3-digit SIC relatedness measure our sample contains 125 serial consolidating acquirers, of which 46 do 3 or more deals, compared to 325 single consolidators. Regarding secondary SIC related deals we find 215 serial consolidating acquirers, of which 95 do 3 or more related deals, against 435 single consolidators. These numbers are before including the control variables, so due to data availability the final sample used in the analysis is smaller.

available upon request). The effect of industry concentration as shown in the probit model in Table 3.2, becomes insignificant in the alternative definitions, probably due to the overall lower industry concentration levels when loosening the relatedness definition.

### 3.6 Discussion

The analysis in this chapter shows that undertaking a serial acquisition program explains differences in acquisition premiums, and mitigates the negative market reaction. The overall negative returns counter acquisition program anticipation effects (as in Schipper and Thompson, 1983), as well as leaving room to suggest overvaluation or overpayment. In light of the serial nature of the acquisition strategy, alternative explanations might exist. For instance, if managers know the value of the growth options they acquire, they might be comfortable accepting a lower short-term performance effect in order to gain access to these options (Folta and O'Brien, 2007). Especially in a path dependent acquisition strategy value creation might occur over a longer term making it less likely to capture value around the initiation of such a strategy. Considering longer-term time windows might then be necessary to assess acquisition performance (King, Slotegraaf and Kesner, 2008). Especially when there is uncertainty regarding appropriation of envisioned targets, the market can be hesitant in establishing the value of the series. Together, these alternatives suggest further research into the value creation throughout the consolidation sequence should be considered.

Focusing on acquisition premiums in serial acquisitions limits our sample to public-to-public acquisitions, calling into question whether this limitation is not too strict in light of the serial consolidation strategy we seek to investigate. However, given the large scale monitoring by the business press and the public knowledge of the premiums paid, focusing on public acquisition (premium) differences alone is interesting. The market and media influence on an acquirer's reputation should make acquirers more aware and cautious in public acquisitions, especially with regards to size of the premiums.

Given the notion that acquirers prefer private targets in intra-industry deals (Capron and Shen, 2007), it seems warranted to extend our analysis to acquisitions of private targets, as these might appear more in consolidating strategies. While there was no significant influence of private related deal experience in our probit model, in order to gain some insight into the potential differences and effects of private acquisition experience in serial versus single consolidators, we consider the percentage of (4-digit) related private deals from all private deals undertaken prior to the public, focal deal used in this research. The results of the T-test show that serial consolidators have a significantly higher percentage of related private deals prior to their first public deal (54%) compared to single acquirers (42%,  $p$ -value = 0.02). These findings provide some insight into the potential importance of private acquisitions within a serial consolidation strategy, and suggest future research can consider private and public related acquisitions in combination. For instance,

given the positive effect acquisitions of private targets have on shareholder value (Fuller et al., 2002; Croci and Petmezas, 2009), as well as lower levels of public attention compared to public deals, acquisitions of private targets can precede public acquisitions as a means to gain (valuation and integration) experience and to build size prior to entering the public acquisition arena.

Using the CEO as unit of analysis assumes initiation of a serial consolidation strategy is mostly initiated on the executive level rather than on the firm level. The lack of finding specific firm level differences between serial and single consolidating acquirers strengthens this idea, and can suggest executive level differences, information asymmetries or preferences to be a potential differentiating factor in initiating a serial acquisition strategy. On the other hand, as the hiring process of executives is under close supervision by the board of directors and shareholders, the strategy could initially be envisioned by the firm's owners or directors who subsequently choose executives capable of executing this task (i.e. "board stacking" (Stuart and Yim, 2010)). In order to see whether the consolidation strategy is initiated by the executive or was already initiated on the firm level prior to the hiring of the CEO, we consider the percentage of related acquisitions out of all acquisitions in the 5 years prior to the start date of the CEO (no private-public separation). We find no statistical differences between single and serial consolidators regarding related deals done prior to the CEOs hiring<sup>36</sup>. Although these findings suggest CEO influence they are in no way conclusive and call for further research regarding executive influence in acquisition programs. For instance, considering executive communication around appointment as well as prior experience with acquisition programs could allow to further disentangle the hiring decision from the executive's influence.

There is considerable consensus on the existence of a decreasing CAR trend within acquisition programs (Fuller et al., 2002; Ahern, 2008; Billett and Qian, 2008; Aktas et al., 2009), however the explanations range from behavioral factors such as hubris to rational, learning elements. While the prior studies have considered differences between public and private targets, showing positive announcement effects for the latter type of deal, none has focused specifically on consolidating deals. While consolidation has benefits regarding valuation estimates and integration, it seems unlikely that consolidation can counter any of the arguments explaining the decreasing CAR trend. In case that, as we find, much of the envisioned value is reflected in the price paid of the first deal, subsequent deals will not lead to additional value creation and should not lead to additional announcement effects. This is in line with Ahern's (2008) anticipation hypothesis, which states that in case the market can correctly identify future targets the value of a future acquisition may have already been reflected in the announcement of prior acquisitions. Given the consolidating nature of the serial acquisition strategy the potential

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<sup>36</sup> Measuring relatedness on the 3-digit SIC level even shows a lower percentage of related deals done prior to the CEOs hiring for subsequent serial consolidators.

future targets can be accurately assessed and identified by the market, suggesting lower announcement effects in subsequent deals<sup>37</sup>.

Alternatively to the real option view in serial acquisitions a learning theory perspective (Finkelstein and Haleblan, 2002; Aktas et al., 2009) can also be considered. In the initial phases of a fragmented market multiple firms can envision the possibilities to undertake a consolidation strategy in order to reap the benefits associated with such a strategy. However, not all firms will be considered equally suitable for successfully conducting such a strategy, for instance due to difference in knowledge bases<sup>38</sup>. Given the market's ability to show the perceived value of executive and firm strategy formulation (Haleblan et al., 2009), a learning perspective in serial consolidation strategies can propose firms learn from the market reaction in whether to continue or abandon their acquisition strategy. Following a positive market reaction to an initial consolidating deal, acquirers will continue their initiated strategy, while a negative market reaction should lead to abandoning the serial strategy. Although a potentially interesting approach to serial consolidation strategies, learning theory does not explain our finding of higher premiums paid by serial consolidators. Information asymmetry between acquirers on the value of the serial consolidation strategy could potentially offer an explanation for the higher premiums in the learning theory perspective.

### *Managerial Implications*

In light of increasing globalization, consolidation becomes more and more apparent, making the findings of this chapter particularly relevant for managers. As we showed, serial consolidation paths can be considered valuable and warrant paying a higher premium. However, such serial paths should be carefully crafted and the potential for success should be considered in light of competition and number of target's present. Also, as consolidation strategies will be bounded by antitrust regulations, the true level on which consolidation benefits can be achieved will differ based on country-specific legal characteristics. Firms operating in highly fragmented or newly developed markets will have higher chances of successfully conducting a consolidating acquisition strategy.

Firms whose home markets show little growth potential can try to extend their geographical coverage by acquiring competitors in different regions. These acquisitions can still be considered horizontal, however certain benefits found in domestic consolidation deals will no longer appear in cross-border deals (i.e. cultural differences,

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<sup>37</sup> Given that the consolidation strategy cannot continue indefinitely, for instance due to antitrust regulations, the consolidator will have a bounded acquisition path, potentially with more targets than he can legally acquire. In this case the market might signal preferences for certain targets over others in the acquirer's announcement returns (which opens the way for acquirer learning with regards to target choices), and preferred targets' share prices will increase in anticipation of the acquisition.

<sup>38</sup> For instance birthright (i.e. size, resource endowment, and cumulative technological capability) can play a role in predicting success in a consolidation strategy, as incumbents have had more opportunity to develop these characteristics effectively into an advantage due to their increased time and experience in the market (Kim and Park, 2006).

lower growth forecast accuracy in unfamiliar markets). When entering new markets the real option analogy becomes even more apparent as a first deal in a new region can help in decreasing uncertainty regarding the growth potential in the new market, and can serve as a platform for further expansion. The additional growth options present in these platform deals will increase their value even more.



## Section II: Bounded Rationality in Acquisitions



# Chapter 4: Risk in Acquisitions: Effects of Reference Points, Method of Payment and Time<sup>39</sup>

*This chapter analyzes public acquisitions from 1990 to 2010 to identify the influence reference points have on acquisition risk. Using the 52-week stock price high as a reference point we find that, following prospect theory predictions, an acquirer's deviation from the reference point (i.e. position in the loss space) influences acquisition risk measured as relative target size. Shareholders of risk-taking acquirers lose wealth, but the influence of the acquirer's deviation from the reference point on this loss depends on the method of payment used. Finally, we extend prospect theory by introducing a temporal dimension, and find acquirer risk-taking increases in time since the reference point occurred for cash paid deals, while the opposite occurs in stock paid deals. The time effect shows firms are considerate of their method of payment, taking advantage of high stock prices while increasing size in deals with positive market reactions.*

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<sup>39</sup> This chapter is based on Kil (2013b). Earlier versions of this chapter benefitted greatly from comments by Remco Zwinkels, Sjoerd van Bakkum, Patrick Verwijmeren, seminar participants at the Erasmus Research Institute of Management (ERIM), and attendants of the Academy of Behavioral Finance 2012 annual meeting and 2013 PREBEM conference.

## 4.1 Introduction

Prospect theory (Kahneman and Tversky, 1979), arguably one of the most influential theoretical contributions to behavioral economics and finance, provides a descriptive decision-making model under uncertainty that offers an alternative framework of analysis to the classic utility theory. An essential tenet of prospect theory is the recognition that changes in wealth, rather than final asset positions, are carriers of utility. In other words, the value function departs from changes (gain/loss) to a reference point rather than changes in absolute magnitudes. Furthermore, prospect theory's value function is convex in the loss space and concave in the gain space, characterizing respectively a risk-seeking and risk-averse attitude dependent on the position compared to the reference point. Finally, the slope of the S-shaped utility function around the reference point is steeper for losses than for gains to account for one more characteristic of prospect theory: loss aversion<sup>40</sup>.

Numerous studies in the finance field have tested the findings of prospect theory by considering investor and managerial decisions under uncertainty. For instance, prospect theory elements have been considered in investor choices (Shefrin and Statman, 1985; Odean, 1998; Grinblatt and Han, 2005), asset pricing and investor attitudes (Barberis, Huang and Santos, 2001), and IPOs (Loughran and Ritter, 2002; Ljungqvist and Wilhelm, 2005). Recent research by Baker, Pan and Wurgler (2012) (hereafter BPW) provides insights into the effects of reference points in establishing prices for targets in acquisitions. As acquisitions are highly visible, discretionary long-term investments (Datta, Iskander-Datta and Raman, 2001), they offer an interesting setting to test prospect theory predictions. The main finding in BPW is that the target's 52-week stock price high acts as an anchor in the valuation process and is a significant determinant of the premium paid by the acquirer. The psychological explanation for the influence of seemingly irrelevant values on finale estimations follows from the anchoring and adjustment bias (Tversky and Kahneman, 1974). While BPW consider a target level reference point and the subsequent effect of this reference point in establishing a fair price for a target, prospect theory predictions depart from the decision-maker's (i.e. the acquirer) perspective whose risk-taking tendency is influenced by the position on the value function compared to the reference point. Contrary to BPW, this chapter considers the decision-maker's position compared to a reference point, and investigates the effect this position has on the risk attitude in acquisitions. The reference point considered is the acquirer's 52-week stock price high. The 52-week high is widely documented in the media, and CEOs can be incentivized to remain close to this level as their personal wealth and compensation is often linked to firm share prices (Bergstresser and Philippon, 2006). Prospect theory predicts acquirers deviating more from the reference point will take more risk in trying to

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<sup>40</sup> Loss aversion: the inclination of individuals to be more sensitive to a decrease in their levels of utility than to an increase (Kahneman and Tversky, 1979).

return to the reference point. The central objective of this chapter is to test whether the acquirer's 52-week high is considered as a reference point, and whether prospect theory predictions regarding acquirer's risk attitude are valid in acquisition decisions.

As a measure for acquisition risk we use the relative size of the target compared to the acquirer. Relative large deals, when unsuccessful, will put tremendous strain on the acquirer's financial position (Pablo, Sitkin and Jemison, 1996) and will increase risk in the post-deal firm (Datta et al., 2001). In case an acquisition turns out unsuccessful (e.g. does not provide the anticipated gains), a relatively small target will inflict less harm to the acquirer than a larger target would (Wright et al., 2002), suggesting relative size can be used to portray risk. Considering relative acquisition size is also useful in light of the reference point used, as potential deal benefits will increase with relative size (Jarrell and Poulsen, 1989) which will be reflected in the acquirer's share price increase (Loderer and Martin, 1990). As such, relatively large deals can be undertaken in order to return to the prior stock price high. However, the mixed effects of relative size on the acquirer's stock price (Faccio, McConnell, Stolin, 2006; Moeller, 2010) suggest caution needs to be taken as not all large deals will have a positive effect on the acquirer's share price.

In the empirical results, we document evidence that the acquirer's deviation from its 52-week high stock price is a salient reference point in explaining acquisition risk, as the deeper an acquirer is positioned in the loss domain, the larger the relative target size becomes. The use of relative size as a proxy for acquisition risk is further strengthened by the negative market reaction surrounding the announcement of relatively large deals, which implies risk-taking firms actually end up further from their reference point. However, cash paid deals show a positive market reaction upon announcement indicating method of payment influences whether the sought benefits are obtained. From the market's perspective, the influence of the acquirer's deviation from the reference point on acquisition risk also depends on the payment method. While this finding suggests market participants and corporate decision-makers consider different reference points in acquisitions, the discrepancy is dependent on payment method used.

Alternatively, we consider the acquisition premium as a risk measure and find that an acquirer's deviation from his 52-week high stock price has a positive effect on the premium paid. When comparing our risk measure against BPW's reference point (i.e. the target's 52-week high), the risk-related effect disappears, indicating that in acquisition pricing the influence of the target-level reference point on the price paid is more profound than the acquirer's position in the loss space.

Finally, we extend prospect theory's assumptions by introducing a temporal dimension. The reference point used allows us to define the time (in days) between the occurrence of the reference point and the announcement date of the acquisition. To the best of our knowledge this chapter is the first to consider a temporal element in reference points and prospect theory's predictions on risk-taking behavior. We find that the time-risk relation is dependent on the method of payment showing an increase for cash paid deals

and a decrease for stock paid deals. These findings suggest acquirers take more risk in stock paid deals when the 52-week high occurred recently, benefiting from the current high valuation by using their high-priced stock to pay for their risky deals, while in cash paid deals the effect of deviation from the 52-week high on acquisition risk increases with time.

This chapter proceeds as follows. Section 4.2 considers the related literature on reference points and acquisition risk. Section 4.3 discusses the data and sample used to test our predictions. The findings of the different multivariate analyses are discussed in section 4.4. Section 4.5 provides discussion of the results and implications of the findings in this chapter.

## **4.2 Reference Points and Risk in Acquisitions**

### **4.2.1 52-week stock price high as a reference point**

Psychological research in human learning and memory suggests that most people struggle to remember a sequential record of informative events, and they tend to preserve and memorize averages or extreme values instead (Fiske and Taylor, 1991; Fredrickson and Kahneman, 1993)<sup>41</sup>. A particular extreme value, and the one used in this chapter, is a stock's historical 52-week high. 52-week highs are widely reported in the financial and business press where they are used to highlight breaches of this level and for comparison to current stock prices (George and Hwang, 2004; Huddart, Lang and Yetman, 2009). The cognitive preference for remembering extremes and availability of this reference point in the media can explain why the 52-week high became such a key value in investors' considerations. For instance, a breach of a stock's historical high is a level where many investors are particularly keen on realizing their profits, resulting in an increase in trading volume (Grinblatt and Keloharju, 2001; Barberis and Xiong, 2011), and this especially holds for the 52-week stock price high (Huddart et al., 2009). Heath, Huddart, and Lang (1999) show the effect of stock price highs in option exercise decisions and find employees display a higher tendency to exercise stock options when the underlying price exceeds the stock's highest price over the previous year. Trading strategies based on proximity to 52-week highs have shown to significantly outperform alternative, traditional momentum strategies (George and Hwang, 2004) and this effect holds in markets outside the U.S. (Marshall and Cahan, 2005). Combined, this research shows extreme stock prices can act as relevant reference points in financial decision-making.

A related strand of literature looks at reference point formation and updating. Kliger and Kudryavtsev (2008) show investors update reference points in stock prices based on the arrival of new and unanticipated firm specific events (i.e. quarterly earning announcements). Baucells, Weber and Welfens (2011) document the manner in which

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<sup>41</sup> This view is supported by earlier and more general psychological experiments (Anderson, 1974; Mandler, 1977).

investors form their reference points based on a time series of prices. Their main conclusion is that the initial (purchase) and final (current) price of the asset carries most weight in forming reference prices. Baker and Xuan (2009) attribute the capability of a firm to raise outside equity to the CEOs performance compared to the reference price inherited upon joining the firm. In their view, replacing a CEO can serve to replace a former salient reference point with a new one.

#### **4.2.2 Acquisitions and risk**

The measure for acquisition risk used in this study is relative target size. Acquisition size is important as only large deals are likely to influence a firm's risk and value (Wright et al., 2002). Also, relatively larger targets will put larger financial strain on acquirers (in light of funding or money spend) and in case the deal turns out unsuccessful (e.g. divested after a couple of years, or fails to deliver the envisioned benefits) the magnitude of the potential losses is greater in relatively larger targets, increasing the level of risk (Pablo et al., 1996)<sup>42</sup>. Related research on relative acquisition size has shown that relatively larger deals tend to be more complex, requiring the use of one or more investment bankers (Haunschild, 1994) and display a negative effect on subsequent acquisition activity (Haleblian, Kim and Rajagopalan, 2006). Datta et al. (2001) consider the tendency of acquirers to be ex-ante more or less risk seeking based on executive compensation (i.e. level of equity based compensation) and show a link between relative target size and an ex-post increase in risk measured by an increase in leverage. An even stronger effect of CEO compensation and acquisition risk is documented in Sanders and Hambrick (2007) who find a positive relation between anticipated risk-seeking behavior and acquisition risk, among which relative deal size. Wulf (2004) relates deal size to empire building, as executive compensation and status increase with firm size. However, increasing size can also serve a defensive purpose, as larger firms are less likely to become takeover targets (Wulf, 2004).

#### **4.2.3 Reference points and risk in acquisitions**

Two recent papers consider the effect of reference points on the risk attitude of decision-makers in an acquisition context. BPW consider the anchoring and adjustment bias (Tversky and Kahneman, 1974) and provide evidence that both target and bidder managers use the target's 52-week high as an anchor in the valuation process to establish a price for the target. Bidders use the target's 52-week high in order to justify higher offer premiums, while target shareholders anchor themselves to the same 52-week high in order to demand higher premiums depending on the proximity of their current stock price to the 52-week high. The authors conclude that offer premiums are influenced to a certain extent by the cognitive limitations of decision-makers.

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<sup>42</sup> The level of risk is highly dependent on the resource requirement after the acquisition, as in case an acquirer can meet and accommodate the continuing resources of the target, the overall risk and resources required will be lower (Pablo et al., 1996).

Schneider and Spalt (2011) describe a gambling propensity of managers towards targets with lottery-like distinctiveness. Their findings suggest that the offer premium is higher for targets that are characterized by high volatility, high skewness and low stock prices (characteristics similar to lottery tickets). The authors explain the higher offer premium through the tendency of decision-makers to put too much emphasis on small probabilities as implied by prospect theory's probability weights. Their results empirically confirm that the effect of target's lottery characteristics on the offer premium is more pronounced for acquirers currently positioned in the loss space of the value function. To test the effect of risk attitude on the gambling propensity of acquirers the authors consider four different reference points: cumulative bidder's stock returns, Altman's Z-score, the ratio of the bidder's stock price to their 52-week high and net income. The results indicate that, apart from the bidder's stock cumulative returns, all other tested reference scales explain higher offer premiums for acquirers that were considered to be in the loss space relatively to acquirers in the gain space of the value function. These results provide insight into the more relevant measures that can be used to investigate the effect of reference points on acquirers' risk attitude.

In this chapter we examine the effect of an acquirer's reference positioning on his risk preference in acquisitions measured by the relative target size. We use the deviation from the acquirer's 52-week high to establish the acquirer's position in the loss domain<sup>43</sup>. Assuming reference points affect decision-makers, prospect theory predicts acquirers positioned further in the loss space become increasingly risk seeking. In an effort to return to the reference point, a risk-seeking acquirer will take more risk by acquiring relatively larger targets.

The use of the acquirer's 52-week high does limit our analysis to only consider the loss space, as positions over the 52-week high automatically create a new 52-week high and as such update the reference point to this new situation. So, rather than following the portrayal of utility and risk preferences from prospect theory, i.e. risk-averse in the gain space and risk-seeking in the loss space, our analysis is limited to the loss space. The specific focus on only one of prospect theory's domains makes loss aversion irrelevant for our consideration as loss aversion follows from a comparison between gains and losses. If anything, it seems that firms deeper in the loss space (i.e. close to bankruptcy) increase<sup>44</sup> rather than marginally decrease risk-taking as predicted by prospect theory (Miller and Chen, 2004). For the remainder of the research we do use the finding that operating below a reference point increases risk-taking (Thaler and Johnson, 1990; Miller and Chen, 2004) and for now refrain from making any predictions on the exact shape of the utility curve.

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<sup>43</sup> In their analysis, Schneider and Spalt (2011) split the variable indicating the bidder's 52-week high to the current stock price in high versus low ratio firms and, contrary to this study, focus explicitly on the premiums paid in acquisitions.

<sup>44</sup> Given the limited liability for the equity holders in case of bankruptcy, increases in risk around bankruptcy can be both beneficial for the firm as well as the shareholders (Golbe, 1988).

### 4.3 Data and Methodology

#### 4.3.1 Acquisition sample

Our initial sample consists of all completed U.S. public-to-public acquisitions available in the Securities Data Company (SDC) database with an announcement date between January 1, 1990 and December 31, 2010. Following BPW, we exclude deals in which the offer price is missing and include only transactions where the acquirer purchased at least 85% of the target firm shares outstanding. In addition, deals that have been classified as recapitalizations, repurchases, or rumors are omitted. Furthermore, deals with transaction value of less than \$1 million have been excluded from the sample. Our initial sample consists of 4,058 deals.

#### 4.3.2 Variables

**Dependent variables.** As the measure of acquisition risk relative target size is used by taking the log of target total assets divided by acquirer total assets in the fiscal year prior to the deal's announcement date<sup>45</sup>. Data are from Compustat, and we winsorize relative target size at the 1% and 99% level.

As an alternative risk measure, and to compare the results to BPW, we also consider the acquisition premium paid, defined as the percentage of the bidder's offer price from the target's closing stock price 4 weeks prior to the announcement date. The premium is obtained from SDC and we use the target stock price 4 weeks prior to the announcement for the calculation of the premium in an attempt to avoid stock price run-ups following rumors regarding the upcoming announcement (Jarrell, Brickley and Netter, 1988). As the premiums obtained from SDC show some large outliers, the premiums are winsorized at the 1% and 99% level.

**Independent variables.** Our main explanatory variable is the deviation of the acquirer's stock price from its historical 52-week high (Acquirer 52-wk high). We take the acquirer's pre-acquisition stock price 4 weeks prior to the deal announcement and the acquirer's 52-week peak stock price measured as the highest daily closing price in the 12 months prior to the pre-acquisition stock price (i.e. stock price high in the period T-4 to T-56 weeks, where T is the deal announcement data). We scale the acquirer's stock price to its corresponding 52-week high to obtain the current stock price's underperformance compared to its 52-week high. We take the natural logarithm of this variable, thereby omitting observations where the acquirer's stock price 4 weeks prior to announcement marks a new 52-week high (i.e. 52-week high deviation is 0). This focuses our research even more into the direction of the loss domain, as only underperformance compared to

<sup>45</sup> We also use a number of alternative measures for relative size. Following Datta et al. (2001) we calculate relative size as  $TMve+TTa-TBe/AMve+ATa-ABe$  or market value of target equity plus target total assets minus book value of target equity, divided by market value of acquirer equity plus acquirer total assets minus book value of acquirer equity. Also, following Moeller et al. (2004) we use transaction value over equity market capitalization of the acquirer (Transaction value/AMV). Finally, target market capitalization over acquirer market capitalization (TMV/AMV) is calculated as an alternative measure of relative size.

the 52-week high is considered. Stock price data is obtained from the Centre for Research on Security Prices (CRSP).

In order to compare our results to BPW we also obtain the target's 52-week high difference to the current stock price, by calculating the percentage difference between the target's 52-week peak stock price and the target's stock price 4 weeks prior to the deal announcement. Rather than scaling this variable to the target's 52-week stock price, in order to see the underperformance of the target to its 52-week high, we follow BPW and scale the target's difference by the target's stock price 4 weeks prior to the deal. In essence this value shows the premium over the current target stock price when the target's 52-week stock price high would be paid.

Table 4.1 shows our final sample of 1,527 deals split per calendar year. The sample shows a peak in acquisition activity at the end of the 90's, while average deal value increased in the years prior to the financial crisis. Average acquirer deviation from the 52-week high shows yearly values between 13% and 33%, indicating decreasing share prices in 2001 and 2002, as well as in 2008 and 2009. Average relative target size, or acquisition risk, decreased after 2000 and average acquisition premiums fluctuate yearly between 32% and 78%.

**Control variables.** In the analysis we control for additional acquirer, target and deal characteristics that might influence the acquisition risk and premium. Acquirer and target characteristics are taken from Compustat and CRSP and are from the fiscal year prior to the acquisition announcement year. Following BPW control variables include return on assets, defined as net income (Compustat: NI) over total assets (Compustat: AT), market capitalization, defined as price (CRSP: PRC) times shares outstanding (CRSP: SHROUT), the book-to-market ratio, defined as book equity divided by market equity where book equity is total shareholder's equity (Compustat: SEQ) plus deferred taxes and investment tax credit (Compustat: TXDITC) minus the redemption value of preferred stock (Compustat: PSRKRV), and the earnings-price ratio, defined as earnings before interest and taxes (Compustat: EBIT) divided by market equity. Return on equity, defined as net income over shareholders equity is also included. All variables are calculated for both acquirers and targets and are winsorized at the 1% and 99% level.

We also control for a number of deal characteristics obtained from SDC. We control for method of payment (cash or stock deal), as cash-financed acquisitions have on average higher offer premiums compared to other deal considerations (Huang and Walking, 1987; Savor and Lu, 2009). We consider whether the deal attitude was hostile (hostile deal) as the premium offered in a hostile takeover is higher compared to a friendly acquisition (Schwert 2000; Alexandridis, Petmezas and Travlos, 2010). In addition we control for acquirer-target relatedness on the 4-digit SIC level, presence of multiple bidders and whether the acquirer owned a minority stake prior to the acquisition announcement. Table 4.2 provides descriptive statistics for the reference point and firm and deal-specific variables for our full sample, as well as cash and stock paid subsamples.

<i>Number of acquisitions from 1990 to 2010</i>								
<b>Year</b>	<b>Number of deals</b>	<b>Single acquirers</b>	<b>Multiple acquirers</b>	<b>Deal value</b>	<b>Acquirer 52-wk high</b>	<b>Acquisition risk</b>	<b>Premium</b>	
1990	25	25	0	421.28	0.27	0.31	53.82	
1991	16	14	1	179.24	0.21	0.49	78.62	
1992	15	15	0	464.53	0.29	0.98	45.64	
1993	22	22	0	984.38	0.25	0.24	43.18	
1994	26	24	1	418.96	0.21	0.41	41.42	
1995	69	65	2	711.92	0.14	0.34	45.01	
1996	70	61	5	906.32	0.22	0.36	49.05	
1997	109	94	6	440.29	0.19	0.42	39.10	
1998	128	110	8	1,692.55	0.27	0.40	49.60	
1999	124	107	7	2,115.12	0.30	0.32	63.10	
2000	145	130	6	1,706.17	0.31	0.35	52.29	
2001	106	93	6	935.21	0.32	0.32	45.70	
2002	66	64	1	1,418.22	0.32	0.20	45.60	
2003	74	68	3	1,270.47	0.20	0.33	49.04	
2004	90	88	1	1,711.12	0.18	0.27	38.81	
2005	84	66	4	2,588.54	0.19	0.26	32.75	
2006	93	84	4	2,194.67	0.13	0.26	32.41	
2007	92	84	4	1,431.79	0.15	0.32	34.83	
2008	57	53	2	1,070.93	0.27	0.29	50.47	
2009	55	55	0	2,727.62	0.33	0.29	61.76	
2010	61	59	1	816.83	0.14	0.30	63.87	
<b>Total</b>	1,527	1,381	62					
<b>Average</b>	72.71	65.76	2.95	1,247.91	0.23	0.36	48.38	

**Table 4.1:** Distribution of the acquisition sample per year. Single acquirers obtained only one target in the calendar year, while multiple acquirers obtained more than one target in the calendar year

Panel A: Reference point and firm-specific variables										
Reference points		N	Mean	S.D.	Firm-specific variables		Acquirer characteristics		Target Characteristics	
							N	Mean	S.D.	Mean
Acquirer 52-wk high	full sample	1527	0.24	0.21	<i>ROE</i>	1527	0.09	0.28	-0.07	0.58
	cash paid	487	0.21	0.19		487	0.14	0.22	-0.06	0.52
	stock paid	492	0.27	0.23		492	0.03	0.30	-0.10	0.58
Premium		1430	51.35	40.08	<i>ROA</i>	1527	0.03	0.13	-0.05	0.24
		471	54.56	41.38		487	0.06	0.09	-0.05	0.24
		449	51.52	38.77		492	0.00	0.16	-0.07	0.27
Target 52-wk high		1398	0.80	1.44	<i>Book-to-market</i>	1527	0.44	0.30	0.63	0.56
		434	0.69	1.19		487	0.43	0.30	0.67	0.59
		464	0.98	1.66		492	0.40	0.32	0.55	0.52
Acquisition risk (TA/AA)		1527	0.33	0.58	<i>Earnings-price</i>	1527	0.07	0.10	0.01	0.28
		487	0.15	0.28		487	0.08	0.08	-0.01	0.29
		492	0.43	0.80		492	0.05	0.11	-0.01	0.28
TMve+TTa-TBe/ AMve+ATa-ABe		1527	0.21	0.33	<i>Marketvalue</i>	1527	14637.23	34,049.74	755.46	1,918.42
		487	0.11	0.25		487	24028.20	45,038.82	409.84	828.56
		492	0.24	0.38		492	10676.55	27,750.53	758.91	2,092.48
Transaction value/AMV		1527	0.00	0.00	<i>CAR (-1,+1)</i>	1324	-0.01	0.08		
		487	0.00	0.00		413	0.01	0.06		
		492	0.00	0.00		424	-0.03	0.09		
TMV/AMV		1449	0.22	0.34						
		454	0.12	0.26						
		476	0.25	0.38						

Panel B: Acquisition deal-specific variables			
Deal-specific variables	N	Number	Percentage
Cash deal	487		32
Stock deal	492		32
Hostile deal	1527	25	2
	487	9	2
	492	4	1
Multiple bidders	1527	74	5
	487	24	5
	492	15	3
Related deal	1527	607	40
	487	157	32
	492	191	39
Minority stake	1527	33	2
	487	16	3
	492	5	1
Financial acquirer	1527	288	19
	487	53	11
	492	107	22

**Table 4.2:** Descriptive statistics for reference point, firm-specific and deal-specific variables. Panel A displays descriptive statistics for the reference point variables and the acquirer and target firm-specific variables. CAR indicates Cumulative Abnormal Returns for the acquirer following an event study conducted in Eventus for the period (-1,+1) days surrounding the acquisition announcement date. Italicized variables indicate variables that are winsorized at the 1% and 99% level. In our analysis we use log values for all reference point variables, as well as target and acquirer market value. Panel B shows the descriptive statistics of the deal-specific variables.

Some notable differences between the cash and stock paid subsamples are the smaller relative size (15% to 43%) and higher acquirer performance, size and market reaction in cash paid deals compared to stock paid deals. Panel A in Table 4.2 shows the average acquirer's deviation from its 52-week high is 24%, compared to an 80% deviation on the target level. On average target assets are about a third of the size of those of the acquirer, and the average premium is 51%. Compared to acquirers, targets seem to underperform

based on negative return on assets and return on equity, and their book-to-market values are higher. From panel B we can see the number of all-cash and all-stock deals is roughly the same (32% of the full sample), and 40% of all deals are related. Tender offers, deals involving multiple bidders and those in which a minority stake was present are relatively scarce.

## 4.4 Results

### 4.4.1 Effect of reference point on acquisition risk

Table 4.3 shows the results from the OLS regression including control variables on acquisition risk measured as the log of target total assets divided by acquirer total assets. Model 2 shows strong support for the notion that acquirers' position in the loss space influences the level of risk taking in acquisitions. More specifically, a 10% increase in acquirer's deviation from its 52-week high results in a 1.3% increase in relative target size. More interesting, the target's 52-week high seems of no influence to relative acquisition size. Following the finding in BPW, this suggests the target's 52-week high is likely more associated with valuation of a target than with risk. We also find that hostile and related deals tend to be larger. Also, target ROA, book-to-market, and earnings-price are positively related to relative acquisition size. This seems to indicate profitable, well performing firms can be good targets as their performance can warrant the risk taken in terms of size. Acquirers with high book-to-market ratios also show to acquire relatively larger targets. Acquirer's ROE, ROA and cash paid deals seem to negatively influence acquisition size, suggesting profitable firms buy relatively smaller targets. In Model 4 we also check for premiums paid in relation to relative size. According to Roll (1986) relatively large targets can be more accurately valued, lowering the premium paid, while premiums might also be lower since it might be easier to obtain shares in large, more dispersed owned firms (Jarrell and Poulsen, 1989, p. 14). In line with these arguments we find acquirers pay lower premiums for relatively large deals.

As a robustness check we use alternative measures for relative size. Following Datta et al. (2001) we calculate acquirer and target size as market value of equity plus total assets minus book value of equity and take the ratio as a proxy for relative size in Model 5 in Table 4.3. Also, transaction value over equity market capitalization of the acquirer (Moeller et al., 2004) (Model 6) and target market capitalization over acquirer market capitalization (Model 7) are used as alternative measures for relative deal size<sup>46</sup>. As shown in Table 4.3, the effect of acquirer's position in the loss domain is robust to the use of alternative market-based measures for relative size. However, the target's 52-week high becomes significant negative when using the alternative variables for relative acquisition size. This relationship is not surprising given the negative correlation between target 52-wk high and the market based measurements of acquisition risk.

<sup>46</sup> We take the log of all alternative size measures.

Dependent variable: Acquisition risk							
	1	2	3	4	5	6	7
Acquirer 52-wk high		0.126*** (0.04)	0.114*** (0.04)	0.100** (0.04)	0.155*** (0.04)	0.136*** (0.04)	0.156*** (0.04)
Target 52-wk high			0.028 (0.03)	0.064** (0.03)	-0.098*** (0.03)	-0.054* (0.03)	-0.098*** (0.03)
Premium				-0.297*** (0.06)			
Cash deal	-1.199*** (0.11)	-1.195*** (0.11)	-1.184*** (0.12)	-1.129*** (0.12)	-1.027*** (0.11)	-1.181*** (0.11)	-1.027*** (0.11)
Stock deal	0.045 (0.10)	0.038 (0.10)	0.024 (0.11)	-0.009 (0.11)	0.074 (0.11)	-0.155 (0.10)	0.074 (0.11)
Hostile deal	0.683*** (0.25)	0.688*** (0.25)	0.747*** (0.27)	0.798*** (0.27)	0.750*** (0.28)	0.837*** (0.26)	0.750*** (0.28)
Multiple bidders	0.281 (0.18)	0.281 (0.19)	0.286 (0.21)	0.299 (0.21)	0.247 (0.20)	0.324* (0.19)	0.247 (0.20)
Related deal	0.521*** (0.09)	0.522*** (0.09)	0.548*** (0.09)	0.531*** (0.10)	0.517*** (0.09)	0.512*** (0.09)	0.516*** (0.09)
Minority stake	-0.417 (0.28)	-0.415 (0.29)	-0.459 (0.29)	-0.322 (0.28)	-0.264 (0.28)	-0.388 (0.27)	-0.264 (0.28)
Target ROE	0.060 (0.11)	0.076 (0.11)	0.023 (0.12)	-0.035 (0.13)	0.119 (0.11)	0.063 (0.11)	0.119 (0.11)
Target ROA	1.170*** (0.38)	1.158*** (0.37)	1.254*** (0.38)	1.400*** (0.41)	1.199*** (0.36)	1.210*** (0.34)	1.199*** (0.36)
Target book-to-market	0.463*** (0.09)	0.458*** (0.09)	0.516*** (0.10)	0.554*** (0.11)	-0.238** (0.10)	-0.175* (0.09)	-0.239** (0.10)
Target earnings-price	0.532*** (0.19)	0.564*** (0.19)	0.779*** (0.22)	0.849*** (0.24)	0.530** (0.22)	0.778*** (0.23)	0.529** (0.22)
Acquirer ROE	-0.701** (0.28)	-0.725*** (0.28)	-0.682** (0.28)	-0.793*** (0.30)	-0.304 (0.27)	-0.272 (0.27)	-0.305 (0.27)
Acquirer ROA	-0.970 (0.70)	-0.923 (0.69)	-1.177* (0.71)	-1.065 (0.75)	-2.467*** (0.68)	-2.372*** (0.70)	-2.467*** (0.68)
Acquirer book-to-market	0.542*** (0.18)	0.531*** (0.18)	0.472** (0.19)	0.382* (0.20)	1.660*** (0.19)	1.550*** (0.18)	1.661*** (0.19)
Acquirer earnings-price	-1.124* (0.60)	-0.914 (0.60)	-0.749 (0.69)	-0.357 (0.74)	0.140 (0.66)	0.354 (0.65)	0.142 (0.66)
Financial acquirer	-0.193 (0.14)	-0.154 (0.14)	-0.235 (0.15)	-0.354** (0.15)	-0.294** (0.14)	-0.380*** (0.13)	-0.296** (0.14)
Constant	-2.147*** (0.46)	-1.922*** (0.46)	-1.231*** (0.39)	-0.146 (0.45)	-2.279*** (0.39)	-8.550*** (0.36)	-2.280*** (0.39)
Time effects	YES						
Observations	1527	1527	1398	1309	1398	1398	1398
R-squared	0.274	0.279	0.278	0.297	0.326	0.332	0.326
Adjusted R-squared	0.257	0.262	0.259	0.276	0.308	0.314	0.308

**Table 4.3:** Influence of acquirer and target position in the loss domain on acquisition risk.

Fixed time effects ordinary least squares regressions explaining acquisition risk by the acquirer and target 52-week high deviation, premiums paid and control variables. All standard errors are in parentheses and clustered on firm level. \*\*\*, \*\*, and \*, indicate statistical significance below the 1%, 5% and 10% levels respectively.

Keeping acquirer size constant, the larger the 52-week target deviation, the smaller the current target's size and the smaller the relative deal size.

#### **4.4.2 Effect of reference point on acquisition premiums**

Based on BPW and Schneider and Spalt (2011), and in order to compare results, the premium paid is used as an alternative measure for acquisition risk. Acquisition premiums can be considered the main determinant of the deal's potential success and inherent perceived risks, and are therefore perhaps the most likely one to be influenced by cognitive limitations (Roll, 1986; Billett and Qian, 2005; Malmendier and Tate, 2008). While premiums can indicate risk taking (Malmendier and Tate, 2008), the height of the premium is not necessarily indicative of risk, as high premiums can be warranted in light of the future value creation of the completed deal. However, overestimating potential gains and underestimating the perceived risk (i.e. probability) of obtaining the envisioned benefits can both lead to higher premiums being paid, where the acquirer increases the size of the potential loss while decreasing his share of the future benefits from the transaction.

One notable difference between samples in related studies and the sample used in this chapter lies in the distribution of offer premiums. While the distribution of premiums in this sample is most in line with Schneider and Spalt (2011), who also use SDC calculated premiums, compared to BPW the mean premium in our sample is much higher (51.35% versus 32.36%). In order to find out whether premiums obtained from SDC are biased upwards, we also calculate the premium by dividing the stock price paid provided in SDC by the target's stock price 4 weeks prior to announcement obtained from CRSP. The average CRSP calculated premium is 51.01% (N=1,345, insignificant difference), suggesting no difference between the SDC premiums and CRSP premiums. In order to increase sample size we use the SDC premium in our subsequent analysis.

The results when using acquisition premium as a risk measure are shown in Table 4.4. Model 2 shows that acquirers who have experienced a 10% retrace from their 52-week high stock price offer a 0.5% higher premium in their acquisitions. For the average acquirer in our sample this amounts to roughly a 1.5% higher premium (average percentage below 52-week high is 24%), or \$22 million dollar per deal on average<sup>47</sup>. Overall, the findings support the idea that acquirers who suffered a greater retrace in their stock price relatively to the 52-week high pay higher premiums, although the size of the excess price paid can be considered marginal. Furthermore, Table 4.4 shows that hostile bids, targets with large book-to-market and, in line with Moeller et al. (2004), large acquirers lead to higher premiums paid. Acquisitions by financial firms, those involving well-performing acquirers and large targets show significantly lower premiums. The latter finding can be attributed to the available information on large targets that helps improve

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<sup>47</sup> Although the envisioned effect can be smaller due to the inclusion of the control variables, the outcome of a regression without controls shows a minor increase to 0.7% higher premiums paid by acquirers that are 10% below their 52-week high.

the due diligence, or a more careful valuation process due to the size of the transaction (Alexandridis et al., 2013).

Next, we consider the effect of the target's 52-week high in Model 3, in order to compare the found effects with those reported by BPW. Given the larger correlation between target 52-wk high and acquisition premium compared to acquirer's deviation (respective correlations are 0.27 and 0.10), it comes as no surprise that the target 52-week high premium offers a much stronger explanation of the premium paid in acquisitions than the acquirer's position in the loss space, showing a 1.4% higher premium for every 10% retrace in target stock to its 52-week high<sup>48</sup>.

As the results show, the acquisition premium can be used as a measure of risk in acquisitions, and acquirers who are expected to take more risk, based on their position in the loss space, indeed pay higher premiums. However, the anchoring effect used in BPW seems to offer a stronger explanation for acquisition premiums than the position in the loss space. This might be due to a difference between the concepts of valuation and risk in relation to acquisition premiums. As the target 52-week high can be readily observed it can be used as an anchor when establishing the fair value of the target firm, rather than indicating a risk preference. It seems difficult to suggest the acquirer's 52-week high has an influence on the value of the target and post-transaction firm and therefore the fair premium to be paid.

#### 4.4.3 Market perception of acquisition risk

As financial markets can state their expectations on proposed target-acquirer fit, synergies, risk of the deal and price paid (Fuller et al., 2002), we use the market reaction surrounding the acquisition announcement in order to establish whether relative size is an indication of acquisition risk. We conduct an event study in Eventus to identify shareholder's abnormal returns related to the acquisition announcement. We consider a market model for a 3-day event window (-1,+1) around the announcement data and use the CRSP equally weighted market index as a benchmark. The OLS estimation period used to obtain the acquirer's abnormal returns starts 46 days before the acquisition announcement date and considers stock returns until 255 trading days prior to announcement<sup>49</sup>.

If acquisitions are wealth-increasing investments, the larger the relative size, the larger the observed returns should be (Jarrell and Poulsen, 1989). Also, small deals are related to higher chances of failure (Kitching, 1967), yet, due to their size, might be less likely to show any abnormal post-acquisition performance (Loderer and Martin, 1992).

<sup>48</sup> We also use the target's 52-wk high deviation by scaling the difference between target 52-week high and stock price 4 weeks prior to the deal by the target's 52-week high. The results, available upon request, are even stronger, showing a 1.7% increase in premium when a target deviates 10% from its 52-week high. The results for our relative size regressions in Table 4.3 remain unchanged when scaling the target's 52-week high deviation by the target's 52-week high.

<sup>49</sup> These are the default settings when using Eventus software.

<b>Dependent variable:</b>			
<b>Acquisition premium</b>	1	2	3
Acquirer 52-wk high		0.046** (0.02)	-0.026 (0.02)
Target 52-wk high			0.138*** (0.02)
Cash deal	-0.020 (0.06)	-0.026 (0.05)	0.021 (0.05)
Stock deal	0.038 (0.06)	0.066 (0.06)	0.025 (0.06)
Hostile deal	0.503*** (0.12)	0.476*** (0.11)	0.392*** (0.12)
Multiple bidders	0.165 (0.11)	0.150 (0.11)	0.147 (0.12)
Related deal	-0.032 (0.05)	-0.029 (0.05)	-0.012 (0.05)
Minority stake	0.126 (0.10)	0.133 (0.10)	0.082 (0.08)
Target ROE	0.004 (0.05)	-0.003 (0.05)	0.030 (0.04)
Target ROA	-0.133 (0.17)	-0.144 (0.18)	-0.061 (0.17)
Target book-to-market	0.059 (0.05)	0.104** (0.05)	0.059 (0.06)
Target earnings-price	0.098 (0.15)	0.146 (0.15)	0.345** (0.17)
Target marketvalue	-0.141*** (0.02)	-0.147*** (0.02)	-0.139*** (0.02)
Acquirer ROE	0.090 (0.11)	0.082 (0.11)	0.056 (0.11)
Acquirer ROA	-0.507* (0.29)	-0.524* (0.30)	-0.502* (0.30)
Acquirer book-to-market	-0.115 (0.09)	-0.100 (0.09)	-0.130 (0.09)
Acquirer earnings-price	0.442 (0.35)	0.604* (0.35)	0.504 (0.36)
Acquirer marketvalue	0.073*** (0.02)	0.086*** (0.02)	0.088*** (0.02)
Financial acquirer	-0.416*** (0.08)	-0.455*** (0.07)	-0.384*** (0.08)
Constant	3.796*** (0.21)	3.819*** (0.15)	3.811*** (0.22)
Time effects	YES	NO	YES
Observations	1430	1430	1309
R-squared	0.152	0.124	0.195
Adjusted R-squared	0.129	0.112	0.170

**Table 4.4:** Influence of acquirer and target position in the loss domain on acquisition premiums. Ordinary least squares regressions explaining acquisition premiums by the acquirer and target 52-week high deviation and control variables. All standard errors are in parentheses and clustered on the firm level. \*\*\*, \*\*, and \*, indicate statistical significance below the 1%, 5% and 10% levels respectively.

The positive effects of relative large deals, like added bargaining power that comes with size (Ang and Mauck, 2011), more top-management attention (Bruton, Oviatt and White, 1994) and providing more value-creating assets, (Shelton, 1988) all suggest large deals should have a positive effect on acquirer returns. Also, large relative deals can indicate financial synergies, and, when fully exploited, acquisition gains are larger compared to deals that rely on operational synergies (Chatterjee, 1986). On the contrary, large targets might be harder to manage properly (Shelton, 1988) and managerial (over) commitment to large deals can result in negative shareholder returns (Mulherin and Boone, 2000). The empirical findings of the effect of relative size on announcement returns are mixed, showing positive effects for the acquirer (Asquith, Bruner and Mullins, 1983; Jarrell and Poulsen, 1989; Faccio et al., 2006) or the combination (Shelton, 1988; Servaes, 1991) while also insignificant (Travlos, 1987; Lang, Stulz and Walkling, 1991) and even negative effects have been found on acquirer's abnormal returns (Eckbo and Thorburn, 2000; Moeller, 2010) as well as performance (Kusewitt, 1985). These findings show caution needs to be taken when conducting relatively large deals, as the effects are not as straightforward as might be suggested.

Next to relative size the method of payment can also influence the market reaction to acquisitions. Firms close to their 52-week high can use their stock as form of payment in order to take advantage of the high current stock price. However, stock paid deals can be considered a signal of bidder overvaluation, to which the market will adjust the acquirer's stock price downwards. Instead, firms seeking to increase their share price following a large deviation from the 52-week high should use cash to finance their deals, as cash paid deals have shown to have a positive effect on acquirer share price compared to stock paid deals (Huang and Walking, 1987; Wansley, Lane and Yang, 1987; Servaes, 1991; Loughran and Vijh, 1997; Linn and Switzer, 2001), as well as positive long-term performance implications (Agrawal, Jaffe and Mandelker, 1992; Lin and Switzer, 2001; Sudarsanam and Mahate, 2003). As such, in acquisitions both relative size and payment method can result in a positive stock price effect, aiding acquirers in returning to their reference point.

Table 4.5 shows the OLS output for our full sample (column 1) and cash and stock paid subsamples (respectively column 2 and 3). Model 1 shows relative acquisition size, labeled acquisition risk, is negatively related to abnormal returns, suggesting relatively larger deals are indeed perceived as risky by the market. The negative effect of risk is even larger in stock paid deals, and the positive effects associated with a deal's relative size are only apparent in cash paid deals.

We also consider the premiums paid in acquisitions in Model 1. Premiums will differ between acquirers, as different firm combinations will have different value-creating potential, depending on the distinctive acquirer characteristics (Officer, 2003). Whether the price paid in an acquisition is excessive depends on the (perceived) added value a target can bring to the acquirer. Acquisition premiums can also reflect the bargaining

power between acquirer and target, as acquirers who are able to pay a premium that is below the total future benefits will gain more in the transaction, resulting in a positive market reaction. In case the acquirer pays for all of the future synergies, a higher premium will not necessarily be value destroying. However, in case of overpayment, due to behavioral biases, competitive situations, or other types of market envisioned risks that make the premium paid excessive, the market will react with a negative readjustment of the acquirer's stock price. Model 1 shows higher premiums are related to lower abnormal returns, suggesting the market deems higher premiums excessive and a form of overpayment rather than reflecting future synergetic benefits from the deal. This finding holds only for the stock paid subsample, as the high premiums in these type of deals could indicate target bargaining power. Finally, Model 1 shows the acquirer's 52-week high deviation is only significant in the cash paid subsample. The insignificance of deviation in the full and stock paid sample suggests managers and markets might rely on different reference points in acquisition considerations (Baucells, Weber and Welfens, 2011<sup>50</sup>) and the effect of the reference point considered in this study depends on the method of payment used.

In order to see whether the 52-week high deviation influences the risk taken in acquisitions, Models 2 and 3 consider the interaction between 52-week high deviation and the risk measures. For the full sample the interaction terms are not significant, suggesting the market neither considers large relative size nor premium to be influenced by the acquirer's position in the loss domain. This finding provides additional support for the discrepancy in reference point consideration between the market and the acquirer. Rather the effect of the 52-week high deviation on risk seems to depend on the method of payment, showing positive results for cash paid deals and a negative effect in stock paid deals for the premium interaction term. From a market perspective, acquirers paying in cash are better in picking the value increasing targets, and these deals are less associated with overpayment. The positive reaction to cash paid deals can also indicate shareholders of firms deviating from their 52-week high value control, preferring cash paid deals to minimize potential dilution of their equity (Ghosh and Ruland, 1998). Also, cash paid deals can be completed quicker than stock paid deals, while premiums might be larger to decrease chances of competitors entering the bidding process (Slusky and Caves, 1991). The market's positive reaction to premiums in cash paid deals can suggest the market attaches more value to these elements than to the size of the premium paid. Finally, Model 4 shows the interaction between relative size and premium, showing that both risk measures strengthen each other, especially in stock paid deals.

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<sup>50</sup> Baucells et al. (2011) show the stock price high has a marginal effect on the reference prices investors attach to stock prices, rather they use the purchase price and the most recent price to establish gains or losses.

Dependent variable: CAR (-1,+1)												
	1			2			3			4		
	full	cash	stock	full	cash	stock	full	cash	stock	full	cash	stock
Acquisition risk (1)	-0.004** (0.00)	0.004* (0.00)	-0.011*** (0.00)	-0.003** (0.00)	0.011** (0.01)	-0.011* (0.01)				0.006 (0.00)	-0.005 (0.01)	0.022* (0.01)
Premium (2)							-0.004* (0.00)	0.020** (0.01)	-0.025** (0.01)	-0.011** (0.00)	0.014 (0.01)	-0.027*** (0.01)
Acquirer 52-wk high (3)												
(1)*(3)												
(2)*(3)												
(1)*(2)												
Cash deal												
Stock deal												
Hostile deal												
Multiple bidders												
Related deal												
Minority stake												
Target ROI												
Target ROA												
Target book-to-market												
Target earnings-price												
Acquirer ROE												
Acquirer ROA												
Acquirer book-to-market												
Acquirer earnings-price												
Financial acquirer												
Constant												
Time effects												
Observations	1242	402	386	1324	413	424	1242	402	386	1269	408	397
R-squared	0.085	0.081	0.115	0.078	0.093	0.082	0.081	0.085	0.094	0.089	0.074	0.128
Adjusted R-squared	0.071	0.043	0.076	0.065	0.056	0.046	0.067	0.057	0.054	0.076	0.036	0.091

**Table 4.5:** Influence of acquisition risk and acquirer and target position in the loss domain on market returns. Ordinary least squares regressions explaining the acquirer's Cumulative Abnormal Returns (CARs) by acquisition risk, the acquirer and target 52-week high deviation and control variables. Interaction effects for acquisition risk and acquirer 52-wk high, premium and acquirer 52-wk high and acquisition risk and premium are included. All standard errors are in parentheses and are clustered on the firm level. \*\*\*, \*\*, and \*, indicate statistical significance below the 1%, 5% and 10% levels respectively.

#### 4.4.4 Time sensitivity of risk-seeking behavior

Prospect theory considers the influence of deviations from the reference point, yet does not consider temporal effects. To the best of our knowledge, prior literature has omitted a temporal consideration in the prospect theory framework. Given the nature of the reference point used in this chapter, we will provide insight into the effect of time spend in the loss space on risk-taking behavior<sup>51</sup>. In Table 4.6, a time dimension is added to the already existing measures of reference positioning, and we again split the sample based on method of payment. Since the 52-week high is based on a stock's daily closing price, we have information on the number of days between the 52-week high and the announcement date of the acquisition. We divided our sample of acquirer's deviation from the 52-week high into 4 quarters of 91 days each.

Panel A in Table 4.6 shows for both the cash and stock paid subsamples the deviation from the 52-week high is increasing with time, suggesting large deviations take time to accumulate. Also, we see acquisition risk increases up to the third quarter and decreases in the fourth quarter. This suggests a concave function of risk with time, where the influence of reference points decreases after a certain time period.

Panel B in Table 4.6 shows the results of the regression with the interaction of time and the reference position. Column 2 shows evidence of an increasing risk level in cash-paid acquisitions up to 3 quarters since the 52-week high occurred. Compared to the first quarter, the fourth quarter shows no significant difference, suggesting the fourth quarter risk-taking is comparable to the first quarter. These results suggest a concave function of time in the loss space and risk-taking in cash-paid acquisitions<sup>52</sup>. Despite the constant reminders in the media, it appears that with time the more a person can come to peace with his losses and comfortable with the new status-quo. Especially in the turbulent business environment, where looking forward is important, losses and failures that occurred more distant in time will likely have a lower influence in current decisions than recently experienced losses. Along these lines, Grinblatt and Keloharju (2001) find evidence in stock trades where stock prices that attain a 6 or 12 month high are relative unimportant in the sell-decision compared to prices attaining a monthly high (p. 605)<sup>53</sup>.

In the stock-paid subsample (Column 3) we find a decrease in the risk in acquisitions with time. Compared to the first quarter, less risk is taken in subsequent quarters when there is a larger deviation from the 52-week high. This seems rational in light of the payment consideration, as acquirers who are still close to their 52-week high can benefit from using their high-valued stock as payment in risky acquisitions. Overall,

<sup>51</sup> Due to our focus on the loss space we can't use the S-shape of prospect theory's utility curve to hypothesize on the suggested risk-time relation, as it incorporates loss-aversion.

<sup>52</sup> We find no statistical proof of the fourth quarter risk being lower than the third quarter risk, suggesting this interpretation has to be made with caution.

<sup>53</sup> However, the volume of trades seems to be influenced by the time since the past peak price (Huddart et al., (2009)).

the influence of time and 52-week high deviation on acquisition risk is dependent on the method of payment. In stock paid deals acquirers seem to optimize the benefits of a current high stock price, taking less risk when the stock price deviates more from the 52-week high and the 52-week high occurred longer ago. In cash paid deals the effect of deviation from the 52-week high on risk in acquisitions increases with time, but given the positive market reaction in all-cash offers, this increase in risk might lead to positive stock price effects for the acquirer.

Panel A: Descriptive statistics per quarter								
Cash Paid						Δ		
	Acquirer 52-wk high	N	%	Mean	S.D.	Q1	Q2	Q3
	Q1	166	34	0.084	0.10			
	Q2	117	24	0.248	0.20	***		
	Q3	79	16	0.267	0.18	***		
	Q4	125	26	0.316	0.19	***	***	**
	Acquisition risk							
	Q1	166	34	0.119	0.18			
	Q2	117	24	0.126	0.22			
	Q3	79	16	0.231	0.49	***	**	
	Q4	125	26	0.160	0.25	*		*
Stock Paid								
	Acquirer 52-wk high	N	%	Mean	S.D.			
	Q1	200	41	0.129	0.15			
	Q2	81	16	0.287	0.18	***		
	Q3	88	18	0.347	0.22	***	**	
	Q4	123	25	0.435	0.24	***	***	***
	Acquisition risk							
	Q1	200	41	0.432	0.36			
	Q2	81	16	0.446	0.38			
	Q3	88	18	0.498	0.95			
	Q4	123	25	0.378	0.48			

**Table 4.6:** Influence of time since 52-week high occurrence on acquisition risk.

**Table 4.6 Continued.**

<b>Panel B: Regression results of time effects on acquisition risk</b>			
<b>Dependent variable:</b>			
<b>Acquisition risk</b>	1	2	3
	full	cash	stock
Acquirer 52-wk high*Q2	0.129 (0.10)	0.389** (0.18)	-0.345* (0.19)
Acquirer 52-wk high*Q3	0.091 (0.15)	0.544* (0.33)	-0.483** (0.23)
Acquirer 52-wk high*Q4	0.105 (0.12)	0.163 (0.22)	-0.370* (0.21)
Q2	0.061 (0.25)	0.801* (0.48)	-0.625 (0.42)
Q3	-0.012 (0.28)	1.011* (0.60)	-0.624 (0.43)
Q4	0.077 (0.24)	0.625 (0.45)	-0.592 (0.41)
Acquirer 52-wk high	0.121** (0.06)	0.085 (0.11)	0.223** (0.11)
Constant	-1.140*** (0.42)	-2.751*** (0.76)	-1.487** (0.64)
Control variables	YES	YES	YES
Time effects	YES	YES	YES
Observations	1527	487	492
R-squared	0.282	0.365	0.186
Adjusted R-squared	0.262	0.308	0.113

**Table 4.6:** Influence of time since 52-week high occurrence on acquisition risk.

Panel A shows descriptive statistics and mean differences between the 52-week high and acquisition risk per quarter for subsamples of acquisitions based on method of payment. Panel B shows the output for fixed time effects ordinary least squares regressions explaining relative acquisition size measured as target total assets over acquirer total assets by acquirer 52-week high deviation divided into time since the 52-week high occurred (in quarters of 91 days). All standard errors are in parentheses and are clustered on the firm level. \*\*\*, \*\*, and \*, indicate statistical significance below the 1%, 5% and 10% levels respectively.

## 4.5 Discussion

The specific choice of reference point in this study limits our analysis to prospect theory's loss domain. Although with different reference points (i.e. points that also have a gain element) an analysis of the entire prospect theory spectrum could be undertaken, we feel extreme reference points are worth investigating, as their occurrence is widespread within the corporate environment. For instance credit ratings (AAA) and market-based size rankings (Fortune 500 #1 firm) all share the same distribution of one extreme value. It remains interesting, and in line with the prospect theory framework, to see how firms are influenced by deviations from these extreme values, and how corporate behavior might be affected in the challenge to return to these extremes.

One of the core assumptions in this chapter is that decision-makers, after dropping below their 52-week high, are seeking to return to this point. Although returns to acquisitions are mixed, relative size and method of payment can have a positive effect on the acquirer's share price, rationalizing the choice for an acquisition to increase stock prices and return to the reference point. Alternative methods with a positive influence on share prices, like share repurchases or changes to dividend payouts (Comment and Jarrell, 1991; Dhillon and Johnson, 1994) could also be considered. An additional explanation for undertaking acquisitions could be the increased personal necessity to achieve success in future ventures to overcome the current loss situation. Potentially instated by shareholder pressure for change, successfully conducting an acquisition can signal strength and provide a potential turnaround moment, irrespective of the shareholder value creation. Also, an acquisition can serve to create a new reference point, as the combined, post-deal firm's stock price will be higher.

Finally, our sample might be biased as we only consider firms that successfully undertake acquisitions. Given the reference point used we can assume that most firms are more often operating below their 52-week high than constructing new highs. This raises the question why, given an equal 52-wk high deviation, certain firms undertake acquisitions and others don't? Firm or executive level characteristics can be factors that influence this decision, as well as the susceptibility towards the reference point. However, this does steer the discussion towards the unit of analysis, and whether acquisitions should be considered as risky choices or risk in acquisitions provides a useful research ground. Although we do not discard research on acquisition activity, given the high frequency of acquisitions and their established consideration as a mechanism for corporate growth, we feel considering acquisitions, and the risk herein, in isolation is justified.

The findings in this chapter possess a number of managerial implications. First, we shed light on the influence (deviation from) the 52-week high has on corporate decisions. Although we focus on acquisition decisions, managers should consider and question other decisions made at times of large underperformance compared to the 52-

week high as our findings might apply to a broader set of corporate decisions. Second, given the market's inconsideration of the deviation from the 52-week high on the acquisition decisions, considering the 52-week high in isolation can potentially be undesirable. Executives and market participants seem to use different sets of reference points in their decisions, suggesting a higher degree of alignment between these reference points could result in corporate decisions with an increasing effect on shareholder value, while providing further insight into the elements considered important by market participants. Third, our results provide insight in the factors in acquisitions that have a positive effect on the market reaction, specifically across different payment methods. Although executives correctly choose their method of payment accordingly to the firm's stock price level, additional (acquirer and target level) elements can be considered to obtain a positive stock price reaction upon announcement.

In light of the empirical results presented here and in other recent papers, future research could consider a multivariate framework of cognitive factors. This framework can incorporate several behavioral phenomena, such as anchoring (BPW), probability weights (Schneider and Spalt, 2011) and reference to time documented in this study, in order to evaluate the overall influence of cognitive factors on the risk in acquisitions. Particularly, a deeper investigation into how multiple reference points compete and relate to each other can enhance our understanding of risk-taking in acquisitions.



# Chapter 5: Behavioral Real Options: Uncertainty Neglect in Acquisition Decisions<sup>54</sup>

*This chapter considers the influence of behavioral biases on decision-makers' perception of uncertainty and the implications for real option based acquisition considerations. Behavioral theory suggests behavioral biases can cause a disparity between perceived and actual uncertainty in the distribution of potential acquisition outcomes. Contrary to staging investments in situations of uncertainty as prescribed by real option theory, behavioral induced uncertainty neglect will lead to inconsideration of a sequential investment strategy. We integrate the two views of decision-making under uncertainty and develop new propositions to clarify the influence of behavioral induced uncertainty neglect on real options, specifically in acquisition decisions. Combining behavioral theory and real option theory provides an alternative explanation for the normative - empirical observed inconsistency in acquisitions, labeled the "minority stake paradox".*

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<sup>54</sup> This chapter is based on Kil and Smit (2013b). Earlier versions of this chapter benefitted greatly from comments by Ian Macmillan, Jim Thompson, Tony Tong and seminar participants at the Wharton School (University of Pennsylvania), Erasmus Research Institute of Management (ERIM) and Academy of Behavioral Finance 2009 annual meeting.

*“We have a very narrow view of what’s going on.”*

*(Daniel Kahneman)*

*“I’m looking for negative control. Okay? No more than 30, 35 percent. Just enough to block anybody else’s merger plans and find out from the inside if the books are cooked.”*

*(Gordon Gekko, from the movie “Wall Street”)*

## **5.1 Introduction**

This chapter proposes decision-makers’ behavioral biases lead to a subjective and distorted perception of uncertainty in acquisition outcomes, subsequently causing inconsideration of a real options, staged investment approach and a preference for immediate acquisitions. Like many other corporate actions where current decisions are made in light of uncertain future outcomes, acquisitions are characterized by risk, uncertainty, complexity and ambiguity (Duhaime and Schwenk, 1985; Pablo, Sitkin and Jemison, 1996). The real option literature considers dealing with uncertain situations in a rational manner by emphasizing the advantages of deferring large-scale investments until part of the uncertainty has been resolved and the investment becomes clearly lucrative (Bowman and Moskowitz, 2001; Tong and Reuer, 2007). Following real option theory, instead of immediate commitment, the full-scale acquisition will be postponed and only executed when, after resolution of uncertainty, there is a certain, or highly probable, beneficial outcome. Consequentially, when the resolution of uncertainty decreases the probability of a positive outcome, the intended full acquisition will be discontinued or even abandoned altogether (McGrath, 1999).

In acquisitions, a real option can be obtained by acquiring a minority equity stake (Folta, 1998; Folta and Miller, 2002; Miller and Folta, 2002) or through an equity alliance (Reuer and Tong, 2010). In acquisitions with uncertain outcomes, a minority stake allows for the downside loss to be contained as in case of an unbeneficial resolution of uncertainty the option holder’s maximum loss is limited to the cost of the minority stake (i.e. the option premium). Minority stake investments fit into the alliance literature as a specific one-way equity alliance, with a limited probability of losing core capabilities, skills and information to alliance partners (i.e. strategic or joint-venture partners), while still benefiting from increased awareness and knowledge-sharing of the potential growth development that follows from an acquisition (Hagedoorn and Duysters, 2002; Porrini, 2004). By increasing the buyer’s understanding of potential value drivers and risk associated with the target and deal outcome, equity alliances<sup>55</sup> prior to acquisitions are

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<sup>55</sup> Equity alliances are also referred to as minority (equity) stakes (Folta and Miller, 2002) and toeholds (Eckbo, 2009). We will use the term minority stake throughout this chapter to refer to all instance where an acquirer

valuable as they provide the acquirer target-specific information and experience that may be an advantage-producing resource (Porrini, 2004; Schijven and Hitt, 2012). Although minority stakes can signal takeover intentions to rivals, potentially starting a bidding war, there is strong empirical proof confirming minority stakes generate an advantageous position in multi-bidder contests, and increase the probability of winning the deal against a lower average price (Betton, Eckbo and Thorburn, 2009; Eckbo, 2009). However, despite their advantages, minority stakes prior to full acquisitions are rare and have decreased in number since the 1990s (Betton et al., 2009; Eckbo, 2009), giving rise to what we will label the “minority stake paradox”.

Uncertainty plays a vital role in deciding to stage an acquisition through use of a minority stake or consider an immediate, full acquisition (Dyer, Kale and Singh, 2004). Given the widespread failure to generate value, and the notion acquisitions are frequently undertaken as one-shot, now-or-never, decisions (Eckbo, 2009), it appears associated risks surrounding acquisitions are often neglected. We propose behavioral theory can be used as an alternative way to explain the (suboptimal) choice of an immediate acquisition in light of the uncertainty present by considering the decision-maker’s perception of uncertainty. Conventional real option theory considers optimal, rational decisions under an unbiased and known distribution of potential values of the underlying asset. Contrary, behavioral theory, based on bounded rationality of decision-makers, provides insights into distorted views of uncertainty and risk in corporate decisions (Cyert and March, 1963). Through influencing the perception of uncertainty, executive level cognitive biases can lead to less considerate investment strategies in light of the uncertain environment in which they operate, resulting in a preference for direct investments as well as refraining from establishing real options in situations where this would be applicable and beneficial. As a result, investments will be undertaken sooner rather than later, causing a bias to invest.

The contribution of this chapter to management theory on acquisitions is twofold. First, we review the various types of uncertainty that influence acquisition outcomes and show executive level behavioral factors can cause a distorted perception of uncertainty in acquisition outcomes<sup>56</sup>. We argue that various behavioral biases have different specific effects on the assumed distribution of investment outcomes, and show these effects tend to be in one direction; underestimating the outcome-distribution’s uncertainty. Prior research on the perception of uncertainty considers the effects of inconsistencies between perceived and environmental uncertainty on firm performance (Sutcliffe, 1994; Gary and Wood, 2011). We extend this stream of research by an in-depth consideration of the causes (i.e.

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purchases a minority equity stake in a potential target with the intention of acquiring the target in a later stage. It is assumed the target will cooperate and no defensive barriers will be instated to block a potential acquisition attempt.

<sup>56</sup> Although the terms risk and uncertainty are often used interchangeable, acquisition risk refers to the unpredictability in the acquisition outcome variables, while uncertainty refers to the unpredictability of environmentally or organizational variables that impact acquisition performance (Miller, 1992). In line with real option theory we consider uncertainty as the ex-ante unknown probability of a certain outcome given the variation within these potential outcomes.

personal level behavioral factors) and implications (i.e. bias to invest) of a discrepancy between perceived and environmental uncertainty in acquisition decisions. More specifically, we extend earlier findings showing individual level differences in uncertainty perception can explain alliance considerations (Dickson and Weaver, 1997) by considering minority stakes in acquisitions, and subsequently making the connection to the real option literature.

Second, we extend the literature on real options and behavioral theory (Coff and Laverly, 2001; 2007; Miller and Shapira, 2004) by developing new propositions for an acquisition context and we show behavioral induced uncertainty neglect results in inconsideration of a real option (staged) investment strategy. As such, this chapter provides a positive theoretical explanation for the “minority stake paradox” by combining normative insights from real option theory with behavioral factors influencing the perception of uncertainty. As prior explanations for the “minority stake paradox”, like mandatory information disclosure, market illiquidity and costs associated with target management resistance to the takeover, fail to fully explain the decreasing use of minority stakes (Eckbo, 2009, p. 165), the proposed influence of behavioral biases on the perception of uncertainty, and the subsequent effect on the choice between staged or immediate investments, can serve as an alternative explanation. While this chapter explicitly focuses on corporate acquisitions and minority stakes, the behavioral real options view considered here is not limited to this specific context, as it can be generalized to other business decisions under uncertainty where real option theory is applicable like R&D investments (McGrath, 1997), joint venture formations (Chi, 2000; Reuer and Tong, 2005; Kumar, 2005; Tong, Reuer and Peng, 2008), equity alliances (Reuer and Tong, 2010) and green field investments (Brouthers and Dikova, 2010).

## 5.2 Theory

### 5.2.1 Real options in acquisitions

Traditional NPV analysis is based on predictable determinants, where investing is a go/no-go decision depending largely on the perception of future operating cash flows, and does not consider dynamic timing of investment decisions to harmonize with the resolution of uncertainty. When contemplating an acquisition, the economic uncertainties (i.e. unpredictability of the environment) regarding the size and likelihood of the envisioned payoffs increase risk (i.e. performance volatility) for the acquirer as there is a chance for substantial losses (Miller, 1992; Pablo et al., 1996; Miller and Folta, 2002). In light of these uncertainties and probabilities for downturns, postponement of the acquisition decision provides for a more considerate investment strategy.

Real option theory encourages exploration in uncertain situations and acknowledges value in sequencing the design and execution of a corporate investment strategy in situations of uncertainty, placing a premium on timing flexibility (Dixit and Pindyck, 1994; McGrath, 1997). Using the real options methodology acquisitions with

uncertain future outcomes are not treated as static scenarios, but instead the investment decision is adjusted as uncertainty resolves providing a rational way to choose whether to undertake, forgo or defer the acquisition depending on how the external environment evolves against explicit threshold values (Bowman and Hurry, 1993; Folta and Miller, 2002; Adner and Levinthal, 2004). In order to obtain an option on the target, the bidder can invest in a minority equity stake (Folta, 1998; Folta and Miller, 2002; Miller and Folta, 2002). Purchase of a minority stake creates a shared option to defer the acquisition and retain the flexibility to guard against unbeneficial developments in the economic climate. In case of appreciating conditions, the bidder will have an advantageous position to subsequently increase the ownership stake to a majority interest compared to rivals without a minority interest. In case of stagnating growth, the loss on the option will be much lower compared to the potential loss in case of a full acquisition.

We conceptualize the option to acquire by using a minority stake as an American call option<sup>57</sup> where after the attainment of the option (minority stake purchase) the appreciating value of the target firm will lead to option exercise (full acquisition). However, deferment of the acquisition involves opportunity costs in terms of missed synergies or other immediate advantages that result from the integration of the two firms (e.g. the loss of early operating synergies or market power improvements). In an option view, these opportunity costs can be considered analogous to dividends, making the timing of option exercise a trade-off between the missed dividends from not investing immediately<sup>58</sup> and the option value to defer in light of the uncertainties present.

Next to additional real option value a number of practical advantages arise from the utilization of minority stakes prior to full acquisitions. First, minority stakes deter competition from entering, making the acquisition option more proprietary in nature by strategically creating disincentives and higher (and in some cases insurmountable) entry costs for competitive bidders (Bulow, Huang and Klemperer, 1999; Betton and Eckbo, 2000; Miller and Folta, 2002; Eckbo, 2009). Second, acquiring a minority stake will increase the probability of winning a potential takeover battle. This effect has been shown in theoretical (Bulow et al., 1999), experimental (Georganas and Nagel, 2011) and empirical research (Betton and Eckbo, 2000). Third, despite the tendency to increase aggressive bidding, higher equity stakes lead to higher profits (Bulow et al., 1999; Georganas and Nagel, 2011) and lower acquisition prices (Betton and Eckbo, 2000; Betton et al., 2009; Eckbo, 2009)<sup>59</sup>. In case a competitor does decide to engage in a bidding war

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<sup>57</sup> The acquisition option is an American option as, contrary to a European option, it can be exercised before maturity.

<sup>58</sup> Since an acquisition option is a shared option, where the holder of the option does not have the sole right to acquire the firm, the dividends foregone should include the possibility of a rival entering and exercising the option (i.e. acquiring the target firm) (Miller and Folta, 2002; Folta and Miller, 2002).

<sup>59</sup> There seems to exist a size effect in minority stakes regarding whether the advantages materialize. When the stake is relatively small (five percent), the probability of winning decreases (Georganas and Nagel, 2011). It appears the minimum stake required to obtain an advantage is around nine percent (Eckbo, 2009).

and outbids the minority stake holder, the latter still benefits from a higher claim to the trade sale of his equity stake (Mathews, 2003). As such, a minority stake owner will have an incentive to bid aggressively as every price quoted acts as both a bid for the remainder of the company and an ask for the equity stake (Bulow et al., 1999).

### **5.2.2 Dimensions of uncertainty in acquisitions**

A firm's choice between obtaining corporate control through sequential investing by means of a minority stake or an immediate majority investment follows from the uncertainty and risk associated with the situation and within the target it is seeking to acquire (Folta, 1998; Dyer et al., 2004). In case of low situational and target uncertainty a full acquisition is appropriate to rapidly capitalize on the valuable growth opportunities, whereas in situations of high uncertainty, when the value-creating potential of the acquisition cannot be confidently assessed, a minority stake is a better choice (Hagedoorn and Sadowski, 1999; Hagedoorn and Duysters, 2002; Dyer et al., 2004).

Uncertainty can be broadly divided in three dimensions: endogenous, industry and exogenous uncertainty (Miller, 1992). Endogenous, firm level uncertainty is controllable and can be resolved through corporate actions while resolution of exogenous, environmental uncertainty is uncontrollable on a personal or firm level. Industry specific uncertainty incorporates competitive influences (Miller, 1992; Miller and Waller, 2003) and is neither fully endogenous nor exogenous, as it can be influenced by individual firm strategic actions as to shape the industry's future direction in the firm's favor (McGrath, 1997; Warner, Fairbank and Steensma, 2006).

In acquisitions, endogenous uncertainty appears in the uncertainty regarding the level of synergies from the new target-acquirer combination. A temporal differentiation can be made between two types of acquisition synergies; restructuring/operational synergies and strategic synergies. Restructuring and operational cost synergies can be directly contributed to the change in ownership when inefficient target management and procedures are replaced with the superior firm's capabilities, and effectively combining firm resources to obtain economies of scale and scope results in lower costs and relatively easy attainable profits. Strategic synergies are synergies that materialize over a longer time period. These synergies can be inter-temporal rather than inter-asset and follow from path dependencies resulting in increased market power or new growth opportunities when the acquisition creates access to new geographies for existing products, or new product-combinations to enter completely new market segments (Smit, 2001; Smit and Moraitis, 2010b). These inter-temporal synergies are surrounded by considerable uncertainty due to their long-term horizon, during which new synergies may appear and those taken for granted in the valuation can evaporate (Coff, 1999). Other factors influencing the integration process and deal success are for instance differences in corporate culture (Weber and Schweiger, 1992; Weber, Shenkar and Ravy, 1996; Lovallo et al., 2007). Next to acquisition-outcome related uncertainty, target appropriation uncertainty on the acquirer

level can be found in financing requirements and the acquirer's ability to secure funding for the transaction (Miller, 1992).

Industry level acquisition uncertainty on potential synergies stems from uncertainty in market and industry developments. Product-market uncertainty<sup>60</sup>, technological breakthroughs, disruptions in the production chain and entry of competitors all threaten to decrease the potential future profits and synergies from an acquisition (Miller, 1992; Werner, Brouthers and Brouthers, 1996). Industry knowledge will increase the accuracy with which synergies and the industry's evolution can be forecasted and therefore diversifying deals will exhibit higher levels of uncertainty on industry value-drivers and competitive actions compared to intra-industry deals<sup>61</sup>. Target appropriation uncertainty will increase when competitive buyers are present. Competition limits the time-period in which an acquisition can be made, as a rival bid could result in the loss of the acquisition opportunity and its associated growth and synergies. Actions taken in a competitive environment can have repercussions by rivals moving sooner, mimicking or instating investment barriers (Miller, 1992; Smit, 2001; Keil, Laamanen and McGrath, 2013). Also, competition can decrease the potential acquisition synergies as competitive bidders will drive up the price for the target, essentially requiring the winner to give up more of the future benefits in order to appropriate the target.

Finally, exogenous, or environmental acquisition uncertainties are uncontrollable on a firm level. Examples are political, macroeconomic, policy and natural uncertainties (Miller, 1992; Brouthers, Brouthers and Werner, 2002). Resolution of environmental uncertainty occurs often without prior warning and is highly irreversible (e.g. natural disasters). This shock-effect requires fast-moving procedures that can be initiated and completed in a rapid pace as to counter the potential negative effects. Cross-border deals will typically exhibit higher levels of exogenous uncertainty, especially with regards to political and macroeconomic risks (Miller, 1993).

Given the probabilistic nature of synergy estimations (Schijven and Hitt, 2012), acquisitions are surrounded by high levels of endogenous uncertainty. Contrary to exogenous uncertainty, the value of deferral will be low in situations of high endogenous uncertainty, as this type of uncertainty will not resolve over time. Rather, endogenous uncertainty is resolved through investing when the combination of target and acquirer resources will unveil their combined value. However, given the high level of endogenous uncertainty in acquisitions there is considerable risk for large scale losses when after investing the endogenous uncertainty resolves in an unbeneficial direction (i.e. lower synergies). Therefore, staging the irreversible investment decision through purchase of a

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<sup>60</sup> Examples of product-market uncertainty are unexpected changes in product demand, client's preferences, or changes in the availability of substitute and complementary products (see Brouthers, Brouthers and Werner, 2002).

<sup>61</sup> Although we can distinguish between the different types of uncertainty it is harder to categorize specific acquisitions based on uncertainty, as a typical acquisition will be influenced by several types of uncertainty at the same time.

minority stake is preferred and valuable as this leads to increased target knowledge and allows to better assess the level of potential synergies. Endogenous uncertainty will then be, at least partially, resolved after the minority investment is made allowing to more accurately envision the outcomes of the full acquisition. As such, minority stakes can help decrease the information asymmetry between target and acquirer (Schijven and Hitt, 2012). Contrary, in situations with high levels of exogenous uncertainty deferral value will be higher, as the exogenous uncertainty will resolve over time allowing for more considerate investment decisions. Gaining better insights into the long-term value creation potential and possible demand in a new geography will benefit the potential acquisition's success. In situations of combined endogenous and exogenous uncertainty (industry specific uncertainty), the endogenous uncertainty can be (partly) resolved by purchasing a minority stake. The holder of the minority stake will increase the level of information asymmetry with rival bidders not holding a minority stake in his advantage by gaining insight into target management and firm procedure efficiency. However, part of the endogenous uncertainty remains as the true level of operational and strategic synergies will only become known after a full acquisition. In light of the (partial) exogenous uncertainty, deferring the acquisition is valuable. Owning a minority stake then allows to postpone the investment in light of the exogenous uncertainty, like industry demand and potential to benefit from increased economies of scale and scope, while decreasing (part of) the endogenous component, providing a competitive advantage over non-minority stake owners. Table 5.1 summarizes the different types of uncertainty, their influence in acquisitions and the benefits of using minority stakes.

### **5.2.3 Uncertainty perception in acquisitions**

The different dimensions of uncertainty surrounding acquisition decisions suggest there exist a number of potential sources of variation influencing the acquisition-outcome. Next to the dimensions of uncertainty, perceptions of uncertainty can differ on a personal level (Duncan, 1972; Anderson and Paine, 1975; Downey, Hellriegel and Slocum, 1977) explaining differences in firms' strategic actions (e.g. Ireland et al., 1987). Combining personal level variation and different uncertainty dimensions, variation will exist on the (mis)perception of the different dimensions of environmental uncertainty (Dickson and Weaver, 1997). For instance, exogenous uncertainty seems to be most easily understated as managers have trouble overseeing all potential low-probability, high-consequence events (March and Shapira, 1987). Neglecting exogenous uncertainty might not be by definition harmful, as a potential resolution of this type of uncertainty will impact all firms in a region/industry. However, firms should try to limit the exposure to specific sources of exogenous uncertainty in order to not become overly vulnerable.

Dimensions of uncertainty	Sources of acquisition specific uncertainty	Benefits of minority stakes
Company specific (endogenous)	<i>Synergy (Acquisition-Outcome) uncertainty</i> - Corporate culture (Lovallo et al., 2007) - Managerial (Miller, 1992; Miller and Waller, 2003) - Restructuring / operational synergies <i>Target appropriation uncertainty</i> - Financing needs	Decrease information asymmetry between acquirer and target regarding the level of synergies (Schijven and Hitt, 2012)
Industry specific	<i>Synergy uncertainty</i> - Product market changes (Miller, 1992, 1993; Brouthers et al., 2002; Miller and Waller, 2003) - Competitive threats (Miller, 1992, 1993; Brouthers et al., 2002; Miller and Waller, 2003) - Technological changes (Miller, 1992) - Up or downstream production disruptions (Miller, 1992; Brouthers et al., 2002) <i>Target appropriation uncertainty</i> - Competitive bidders	Decrease synergy uncertainty and provide a competitive advantage (decrease target appropriation uncertainty)
Environmental (exogenous)	- Macroeconomic conditions (Miller, 1992, 1993; Brouthers et al., 2002; Miller and Waller, 2003) - Natural disasters (Miller, 1992; Miller and Waller, 2003) - (Geo)political changes (national social influences) (Miller, 1992, 1993; Brouthers et al., 2002; Miller and Waller, 2003) - Legal (Miller, 1992; Miller and Waller, 2003)	High deferral value. Provide a competitive advantage if after resolution of uncertainty the acquisition will be undertaken (Eckbo, 2009)

**Table 5.1:** Sources of uncertainty in acquisition decisions.

Likewise, competitor neglect, when a firm’s role and influence in the industry is overestimated (Zajac and Bazerman, 1991), can decrease the perception of industry level uncertainty. Target appropriation uncertainty will be initially understated as the potential for competitor actions is neglected. In a competitive bidding situation this can cause irrational bidding and excessive premiums to secure the target (Zajac and Bazerman, 1991).

The perception of endogenous uncertainty will be influenced by behavioral factors such as opportunistic behavior by management (Miller and Waller, 2003). For instance restructuring synergies can be overstated when an opportunistic acquirer overstates his own capabilities compared to the target management. Also, the time delay between the materializing of operational/strategic synergies makes them prone to inaccurate perception.

In order to obtain further insight into the different sources and effects of individual factors influencing the perception of uncertainty, we turn to behavioral theory. Grounded in psychology, behavioral theory describes how bounded rationality and personal level, behavioral limitations in decision-makers can lead to irrational decisions with harmful outcomes for the firm (Cyert and March, 1963). This, mainly experimental, research has been translated to more observable managerial practices in order to test the existence and implications of managerial biases in real-life business situations and as a

response to the inability of rational managerial arguments to explain acquisition performance (see for instance Roll, 1986). Although traditionally we expect decision-makers to accurately portray and weight the risks when making investment decisions, behavioral elements provide evidence of deviation from economic rationality and errors occurring on a large scale directly attributable to the decision-maker's behavioral boundaries (Garbuio, King and Lovallo, 2011).

In order to accurately portray the effects of behavioral biases on the perception of uncertainty in acquisition decisions, we consider the potential outcomes of an acquisition as a distribution over the direct outcomes of the uncertain event. At this point, we assume the distribution of acquisition outcomes to be symmetrical, and will focus primarily on the firm level (endogenous) uncertainty regarding the potential benefits and losses of the envisioned acquisition<sup>62</sup>. While early research pointed to the sole importance of considering perceived uncertainty, as management won't react to conditions not identified (Snow, 1976), later research considered the importance of congruence between perceived (managerial) uncertainty and (actual, firm) environmental uncertainty and the effects on firm performance (Bourgeois, 1985; Sutcliffe, 1994). We depart from the latter notion and assume environmental uncertainty (i.e. acquisition outcome uncertainty) can be observed, or at least accurately portrayed, and propose that at the start of an acquisition biased decision-makers perceive an altered distribution shape of potential outcomes, resulting in an underestimation of uncertainty. Underestimating uncertainty causes acquirers to make incorrect, biased decisions in light of the "true" distribution's shape<sup>63</sup>, largely ignoring the incremental risk in appropriation of the acquisition, integration and realization of synergies. As the number of biases identified in the literature is vast, we limit our analysis to four individual level biases that have received attention in the acquisition literature (i.e. overconfidence, optimism, illusion of control, and commitment and confirmation) and consider how these biases lead to a distorted view of the distribution of acquisition outcomes<sup>64</sup>.

### 5.2.4 Behavioral biases in acquisition decisions

#### *Overconfidence and attribution*

Overconfidence and the better-than-average effect (Svenson, 1981)<sup>65</sup> arise in acquisitions when executives perceive to possess superior managerial capabilities to run a firm

<sup>62</sup> The reasoning can be extended to the industry and environmental level.

<sup>63</sup> Distributions can be characterized by four moments depicting the size and shape of the distribution where the first moment relates to the mean, the second moment to the variance, the third moment to the skewness and the fourth moment to the kurtosis of the distribution. We will use the four moments to clarify the proposed effects of biases on the assumed distribution.

<sup>64</sup> We feel other biases might lead to similar effects as the biases we consider in detail.

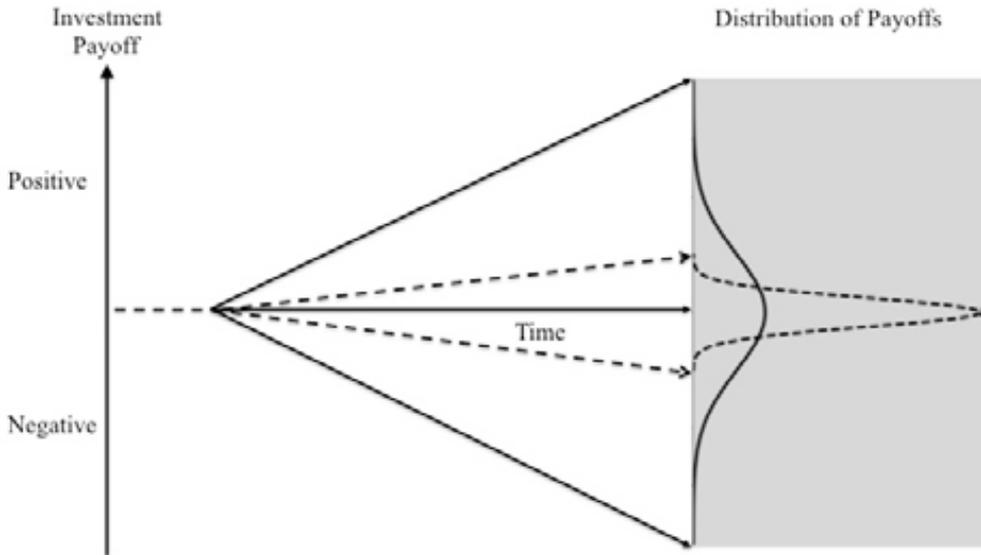
<sup>65</sup> Although overconfidence and the better-than-average effect can be treated as closely related phenomena, a negative relation may occur when taking task difficulty into consideration (Larrick, Burson and Soll, 2007) and we should point out the difference between the better-than-average effect, which relates to the higher perception of one's abilities compared to others, and overconfidence, which considers confidence of accuracy in predictions.

compared to target management and are overly confident they can increase target firm performance once they gain control of the firm (Malmendier and Tate, 2005b; Brown and Sarma, 2007). Consequently, overconfident executives will engage in acquisitions to release target firms from “incumbent” management (Malmendier and Tate, 2005b). While this view looks at overconfidence in assessment of capabilities compared to others, overconfidence can also relate to assigning (too) narrow confidence intervals to future estimations, underestimating the standard deviation of potential outcomes (Russo and Schoemaker, 1992; Malmendier and Tate, 2005b).

Acquisition experience plays a role in the development of overconfidence as positive past performance and successful completion of earlier deals can increase executive confidence in their perceived acquisition skills, resulting in underestimating the possibility of failure in future acquisitions (Langer, 1975; Gervais and Odean, 2001; Malmendier and Tate 2005ab; 2008). The self-attribution bias, when success is explained as a result of personal level influences and failure as stemming from bad luck, can be regarded as a first step to developing overconfidence (Billett and Qian, 2008) and reinforces overconfidence as executives expect their behavior to produce success (Malmendier and Tate, 2005a). Langer (1975) found that a skill attribution occurs early in a sequence of outcomes, and after the attribution is made, outcomes inconsistent with it are not given much weight. Executives whose overconfidence arises following the attribution bias will undertake multiple acquisitions in a short time period, but these subsequent acquisitions are likely to experience negative performance due to overconfidence (Doukas and Petmezas, 2007; Billett and Qian, 2008).

Regarding the assumed uncertainty distribution of potential acquisition outcomes, overconfidence leads to considering small confidence intervals, neglecting the larger spectrum of possible outcomes (moment 2). Overconfidence leads to assuming more certainty regarding the potential outcomes, and causes the distribution to become narrower and steeper while the mean remains the same, assuming a more certain payoff than is warranted (moment 4). Figure 5.1 graphically shows the effect of overconfidence on the perceived distribution of acquisition outcomes.

*Observation 1: Overconfident acquirers perceive less variance and a narrower distribution of potential acquisition outcomes.*



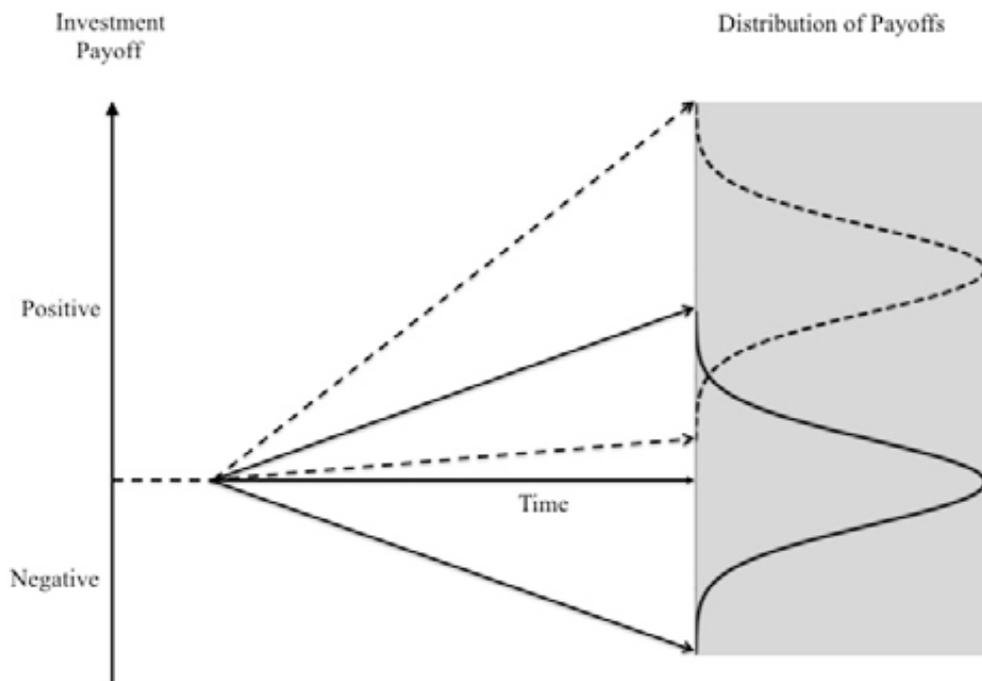
**Figure 5.1:** Effect of overconfidence on the perceived distribution of acquisition outcomes.

### *Optimism*

Estimating the predicted benefits of a deal can be influenced by overly optimistic forecasts (Kahneman and Lovallo, 1993) as people generalize the expectancy of positive outcomes independent of the source of the outcomes (McKenna, 1993), especially when used to strengthen a decision's rational. Overstating the deals potential outcome will lead to overpayment and higher acquisition premiums (Hayward and Hambrick, 1997). Individuals are more optimistic, both in the present as well as in future forecasting, about outcomes which they believe are under their personal control (Langer, 1975; McKenna, 1993; Hayward and Hambrick, 1997; Heaton, 2002) and overestimate outcomes to which they are highly committed (Weinstein, 1980; Heaton, 2002). Optimism is therefore related to overestimating (underestimating) the size of future returns (losses) of a deal, as well as overestimating (underestimating) the probability of favorable (unfavorable) events occurring (Hey, 1984; March and Shapira, 1987; Hayward and Hambrick, 1997)

Regarding the uncertainty distribution, optimistic forecasts lead to higher assumed returns (moment 1), leaving the distribution's shape intact, but shifting the entire distribution to a higher mean. Optimism can also change the shape of the distribution, skewing it to the upside (moment 3), representing the higher perceived probability of positive acquisition outcomes to occur. Figure 5.2 graphically shows the effect of optimism on the perceived distribution of acquisition outcomes.

*Observation 2: Optimistic acquirers perceive a higher and more probable distribution of potential acquisition outcomes.*



**Figure 5.2:** Effect of optimism on the perceived distribution of acquisition outcomes.

### *Illusion of control*

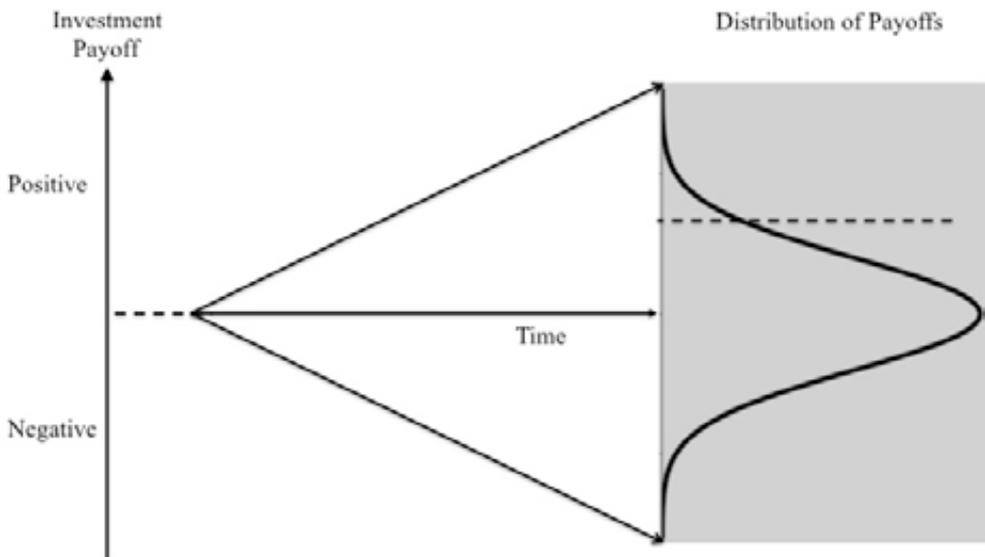
A consequence of the self-attribution bias is the illusion of control (Barnes, 1984), when the expected chances of personal success are inappropriately higher than is objectively warranted (Langer, 1975) and future events are considered controllable on a personal level. As a consequence, greater perceived control leads to developing fewer new decision alternatives (Wehrung et al., 1989). According to Hayward and Hambrick (1997), the principal sources of the illusion of control are perceived ability to influence the environment and (organizational) self-perception. The perceived ability to influence the environment can follow from attributing positive outcomes to skill, therefore controllable, and wrongfully projecting control to situations with high exogenous uncertainty like pure chance, lottery like situations (Langer, 1975; Langer and Roth, 1975).

A high feeling of control leads to the idea the future can be clearly defined and causes neglect of uncertainty and variation in outcomes. Company valuation tools, like DCF, reinforce an illusion of control when current numbers are (linearly) extrapolated to construct a single scenario and outcome. As a consequence, the illusion of control may cause managers to evaluate acquisition candidates less thoroughly, misjudge exogenous variables, and increase the absolute value of errors (Duhaimé and Schwenk, 1985;

Hayward and Hambrick, 1997).

Regarding the uncertainty distribution, the illusion of control leads to underestimating acquisition outcome uncertainty as the future is assumed to be under direct personal control, increasing the belief in the certainty of reaching one particular (positive) outcome. When the illusion of control leads to consideration of a single scenario (or a limited number), the total distribution is neglected (moment's 2, 3, and 4 are not considered). As such, it can be considered an extreme form of the overconfidence effect. Indeed managers underplay inherent uncertainty, believing they have large amounts of control over the firm's performance (March and Shapira; 1987, in Heaton, 2002) and the higher the perception of control, the higher the likelihood of underestimating risks (Schwenk, 1986, in Hayward and Hambrick, 1997). Figure 5.3 graphically shows the effect of the illusion of control on the perceived distribution of acquisition outcomes.

*Observation 3: Acquirers' illusion of control leads to considering only a single (or limited number of) potential acquisition outcome, thereby neglecting the existence of a distribution of potential acquisition outcomes altogether.*



**Figure 5.3:** Effect of illusion of control on the perceived distribution of acquisition outcomes.

*Enduring reliance on biased uncertainty distributions - commitment and confirmation*

Over time, as uncertainty resolves, the true shape of the acquisition outcome distribution will become more apparent. In case the outcome appears to evolve in an unbeneficial direction, certain biases can cause continuation of the acquisition process although withdrawal would be the better choice. In acquisition decisions, the commitment and

confirmation bias will lead to continued reliance on an earlier (potentially biased) uncertainty distribution even when new information warrants updating of the outcome distribution.

Overcommitment occurs when after the decision to acquire is initiated, preferably by the executive himself, the executive becomes committed to execute the deal, leading to inappropriate continuation of a favored course of action (Staw, 1976; Coff and Laverty, 2001; 2007). Executives' professional standing, personal prosperity and future employment prospects lead them to commit to the outcome and execution of the proposed deal (Heaton, 2002; Malmendier and Tate, 2005b). Intensive personal involvement, time pressure, and reliance on past experience can increase commitment and lead to a reluctance to walk away from the deal. As a result, getting the deal done sooner rather than later becomes the corporate objective (Jemison and Sitkin, 1986). Following peer and subordinate pressures, executives lacking acquisition experience can become committed to completing a deal in order to obtain this experience (Jemison and Sitkin, 1986; Haspeslagh and Jemison, 1991). Also, personal responsibility, competition for a target and public knowledge about a deal can induce managers to seek to safeguard their reputations<sup>66</sup> leading to escalated commitment as executives continue to assign resources to failing ventures while ignoring signs indicating the necessity to exit<sup>67</sup> (Staw, 1976; 1981; Staw and Ross, 1989; Haunschild, Davis-Blake and Fichman, 1994; Katz, Simanek and Townsend, 1997). Continuation of a deal following negative information and the preference for fast completion result in premature solutions, incomplete contemplation of integration issues, and increases the likelihood of acquisition failure (Jemison and Sitkin, 1986; Haunschild et al., 1994).

Commitment and continuation are further strengthened through the confirmation bias, when executives consider only information that confirms their previously held beliefs, expectations or desired conclusions on the positive outcome of a project, while disregarding negative information (Jonas et al., 2001; Lovallo et al., 2007). This biased search for information interferes with making adjustments to a distribution in order to reflect the current situation more accurately (Jonas et al., 2001). The potential profound influence acquisitions have on firm performance (and future prospects) should require thorough reconsideration and testing of the initial assumptions underlying the deal's rationale. However, experimental evidence indicates there is a persistent preference to consider only information that confirms proposed plans while disconfirming data is ignored (Jones and Sugden, 2001; Horn, Lovallo and Viguerie, 2006; Shefrin, 2007). Although market changes and new information on the target can alter the perceived

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<sup>66</sup> Alternative explanations include empire building or growth related financial benefits. Escalation of commitment can also follow when some sort of enthusiasm or strong belief is associated with the acquisition or if there is a feeling that past success will be replicated (Schwenk, 1986).

<sup>67</sup> This is sometimes referred to as 'throwing good money after bad'. Managers responsible for the initial decision show to assign more resources to failing courses than managers not responsible for the initial decision (Staw, 1976).

attractiveness of the deal, requiring initial decisions to be reconsidered, commitment and the confirmation bias lead to continuation of unprofitable deals.

*Observation 4: Commitment and confirmation result in continued use of an inaccurate distribution of potential acquisition outcomes.*

The previous observations show behavioral biases can influence the perceived level of uncertainty in the investment environment. In light of the decision to acquire, behavioral biases will result in a lower level of perceived uncertainty, and cause a disparity between perceived and actual uncertainty.

*Proposition 1: Behavioral biases increase the disparity between perceived and actual uncertainty regarding the distribution of acquisition outcomes. This distortion is one-directional as perceived uncertainty is lower than actual uncertainty.*

### 5.3 Implications of Behavioral Biases in Decisions under Uncertainty

#### *Explaining the minority stake paradox*

From a real option perspective, the benefits of using a minority equity stake to stage an acquisition depends on the level of uncertainty. When behavioral biases cause understating of true acquisition outcome uncertainty, biased decision-makers will be less likely to stage an acquisition strategy. Consequently, when executive biases are present, real option construction in acquisitions is less likely to occur, as there is no perceived added value from staging or deferral.

*Proposition 2: Following proposition 1, behavioral biases make real option consideration less likely. More specifically, behavioral biases lead to less minority stake purchases prior to a full acquisition.*

#### *Option size and perceived uncertainty*

In addition to the trade-off between acquiring a minority versus a majority stake, the option benefits associated with a minority stake depend on the size of the stake. This benefit-size relation has an inverse U-shaped form, starting with a small minority stake, increasing to a blocking stake, which constitutes the optimum, and subsequently declining again to a majority stake when there are no additional option benefits. The shared option nature in relative small minority stakes results in the option benefits, like a competitive advantage in appropriating the target or increased influence in target management, to be small or non-existent as rivals can easily match the bargaining position. Indeed, Eckbo (2009) shows the competitive advantage in appropriating a target won't materialize in

minority stakes below 9%. Minority stakes that are blocking stakes result in proprietary acquisition options that can be exercised in line with the resolution of uncertainty and without the need to consider potential rival actions. The minimal required stake to obtain blocking rights will vary on a country level (Berglof and Burkhart, 2003). Obtaining a minority stake in excess of a blocking stake (but smaller than a majority stake) can be considered as an excessive initial investment causing a suboptimal option construction. A relatively large minority stake unnecessary increases the value at risk in case of an unbeneficial resolution of uncertainty. In essence, purchasing a minority stake in excess of the optimal size can be considered as overpaying for the option.

In case uncertainty is high, gradually increasing a small minority stake to a blocking stake limits the loss in case of an unbeneficial development of uncertainty, while obtaining more of the option benefits when uncertainty is resolved. When uncertainty is understated due to behavioral biases, the more the acquisition attempt will move towards a majority share.

*Proposition 3: The option benefit – minority size relationship is inverse U-shaped with a blocking stake constituting the optimum. Following proposition 1, behavioral biases lead to minority stakes in excess of the optimum.*

#### *Option exercise decisions and perceived uncertainty*

The influence of behavioral biases on the disparity between perceived and actual uncertainty will also influence option exercise decisions. While uncertainty influences the value of options, accurate and timely exercising of the option rights is necessary to capture this value. However, the timing of option exercise often occurs too early or too late (Copeland and Tufano, 2004). While low perceived uncertainty limits the purchase of minority stakes prior to an acquisition, minority stakes (i.e. real options) could have been acquired by preceding executives or be part of the acquired asset base of prior targets. At a certain point a decision has to be made on what to do with these inherited acquisition options. While certain acquisition options will be valuable as they relate to investments with uncertain outcomes, a biased decision-maker who understates actual uncertainty will misperceive the value of these options and will exercise the option to acquire prematurely. Incorrect option exercise will lead to value destruction as the option value is foregone and an acquisition with high levels of uncertainty regarding the outcome is undertaken.

*Proposition 4: Following proposition 1, behavioral biases lead to valuable acquisition options to be exercised too early. More specifically, behavioral biases lead owners of a minority stake to obtain a majority stake too early.*

Likewise, certain acquisition options will lose their value over time as uncertainty develops in an unbeneficial direction. In this case the minority stake needs to be sold and

the remaining value is better collected and reinvested elsewhere. The sale of invaluable acquisition options will often involve taking losses, introducing the influence of loss aversion and sunk costs in the abandonment decision. Sunk costs (Staw and Ross, 1989), much like commitment and confirmation, can rationalize continuation of a certain course of action, and dealing with losses can instate late exits (Shefrin and Statman, 1985). Especially when the decision-maker has instated the option, abandonment is likely to be postponed. Note that in this case the perception of uncertainty might not be as large of an influence as in the previous propositions<sup>68</sup>, rather acknowledging and dealing with losses will influence accurate and timely abandonment in order to recover the maximum value.

*Proposition 5: Loss aversion leads to invaluable options being abandoned too late. More specifically, owners of minority stakes sell their stake too late after an unbeneficial resolution of uncertainty.*

## 5.4 Discussion

This chapter considers the influence of behavioral biases on the perception of uncertainty and the subsequent effect on real option consideration in acquisitions. We only consider a limited number of behavioral biases in isolation, but within the acquisition process different biases can co-exist and follow or strengthen each other. Given the proposed influence of biases on the assumed distribution of potential outcomes, the effect of several biases simultaneously can also be portrayed. The overall effect remains unchanged, as multiple biases will cause an altered perception of uncertainty, resulting in suboptimal decision-making in light of the objective uncertainty present.

### *Alternative influences on the perception of uncertainty*

Alternative to the behavioral factors discussed in this chapter, time pressure and the breadth and depth of search can influence the ability to obtain an accurate estimate of acquisition outcome uncertainty. The demand of external stakeholders and media for constant increases in corporate growth (Narayanan, 1985), combined with short average tenure times for executives, provides outside pressure for hasty, inconsiderate decision-making. Indeed, longer organizational tenure leads to more successful acquisition outcomes (Bergh, 2001). However the decreasing trend in executive tenure over the past ten years (Schloetzer, Tonello and Aguilar, 2012) suggests an increased chance for undesirable future acquisition outcomes. External pressures and short time-horizons will create an environment that inflects pressure on the executive to make decision quickly, increasing the potential for error and inconsideration of all potential outcomes (Maule, Hockey and Bdzola, 2000; Kocher and Sutter, 2006). Also, short-termism (Laverty, 1996) can lead to

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<sup>68</sup> If anything, uncertainty might be used as a way to rationalize postponing abandonment of the real option as uncertainty has a positive effect on the option's value.

acquisitions being rationalized for their short-term benefits (i.e. immediate size increase) while the long-term disadvantages (i.e. synergies not materializing leading to losses, depletion of financial resources due to overpayment) are overlooked.

The length and breadth of search for an acquisition target out of the larger universe of potential targets as well as the time spend on analyzing the envisioned target in more detail offer additional explanations for using an inaccurate uncertainty distribution. Local and distant search will have an influence on the construction and size of the choice set of potential targets (Rosenkopf and Almeida, 2003; Iyer and Miller, 2008). When a particular target is considered, the prior and subsequent time spent on analyzing the target will contribute to obtaining a better distribution of the potential acquisition outcomes regarding this specific target. However, since there might be considerable (opportunity) costs associated with extensive search and evaluation processes (Gruber, MacMillan and Thompson, 2008), decision-makers seeking to limit these costs will decrease the time allocated to analyzing the target specific acquisition outcome distribution. As such time pressure and a limited length and breath of search make it unlikely for even an unbiased decision-maker to be able to accurately map all the potential sources of uncertainty influencing the acquisition outcome.

#### **5.4.1 Future research directions**

Following the conceptual and theoretical nature of this chapter, a logical extension would be empirical testing of the propositions. We can think of several ways in which this can be achieved. First, it is possible to rely on alternative proxies for the biases considered to try to identify differences between experienced and inexperienced acquirers. For instance, the effects of overconfidence are unlikely to be limited to acquisitions. Considering alternative executive forecasting decisions like corporate earnings and industry growth estimates, can be used to identify distorted uncertainty distributions (Hribar and Yang, 2006; Ben-David, Harvey and Graham, 2007). In case of experimental procedures, subjects can be evaluated ex-ante and ex-post to see changes in their perception of uncertainty. Increasing confidence through a series of (experimenter controlled) positive outcomes could be used to test and validate the proposed effects.

If the proposed effects are empirically supported, a next step would be to consider possible ways to overcome the effects of biases on the uncertainty distribution. For instance, can increased length and breath of search decrease behavioral level influences, or will the latter prevail? Also, real options could be considered to potentially overcome certain biases (Miller and Arikan, 2004).

#### *Can real option based valuation tools unbiase acquisition decisions?*

While the focus so far has been on the effect of behavioral biases on deciding to use a real option approach in acquisition decisions, a second question that arises is whether the use of real options might be essentially useful in aiding biased decision-makers in their

acquisition decisions. The use of real option theory and valuation can serve as a normative guideline in deciding on which projects to undertake and which to avoid in light of the inherent uncertainties present in corporate investment decisions, and real option analysis could serve as a potential way to mitigate the biased perception of uncertainty. Real option reasoning can be helpful in reinforcing the understanding that the success of an acquisition strategy is not entirely under executives' control, but depends in part on the resolution of uncertainty that influences the acquisition outcome. Understanding the considerable influence of a beneficial development in uncertainty on the successful outcome of a decision can clarify the difference between success following accurate estimations and good management or a lucky and uncontrollable turn of nature. Contemplating the uncontrollable nature of events shifts corporate strategic focus from following a single, pre-defined track to a process of constant adjustment. As such, real options show grounds to potentially counter biases such as the illusion of control causing single scenario thinking, as the conditional nature of different outcomes, positive or negative, underlying the real option model forces decision-makers to incorporate the volatility of future outcomes in their investment considerations. Becoming aware of uncertainty, and seeing an increase in risk in a situation (and a decrease in perceived control) compared to the biased view will lead to less risk-taking (Wehrung et al., 1989).

Incorporating potential downturns and losses and contemplating their harmful effects on firm value provides clear guidance on how to deal with an uncertain future and facilitates identifying the point beyond which continuation is invaluable. Establishing clear decision points at the outset of a project can help to overcome commitment to a losing investment. As decision-makers show more interest in the actual number of expected losses rather than the distribution or probabilities of these losses materializing (March and Shapira, 1987), providing insight into the total size of losses and the ability of real options to limit the downside should appeal to practitioners. The use of option valuation tools like the binomial tree can give insight into probabilities associated with different events materializing. However, the subjectivity involved with assigning probabilities to events introduces room for bias and can lead to option misvaluation and subsequent incorrect decision-making. Like any other valuation method, real options are prone to "irrational infection" as the decision-maker can adjust inputs to arrive to a preferred outcome. By extending methods to increase option valuation accuracy in business projects (van Putten and MacMillan, 2004) with quantifiable behavioral influences, real options can potentially serve in countering inappropriate views of uncertainty due to behavioral biases, allowing decision-makers to obtain the previously mentioned benefits from the real option decision structure. Although this chapter shows part of the inherent difficulties that exist in reconciling real option theory with behavioral theory, objectively deriving probabilities in estimation errors based on different levels of a particular bias could serve as a first step toward quantitatively sound behavioral real options.

# Chapter 6: Summary and Conclusion

## 6.1 Summary and Conclusion

The studies presented in this thesis provided new insights into corporate acquisitions by considering both a rational, real option and a bounded rationality, or behavioral perspective on acquisitions.

Starting with chapter 2, the first, rational part of this thesis shows that a real option categorization of acquisitions can explain differences in premiums paid for different types of acquisitions. On average, simple acquisition options, which are not part of a larger plan or series, receive 6% lower premiums compared to compound acquisition options that are part of a serial acquisition strategy. The higher price paid for these latter deals can be explained by the additional option value these deals generate compared to single, isolated acquisitions. Next, the acquisition option's shared or proprietary nature is considered. In line with prior findings, acquisitions involving multiple bidders (i.e. shared options) lead to higher premiums paid. Contrary to expectations there is no evidence found of minority stakes increasing a deal's proprietariness, as minority stake presence does not lead to lower premiums paid. While this finding suggests holders of proprietary options bid more aggressively, it appears the size of the minority stake influences the level of proprietary benefits as larger minority stakes lead to lower premiums. While we find no direct effects of proprietary options on the premium paid, the market does react positive to proprietary option holders (measured by both minority stake presence as well as market share), suggesting the level of proprietariness in an acquisition option can be considered valuable.

Chapter 3 considers premiums paid in serial consolidating acquisition strategies. The analysis shows that serial consolidators pay on average a 22% higher premium for their first deal compared to single consolidators. This finding is in line with real option theory predictions and suggests consolidating acquirers acknowledge the future benefits from such a strategy and this value is reflected in the price paid for the first acquisition in the series. Despite the higher premium the market does react more favorable to serial acquirers. However, the overall value creation around announcement is negative which could reflect the uncertainty in successfully executing the envisioned strategy. Finally, although serial consolidating acquirers' premiums in subsequent deals decrease, we find no strong support for learning, as the decrease is not continuous throughout the sequence but merely observable compared to the first deal.

The second part of this thesis considers bounded rationality, or behavioral factors in acquisitions. Chapter 4 shows the magnitude of an acquirer's stock price deviation relative to the stock's historical 52-week high can help explain the risk taken in acquisitions. Following prospect theory's value function, a larger deviation from the 52-week high positions an acquirer further in the loss space, resulting in an increasing risk-preference. The 52-week high can serve as a reference point in the decision-making

process of the acquirer, and offers an additional explanatory variable that influences the acquirer's risk attitude while pursuing the acquisition of a potential target. Despite the effort to return to the 52-week high, the negative market reaction to relative large deals leads to a further drop from the 52-week high. Consequently, shareholders of acquirers with a risk-seeking profile lose wealth as a result of the transaction, yet we find no evidence of the market attributing this loss to the acquirer's position in the loss space. The method of payment seems to influence the market reaction, both in isolation as well as in combination with the reference point. Chapter 3 also extends the analysis of the loss function in prospect theory by including temporal effects. The results provide a strong indication that not only the reference point but also the duration of being in the loss space can play a role in the level of risk-taking. As such, a time dimension can also be considered in analyzing prospect theory's loss domain.

Finally, chapter 5 provides a theoretical framework showing the influence of executive level behavioral biases on the perception of uncertainty in acquisition decisions. Given the different types of uncertainty surrounding acquisition outcomes, staging the acquisition and postponing the investment until part of this uncertainty has resolved is valuable and limits losses in case of unbeneficial developments of uncertainty. Behavioral biases can cause a divergence between perceived and actual uncertainty regarding the potential acquisition outcomes, resulting in a smaller likelihood of staging the investment. The influence behavioral biases have on the perception of uncertainty offers an alternative explanation for the apparent lacking use of minority stakes prior to full-scale acquisitions in practice.

## 6.2 Shortcomings and Future Research Directions

In line with the majority of acquisition related research, the research presented in this thesis considers acquisition initiation and strategic intentions, focusing on the point the deal is announced. While this moment within an acquisition track is interesting, as it is the focal decision point and is influenced by future forecasts and perspectives or strategies the firm is determined to follow, it is only a small part of the entire acquisition process. The predictions on which the decision to acquire is based will start to materialize after the acquisition is conducted and both firms are combined in order to capitalize on the envisioned benefits. In order to obtain a true notion of acquisition success or failure, post-acquisition research is in place. Future research, and perhaps a logical extension of the work presented here, could focus more on the long(er) term outcomes of the initiated acquisition strategy, as well as considering the accuracy with which the different drivers that influence the choice to initiate the acquisition are predicted<sup>69</sup>. Especially the findings

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<sup>69</sup> However, from a methodological view this type of research is difficult as after the acquisition and integration it is very hard to disentangle the target's resources and influence on the newly, consolidated firm's financial figures.

in chapters 2 and 3 regarding higher value perception in serial versus single deals calls for research looking at the long-term performance differences between firms with different acquisition strategies. Other differences between these firms, such as integration problems and techniques, might also exist and are worth considering in future research.

The data considered in this research is limited to U.S. firms undertaking mostly domestic acquisitions. Extending this research to other countries is a logical next step in seeing whether the found effects are geographically bound. In relation to empirical testing of the propositions in the final chapter, it might be interesting to also consider non-standard data sources, like interviews or surveys, to obtain insights into the level of managerial uncertainty neglect, and whether this differs geographically. For instance, frequent cross-border acquirers might show different perceptions of uncertainty compared to acquirers focusing primarily on the domestic market. Also, experience, nationality and gender differences could potentially mitigate the level of uncertainty neglect, making it interesting to attempt to define these factors.

In merging real option theory with behavioral theory some hurdles still exist. Adjusting the option framework to incorporate behavioral elements seems difficult as with any model the accuracy of the parameters influences the accuracy of the outcome. Behavioral factors might lead to miscalibration of certain variables, suggesting a discount or premium to be added to the eventual outcome based on the direction of the miscalibration. Which option parameters suffer most is area for further research, but given the importance of uncertainty and volatility within the options framework, these practical elements seem most interesting to consider. For instance, what are the effects of (acquisition) experience on estimating volatility? Which firms or executives are accurate in their assessments, and which tools do they use? Perhaps more fundamental is the question whether (or when) volatility has a place in acquisition decisions. Given the timeframe in which the decision needs to be made, contemplating too long on potential scenarios could result in losing the opportunity to a competitor who acts sooner. However, inconsideration of volatility could lead to unpreferred outcomes with potential devastating consequences for the firm.

### **6.3 Managerial Implications**

The findings in this thesis can help managers undertaking acquisitions in two ways. First and foremost, this thesis shows different elements that can influence the price paid in acquisitions. By differentiating between types of acquisitions (single vs. serial) and strategies (i.e. consolidation) we place acquisitions in a broader context for managers to consider at the outset of their acquisition path. Contemplating the strategic rationale of the acquisition from the start (i.e. single for resource specific goals, or serial for larger growth strategies or new market leadership), can lead to a better perception of value of the deal in light of the larger corporate strategy. Also, certain “tools”, like minority stakes, can be

used in acquisitions to obtain a competitive advantage, which allows to better play the acquisition game in light of the competition present.

Secondly, this thesis can be helpful in creating awareness into the potential limitations and cognitive pitfalls that can arise within the acquisition process, as well as showing the effects of risk preference and uncertainty misperception in acquisitions. Although executives might not explicitly consider their share price underperformance in acquisition decisions, the influence is apparent, and might be related to factors coinciding with low share prices such as increased shareholder influence and pressure for corporate change. Regarding the perception of uncertainty, the final chapter clearly states how executives can understate uncertainty and what the subsequent effects are in acquisition decisions. Creating awareness of these pitfalls and shortcomings should lead to personal reflection and increased knowledge on points of caution in future acquisitions. Understanding the sources and implications of uncertainty in acquisition decisions can be a first step in acknowledging the importance of accurately estimating and dealing with uncertainty at the outset of an acquisition attempt.

While from a theoretical point both the rational and bounded rationality perspectives seem to counter one another, this thesis shows even more there are numerous factors that influence acquisition decisions. Given the widespread occurrence of acquisitions in the corporate landscape, and potential increase in global acquisition activity once economic conditions strengthen, understanding personal level limitations as well as drivers of acquisition prices will hopefully lead to less corporate value destruction and more stable, profitable firms in the future.

# Samenvatting (Summary in Dutch)

Het onderzoek in dit proefschrift bekijkt bedrijfsovernames - of acquisities - door een gedragseconomische en een reële optie lens, en gebruikt zodoende zowel een rationeel als een beperkt rationeel perspectief. Het rationele gedeelte, dat begint met hoofdstuk 2, laat zien dat een reële optie differentiatie van acquisities verschillen in betaalde premies kan verklaren. Gemiddeld genomen betalen enkelvoudige overnemers, wiens acquisities geen deel uitmaken van een groter plan of serie, een 6% lagere premie in vergelijking met overnemers die een groter acquisitieplan volgen. De hogere prijs voor deze laatstgenoemde overnames kan worden verklaard door de additionele optiewaarde die deze overnames genereren in vergelijking met enkelvoudige, geïsoleerde overnames. Hierna wordt de invloed van gedeeld of alleenrecht op de acquisitie bekeken. Zoals verwacht, resulteert een groter aantal mogelijke concurrenten (gedeelde optie) in hogere premies. In tegenstelling tot de aanname dat een minderheidsbelang het alleenrecht voor een potentiële acquisitie vergroot en zodoende de premie verlaagt, is dit voordeel niet zichtbaar in acquisities die voorafgegaan worden door een minderheidsbelang in de onderneming. Een mogelijke verklaring hiervoor is agressief bieden door houders van minderheidsbelangen om zodoende de kans te vergroten dat een doelwit daadwerkelijk wordt toegeëigend. De grootte van het minderheidsbelang blijkt wel van invloed te zijn op het verkrijgen van een alleenrecht op een acquisitie en een groter minderheidsbelang leidt tot lagere premies. Ondanks dat geen direct bewijs wordt gevonden voor het effect van alleenrecht in overnames op betaalde premies, suggereert de positieve marktreactie op de acquisitie aankondiging van overnemers met een minderheidsbelang of een groter marktaandeel dat alleenrecht in acquisities wel degelijk van waarde kan zijn.

In hoofdstuk 3 wordt gekeken naar de betaalde premies in seriële overnames met als doel industrie-consolidatie. De resultaten laten zien dat seriële overnemers hogere premies betalen voor hun eerste industrie-gerelateerde acquisitie dan enkelvoudige overnemers. Deze bevinding volgt de verwachtingen vanuit de reële optie theorie en suggereert dat seriële overnemers de toekomstige waarde van hun acquisitiestrategie opnemen in de premie die wordt betaald in de eerste overname binnen een serie. Ondanks deze hogere premies reageert de markt positiever op de aankondigingen van seriële overnemers. Echter, de totale waardecreatie rond de acquisitie aankondiging is negatief, wat kan duiden op onzekerheid in het succesvol uitvoeren van een dergelijke acquisitiestrategie. Met betrekking tot de premies in consoliderende overnames vinden wij geen sterk leereffect, aangezien de daling van de premies niet constant is in latere acquisities, maar enkel zichtbaar is ten opzichte van de eerste overname.

Het tweede gedeelte van dit proefschrift veronderstelt beperkte rationaliteit en incorporeert psychologische factoren in acquisitie beslissingen. Hoofdstuk 4 is gebaseerd

op keuze-theorie en laat het effect zien van de grootte van de afwijking van de huidige beurskoers ten opzichte van de hoogste beurskoers over de voorgaande 52 weken op het risico dat een overnemer neemt in zijn acquisitie beslissingen. Hoe lager de huidige beurskoers is in vergelijking met de historische beurskoers, hoe meer risico er wordt genomen door het overnemen van relatief grotere bedrijven en het betalen van hogere premies. Hoewel wordt getracht terug te keren naar de hoge, historische beurskoers reageert de markt negatief op dergelijke risicovolle acquisities waardoor de beurskoers verder afneemt. Het effect van de mate van afwijking tussen de huidige en historisch hoogste beurskoers op het risicogedrag wordt beïnvloed door tijd en is afhankelijk van de betalingswijze van de acquisitie. De uitkomsten van het onderzoek laten zien dat niet enkel het referentiepunt (de hoogste historische beurskoers), maar ook de tijd die is verstreken sinds de hoogste beurskoers zich voordeed, invloed heeft op het risico wat wordt genomen.

Tot slot geeft hoofdstuk 5 een theoretische kijk op de invloed van bestuurlijke cognitieve beperkingen op de perceptie van onzekerheid in acquisitie besluiten. Gegeven de verschillende soorten onzekerheden rondom acquisities is het waardevol om de investeringsbeslissing gefaseerd uit te voeren totdat deze onzekerheden (gedeeltelijk) zijn opgelost. Cognitieve beperkingen die voorkomen in directies en leidinggevenden kunnen ertoe leiden dat besluitvormers de onzekerheden in overnames onderschatten. Dit leidt tot een voorkeur voor het direct kopen van meerderheidsbelangen boven gefaseerde overnames door middel van minderheidsbelangen. Onze gedragstheoretische verklaring voor de onderschatting van onzekerheden biedt een alternatieve verklaring voor het beperkte aantal gefaseerde acquisities dat voorkomt in de praktijk.

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# Biography



Joris Kil (1984, Deventer) received his VWO diploma (Nature & Health track) in 2002 from St-Odulphus Lyceum in Tilburg. After a year at the University of Arkansas, through the Campus Scholarship Program of the Fulbright Center Amsterdam, he started the Bachelor of International Business Administration at the Rotterdam School of Management, Erasmus University (RSM), which he successfully completed in 2006. After his bachelor he transferred to the Erasmus School of Economics (ESE) to obtain a Master in Financial Economics (2009, *cum laude*), and stayed there to start his Ph.D. in Finance in September 2009 at the joint research school of ESE and RSM, the Erasmus Research Institute of Management (ERIM). During his Ph.D., Joris attended academic Summer Courses at HEC Paris and CEMFI Madrid, and spend 3 months as a visiting scholar at the Wharton School (University of Pennsylvania) and the Leeds School of Business (University of Colorado, Boulder). His work has been presented at numerous international academic conferences including the annual meetings of the Academy of Behavioral Finance in Chicago (2009) and New York (2012), the annual meeting of the Strategic Management Society in Miami (2011), the PREBEM conference in Amsterdam (2013), the Real Options Group annual meeting in Tokyo (2013) and the Academy of Management annual meeting in Lake Buena Vista, FL (2013). Chapter 4 of this thesis was awarded the *best Ph.D. paper award* at the annual meeting of the Academy of Behavioral Finance in New York. Joris was a member of the ERIM Ph.D. council and actively involved with the organization of the PREBEM Ph.D. conference in Rotterdam (2011), and is a current member of the faculty council of the ESE. Since 2011, Joris teaches the Master seminar Advanced Corporate Finance: Private Equity, obtaining consistent outstanding student evaluations, and he has supervised over 30 Master theses. Next to his research, Joris ran both the Rotterdam (2010) and Philadelphia Marathon (2012) in a PR of 3:28:32.

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## ACQUISITIONS THROUGH A BEHAVIORAL AND REAL OPTIONS LENS

This thesis combines four studies that contribute to our understanding of corporate acquisitions by taking a behavioral and real options perspective. Chapter 2 classifies acquisitions based on real option characteristics and shows option type (single vs. compound) and option nature (shared vs. proprietary) influence the value and premium paid in acquisitions. Chapter 3 considers a specific serial acquisition strategy aimed at industry consolidation and finds higher premiums are paid for first deals in the sequence, showing part of the potential future value generated in the consolidation strategy is already reflected at the start. Chapter 4 takes a behavioral perspective and shows a stock's historical high influences the risk firms take in their acquisitions. Firms with a larger deviation from their past stock price high initiate relatively larger deals, but are unsuccessful in their effort to return to prior stock price levels. Finally, chapter 5 merges real option theory, behavioral theory and acquisitions by considering the influence of executive level behavioral biases on the perception of acquisition outcome uncertainty. Given the uncertainties surrounding acquisitions, staging the investment through the initial purchase of a minority stake is beneficial as it allows deferring the full acquisition until outcome uncertainty has decreased. However, behavioral biases can cause disparities between perceived and actual uncertainty, resulting in inconsideration of a staged investment strategy. These insights provide a new explanation for the limited number of observed minority stake purchases prior to full-scale acquisitions.

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