PhD-FDEF-2019-06

The Faculty of Law, Economics and Finance

DISSERTATION

Defence held on 29/08/2019 in Luxembourg

to obtain the degree of

DOCTEUR DE L'UNIVERSITÉ DU LUXEMBOURG

EN GESTION

by

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TITLE OF THE DISSERTATION:

THE INFLUENCE OF FAMILY OWNERSHIP ON M&As AND INNOVATION

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Acknowledgements

My profound gratitude goes to my Supervisor Professor Dr. Katrin Hussinger for her professional and invaluable guidance from the process of developing a research proposal to writing this final thesis. Your critical comments have shaped my independent theoretical and practical analysis. You created an environment filled with patience and support which has shaped and impacted my life tremendously. I couldn't wish for a better supervisor.

As a member of my doctoral committee, Professor Christoph Grimpe has been extremely supportive throughout this rewarding learning experience. He has been generous with his time and never hesitated to give me careful and critical review of my work. Professor Grimpe also played host during my research visit to the Copenhagen Business School which turned out to be the most exciting period of my PhD education. For this and many others I am grateful.

I am thankful to members of my PhD examining committee for their careful review and comments. Professor Denise Fletcher was my first contact with the University of Luxembourg. Professor Thomas Kaspereit provided the Compustat data during the early stages of my PhD. And special thanks to Professor Yannick Bammens for hosting me and reviewing a chapter of my thesis during my research visit to Maastricht University.

And to the Government of Luxembourg, to the Luxembourg National Research Fund (FNR) whose generous PhD grant I was able to pursue my Doctoral education. I am grateful. In me you have an ambassador.

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Chapter 1

Introduction

Contrary to the image of large modern corporations, majority of firms around the world are controlled by families (La Porta, Lopez-De-Silanes & Shleifer, 1999). More than thirty percent of US firms and forty percent of German and French firms with yearly revenue of over one billion US Dollars are family controlled (The Economist, 2015). Statistics from the European Family Businesses (2012) shows that 75 percent of net employment growth in the United States are attributable to family firms. Indeed, about 36 percent of firms in the S&P are family firms (Block, 2009). Some of the oldest leading firms are associated with families in terms of ownership and control (The Economist, 2015). Family firms are thought of as largely conservative such that the form of ownership and control as well as the preservation of nonfinancial goals or socioemotional wealth are some of their defining characteristics (Caprio, Croci & Del Giudice, 2011). Socioemotional wealth refers to the non-financial benefits derived from the ownership of a firm such as being able to provide employment for family members, perpetuating the family dynasty, the ability to exercise control or influence, the prestige associated with ownership and family identity (Gomez-Mejia, Haynes, Núñez-Nickel & Monyano-Fuentes, 2007; Miller & Le Breton-Miller, 2014).

A consensus has yet to emerge on a generally accepted definition of family firms among scholars due to the complex nature of family firms (Westhead, Howorth & Cowling, 2002; Block, 2009; Klein 2005). Habbershon & Williams, 1999). For instance Mandl, (2008) signals the existence of over 90 definitions of family firms. Furthermore, Miller, Le Breton-Miller, Lester & Cannela (2007) also indicate that 28 definitions of family firms are used in the literature. This goes to indicate the complex nature of finding an all-encompassing definition of family firms. Villalonga

& Amit (2006) consider a family firm as one where the founder of the firm, a blood relative, or an in-law acts as a CEO or as a block-holder. Andersson & Reeb (2003a) refer to this as founder owned family firm. According to Vikstrom & Westernberg (2010), a firm is a family firm if at least one member of the family owns it and at least a member of the family is active in the management of the firm. The common thing among these definitions is that they are centered on ownership, management, control and the family generation involved (Block, 2009).

The lack of consensus on a widely accepted definition makes comparison between different studies difficult while also making it difficult to generalize findings or test theories given that some theories predict differences between family and non-family firms (Block, 2009). Therefore, scholars have tended to use several definitions to ensure that results are robust irrespective of the definition used.

As the definition remains the crux of family business research, the operational definition adopted in this thesis is as follows. A firm is said to be a family firm if the combined stock ownership of the family is above 5% and a member of the family is either CEO or chairman of the board of directors. This definition is similar to the definition used by Anderson and Reeb (2003a) and BusinessWeek (2003). Based on this definition and the BusinessWeek issue of July 2003 (pp. 111-114), as well as a manual search, Block (2009:237-242) published a list of all family firms and non-family firms in the S&P 500 as at July 2003[1].

A question arises about the relevance of characterizing firms as family firms. It is important to note that the growth of US industries during the early stages of modern capitalism is largely attributed to the professionalization of firms or the use of salaried managers whose sole duty was to run these large firms (Chandler, 1990). In comparison to Germany and the US, Chandler (1990)

[1] The book by Block is publicly available /at: https://epdf.tips/long-term-orientation-of-family-firms.html.

ascribed the plummeting industrial capabilities of Britain prior to world word II to the dominance of family firms. He noted that while US firms aimed at long term growth and profit, British family firm owners who double as managers aimed at short term financial returns or steady cash flow as retained earnings is often too low due to high dividend payments (Chandler, 1990). The underlying rationale is that family owners are more susceptible to pressure from family members who may not be involved in the day to day running of the firms, to pay higher dividends. On the contrary professional managers are better placed to handle the pressure from members of the owning family (Block 2009).

Porter (1998) expresses a divergent view and laments that US firms invest less in competitiveness enhancing assets and capabilities such as supplier relations, R&D and employee training and development. This dynamic is attributable to the short term nature of the relationship between firms and external capital providers such as institutional investors (Porter, 1992). While a significant proportion of total equity is controlled by institutional investors, the portfolio of these investors are also diversified across firms thereby leaving only small holdings in each firm (Block, 2009). Furthermore, institutional investors are motivated by short to medium term returns on their investments. This does not only limit the capital available to firms, but also exacerbates the shuffling of institutional investors between firms (Porter, 1992). This trend undermines the competitiveness of the firms in which these investments are made (Porter, 1998)

Porter (1992) further observed that dedicated owners who hold large stakes in firms and also act as principals rather than agents tend to have long term ambitions with regard to their investments. The intergenerational transfer of ownership ambition of family firms underlie the longer term outlook of these firms (Miller & Le Breton-Miller, 2005; Chrisman & Patel, 2012) which makes them similar to Porter's idea of dedicated owners (Block, 2009). This historical account underscores the importance of family firms.

1.1 The Involvement of Family Firms in M&As and Innovation

Due to increased competition and rapid technological change, firms no longer have ample time to develop technological capabilities or enhance existing competencies to cope with the fast changing demands of the market (Kotlar, De Massis, Frattini, Bianchini & Fang, 2013; Graebner, 2004; Cassiman, Colombo, Garrone & Veugelers, 2005). The complex nature of products and the technologies and processes involved in production, has placed mergers and acquisitions (M&A) as enchanting strategies to make up for the technological as well as capability deficits of firms (Cassiman et al, 2005; Ahuja and Katila, 2001). M&As thus is a vehicle for access to technologies and other resources, which are critical to a firm's long term innovation success as well as its competitive advantage in an industry (Maksimovic et al, 2011; Hagedoorn and Duyster, 2002). M&As also reflect recent interest in collaborative and open innovation in the development of technological competences (Kotlar et al, 2013; Dahlander & Gann, 2010). The growing numbers of M&As transactions also indicate that M&As are not only a strategy for gaining access to new knowledge, technology assets and other capabilities, they are also used as firm growth and internationalization strategies (Ahuja and Novelli, 2014; Cartwright and Schoenberg, 2006; Cassiman & Colombo, 2006; Teerikangas, Very & Pisano., 2011). Prior research shows that M&As continue to be a popular strategy. For instance in the year 2016, 13000 M&As were recorded in the USA alone summing up to a total deal value of 1.700 trillion (Fernandez, 2018; S&P Global Market Intelligence, 2017). It is important to note that a significant proportion of these M&As are technology based (Cassiman and Colombo, 2006; Martynova and Renneboog, 2008) which is a manifestation of the growing quest to gain access to target technology related resources (Capron, Dussauge & Mitchell, 1998; Cassiman, Colombo, Graebner, 2004) as well as intellectual property (Katila & Ahuja, 2002; Graebner, 2004; Grimpe & Hussinger, 2014).

The literature on M&A suggests that it was not until about a hundred years ago that the first comprehensive literature which covered a wide areas including transaction analysis to post deal performance was recognized (Dewing, 1921). This was examined from different angles including financial, strategic, behavioral and organizational points of views (Worek, 2017).

Recent studies have shown that even though M&As remain a popular growth strategy, most of these M&As do not succeed as an estimated 50-80 percent of M&As fail (Worek, 2017; Cartwright, 2005; Cartwright & Schoenberg, 2006). This brings to the fore the vital issue of the motives associated with the decision of firms to engage in M&As. While research shows a myriad of reasons, chief among them are resource redeployment (Capron, Dussauge, & Mitchell, 1998; Uhlenbruck, Hitt, & Semadeni, 2006); cost reductions (Graham, Lemmon, & Wolf, 2002) and market power (Hitt, Harrison, & Ireland, 2001), improving innovation performance (Kotlar et al, 2013) etc.

As mergers tend to be witnessed in clusters or waves, the M&A literature identifies five waves starting from the early 1900s (Martynova & Rennebourg, 2008). The rise of merger waves have largely been attributed to several factors including shocks in the business environment, managerial herding, and the development of financial markets (Martynova & Rennebourg, 2008).

The ownership structure of a firm has implications for its M&A behaviour (Patel & King, 2015) as well as post M&A innovation. It is well known that organizations owned by families follow different strategic goals than other organizations especially regarding M&A decisions (Kotlar et al, 2013; Connelly, Hoskisson, Tihanyi & Certo, 2010. Prior research suggests that family firms are less likely to engage in risky activities such as R&D investments (Chrisman & Patel, 2012) and M&As because it may threaten ownership and control (Caprio et al, 2011; Shim & Okamuro, 2011). However, the reality is that family firms are quite involved in M&As (Worek, 2017; Family Capital, 2015; Basu, Dimitrova & Paeglis, 2009). Even though research about the

involvement of family firms in M&As has only started to gain momentum in last decade (Worek, 2017), the first recognized study is three decades old (Astrachan, 1988).

Recent empirical findings show that the M&A behaviour of family firms tend to differ from firms with other forms of ownership (Gomez-Mejia et al, 2018; Feito-Ruiz & Menendez-Requejo, 2010; Worek, 2017). This is because family firms follow different goals and apply different decision-making processes in comparison to non-family firms. Since family firms are expected to be less likely to engage in risky activities such as radical innovation or M&As, it would be of great interest for academic scholars and practitioners to understand the conditions under which family firms engage in risky actions such as M&As and the implications for innovation (Kotlar et al, 2013).

To understand the phenomena of family firms' involvement in M&As, a behavioural perspective is especially relevant in exploring the factors that drive strategic decisions of family firms. The behavioural agency model (BAM), an offshoot of the prospect theory, provides a theoretical framework that allows us to explain why in some circumstances family firms would still be prepared to engage in risky activities such as innovation (Chrisman & Patel, 2012) and M&A activities (Gomez-Mejia, Patel & Zellweger, 2018). The behavioural model underscores that loss aversion, rather than risk aversion, and problem framing are the drivers that shape the behavioral preferences of people (Kahneman, Knetsch, & Thaler, 1991; Wiseman & Gomez-Mejía, 1998). Loss aversion implies that individuals are more concerned with avoiding losses than with making gains. Problem framing contrives choices from an angle of gains and losses in relation to current endowments or socioemotional wealth in the case of family firms (Kahneman & Tversky, 1979). Problem framing is influenced by the way a choice is presented. Individuals tend to engage in risk seeking behaviors when a choice is negatively framed and the vice versa. (Chrisman and

Patel, 2012). In short the likelihood of engaging M&A transactions depends on whether family firms are performing above or below aspiration levels (Iyer & Miller, 2008).

The BAM explains why owners of family firms are loss averse with regard to their socioemotional wealth, thus implementing decisions aimed at preserving socioemotional wealth that arises as a result of control of the firm (Gomez-Mejia et al, 2007). Conflicts between financial and socioemotional wealth goals may occur. It is however, possible for these goals to converge at some point in the framing of strategic choices (Zellweger & Nason, 2008; Chrisman and Patel, 2012). The existence of conflicts between financial and SEW makes the acquisition decisions of family firms a mixed gamble. Mixed gambles refers to decisions with possible outcomes of gains and losses (Bromiley, 2009). The prevailing logic is that while BAM predicts that family firms will always be less inclined to engage in risky activities than non-family firms, the concept of mixed gambles allows us to reach opposite predictions for situations where the expected gains outweigh the expected losses in SEW.

While research on innovation in family firms is limited and less understood (De Massis, Frattini, & Lichtenthaler, 2013), existing research indicates that family firms generally invest less in R&D as compared to non-family firms (Block, 2012; Chrisman & Patel, 2012). The results in this regard are largely consistent. Also, prior research shows that innovation activities are carried out differently between family and non-family firms (De Massis Di Minin & Frattini., 2015). Meanwhile, empirical evidence about innovation outputs of family firms remains largely mixed (Massis et al, 2015). External acquisition of technology resources is an important innovation strategy for many firms including family firms. The inherent difference between family firms and other types of firms position them to be able to utilize acquired resources differently which should lead to different innovation outcomes (Kotlar et al, 2013).

This thesis contributes to the M&A and family business strategy literature by taking a behavioural approach to understand the antecedents of M&As among family firms and non-family firms. Furthermore, the thesis brings to the fore the mechanisms that drive post M&A innovation in family firms.

The next section briefly discusses the various chapters.

1.2 Research Questions

The effect of ownership on M&A and innovation is an aspect of strategy that is growing in importance given the increasing involvement of family firms in M&A transactions. This thesis focuses on the behavioural antecedents of M&As involving family firms and the implications of M&As for innovation in family firms. In doing so, the thesis empirically examines the following questions: *1) Are family firms more likely to engage in M&As than non-family firms? 2) Do family firms become more innovative than non-family firms after M&As? 3) How do merger waves influence the choice of M&A targets?*

The second chapter takes the view that it is a well-documented fact that strategic decisions of family firms are not motivated by only financial considerations, but also to a large extent by non-financial considerations (Gomez-Mejia, Haynes, Nunez-Nickel, Jacobson & Monyano-Fuentes 2007; Zellweger, Nason, Nordqvist & Brush 2011, Kellermanns, Eddleston & Zellweger 2012; Miller & Le Bretton 2014). The focus on SEW, however, also implies that family firms have a long run perspective on their corporate decisions because of their desire to transfer ownership to future generations (Zellweger, 2007; Le Bretton-Miller & Miller 2006; Classen, Carre, Van Gils & Peters 2014). This means that family firms have strong incentives to engage in activities with a long run perspective and the potential to increase SEW such as R&D (Westhead 1997, Craig & Dibrel 2006, Classen et al. 2011) and firm acquisitions.

Family firms' strategic decision making is often analyzed using BAM (Gomez-Mejia et al. 2007; Lim, Lubatkin & Wiseman 2010; Zellweger, Kellermanns, Chrisman & Chua 2012; Chrisman & Patel 2012). Due to their focus on SEW family firms are believed to be loss averse (Gomez-Mejia et al. 2007). However, the BAM and the concept of loss aversion do not account for potential SEW gains that the engagement in risky activities can generate. Under BAM family firms engagement in firm acquisitions is expected to be lower than that of non-family firms (Shim & Okamuro 2011, Caprio et al. 2011). However, the concept of mixed gambles allows us to reach opposite predictions under certain circumstances. This chapter draws from the concept of mixed gambles (Bromiley 2010; Gomez-Mejia et al. 2013) in order to investigate the involvement of family firms in firm acquisitions. Here, an acquisition is viewed as a mixed gamble which can potentially lead to gains and losses (Gomez-Mejia, Campbell, Martin, Hoskisson, Makri, & Sirmon 2013). Potential gains and losses are determined by financial performance as well as by SEW, which distinguishes family firms from non-family firms. It is therefore hypothesized that family firms are more likely to engage in related acquisitions, a means of related diversification (Andersson & Reeb 2003b), than non-family firms and that this effect is stronger for family firms in a gain frame, i.e. those that perform above the industry average.

The third chapter acknowledges the involvement of family firms in M&As and focuses on estimating the post M&A innovation in family firms from a resource based view perspective. The chapter observes that family firms are endowed with distinct resources such as organizational social capital, survivability capital, patient financial capital etc. which all favour long term innovation in family firms (Sirmon & Hitt, 2003, Acquaah, 2016) By taking into considering the fact that mergers take place in waves, the paper explores the idea that the early phase of a merger wave consist of a large pool of potential targets thereby increasing the chances of targets with potential synergies (McNamara et al, 2008). This further allows for a comparison between family and non-family firms

in terms of how they are able to utilize acquired resources during the different phases of the merger wave. It is then observed that by virtue of their distinct resources, family firms are better placed to utilize acquired resources in combination with internal resources (Newbert, 2007) more efficiently than their non-family counterparts there by becoming more innovative after M&As than family firms.

The fourth chapter focuses on exploring how merger waves influence the choice of M&A targets and the circumstances under which firms diversify acquisitions. This is similar to chapter 2 except that it examines the likelihood of acquisitions in the context S&P 500 firms without making any distinction between family and non-family firms. It is argued that technology development has traditionally been carried out as an internal process through investment in research and development (R&D) (Ahuja & Katila, 2001). However, due to increased competition and the rapid changing nature of industries and markets, technology development has evolved to include externally sourced knowledge bases (Köhler, Sofka, & Grimpe 2012, Laursen & Salter 2006). While there are several other means through which organizations can access external knowledge, firm acquisitions are considered an important instrument to gain access to external technological capabilities that are valuable in dynamic business environments (Graebner, 2004, Grimpe & Hussinger, 2014).

In spite of the recognition of the importance of acquisitions, the acquisition behaviours of organizations remain largely underexplored (Barkema & Schijven, 2008). Recent interest in the behavioural motives of firms for engaging in acquisitions have focused mainly on the effect of financial performance aspiration gaps (Gomez-Mejia, Patel & Zellweger, 2018; Chen, 2008; Chen & Miller, 2007; Greve, 2003). In view of this the chapter focuses on how technology performance aspiration gaps influence technology acquisition decisions of firms. This chapter fills this gap by arguing from the perspective of the behavioural theory of the firm that a firm's technology

performance above or below aspiration levels is a major antecedent of acquisitions. It also focuses on the idea of industry relatedness of externally sourced technology resources (Cefis, Marsili & Rigamonti, 2019) and examines how a firm's position in a merger wave impacts the choice of acquisition targets relative to a merger wave. Since M&As occur in waves (McNamara, Haleblian & Dykes, 2008), the chapter sheds light on this by employing insights from competitive dynamics and bandwagon pressures that are occasioned by merger waves.

1.3 Thesis Dataset

Data from different sources were linked to construct the dataset for this dissertation namely Thomson One Banker, Compustat, NBER patent and citations data, S&P 500 and the BusinessWeek issue of July 2003.

The S&P 500 is the starting point of the data building the dataset. The BusinessWeek issue published a list and ownership information of family firms in the S&P 500 at of 2003. In total there were 177 family firms representing 35 percent of all firms in the S&P 500.

The S&P 500 was merged with the Compustat database leading to a panel of 500 firms. In the next step this was combined with the M&A data. Information on M&A transactions were taken from Thomson One Banker. This dataset provides deal information for all publicly listed US firms between 1976 and 2013 which amounted to 36, 841 observations. M&As involving the same target and acquirer, uncompleted deals and deals and deals with more than two firms were discarded. In the next step the M&A data was matched with the NBER patent and citation data to retrieve information on patents using CUSIP and GYKEY as the common idenfiers. This resulted in a total of 7,056 observations for the window of interest (01/1980 – 12/2010).

Different data samples were obtained from this dataset for each chapter of the dissertation. Chapter 2 uses a panel dataset of 4903 observations from 225 firms spanning the period 1980-

2010. 1676 observations correspond to 86 family firms and 3226 to 139 non-family firms. The share of family firms in the sample is 38.2%. Out of the 225 firms, 423 acquisitions were conducted by 129 firms during this time window. Among them are 158 acquisitions made by 46 family firms and 265 acquisitions made by 83 non-family firms. In terms of industry classification of firms in our sample, 189 firms, 68 of which are family firms are in manufacturing. Of the 36 firms in the service sector, 18 are family firms. Chapter 3 uses a sample of firms from only manufacturing to estimate post M&A innovation which resulted in 324 different deals in the sample with a final data sample of 4213 observations. Both chapter 2 and 3 made distinction between family and non-family firms. Chapter 4 uses a sample of firms from the manufacturing and services, only this time with no distinction between family and non-family firms. This resulted in a sample of a panel dataset with 4735 observations from 270 firms and a total of 408 different acquisitions. 323 acquisitions were conducted by 122 firms in manufacturing and the remaining 85 by 36 firms in the service sector.

The family firm variable in the thesis is estimated based on BusinessWeek classification of 2003 which is assumed to be constant for the years before 2003 (1980-2003). They are not measured on a yearly basis. However, I am unable to make a show that the family ownership status remains same beyond 2003 because ownership of firms could change. For this reason a strong assumption is made that, these firms remain family firms throughout the years under consideration. That is why the analysis is always presented for the years before 2003 where there is certainty that firms classified as family firms are indeed family firms. Results for the full sample including the years after 2003 are also presented

Figure 1 shows the yearly volume of M&As transactions for the sample of firms for the period under consideration which also depicts the merger waves. Figure 2 presents the volume of

acquisitions for family firms in the sample and that of non-family firms is presented in figure 3. In comparison to non-family firms, family firms display less volumes of acquisitions for the years a under consideration.

1.4 Outline

The dissertation consists of three empirical studies which are presented in chapters 2, 3 and 4 where each chapter addresses one research question. Furthermore, each chapter presents a review of the relevant literature and hypothesis, methodology, empirical results, discussion and conclusion where implications of the study are discussed.

Each of the three chapters is independent of the others and can therefore be read as so .While chapters 2 and 3 are about family firms, Chapter 4 makes no distinction between family and non-family firms. Finally, chapter 5 discusses the main findings, implications for both practitioners and scholars and the limitations of the study. Finally, it suggests avenues for future research. It is important to note that the terms M&A(s) and acquisition(s) are used interchangeably.

Figure 1: Volume of M&A transactions for the Manufacturing and Service Industries

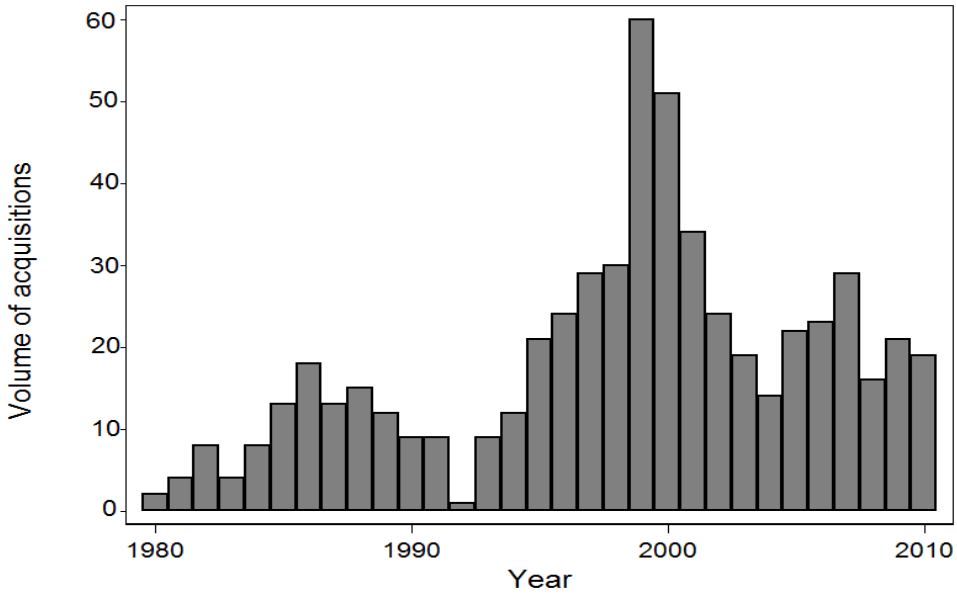


Figure 2: Volume of acquisitions for the Manufacturing and Service Industries (Family firms)

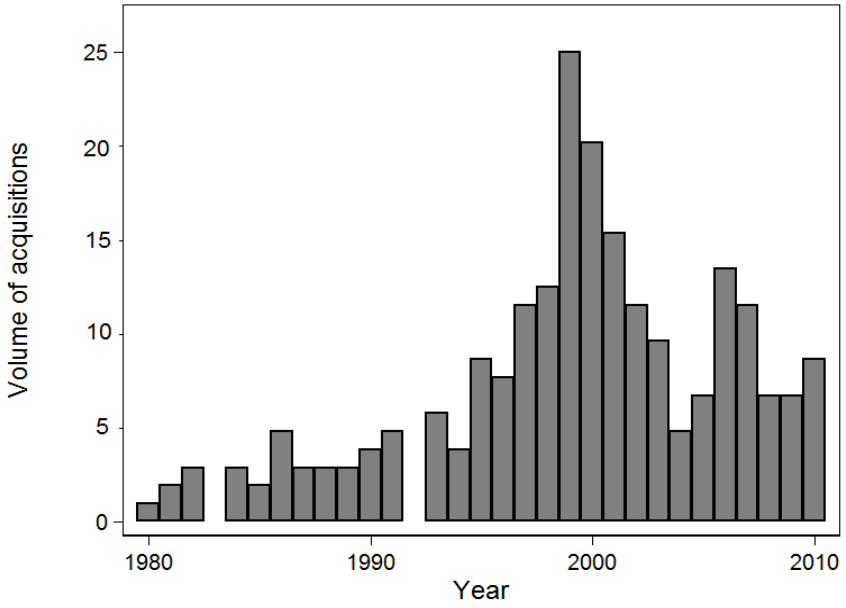
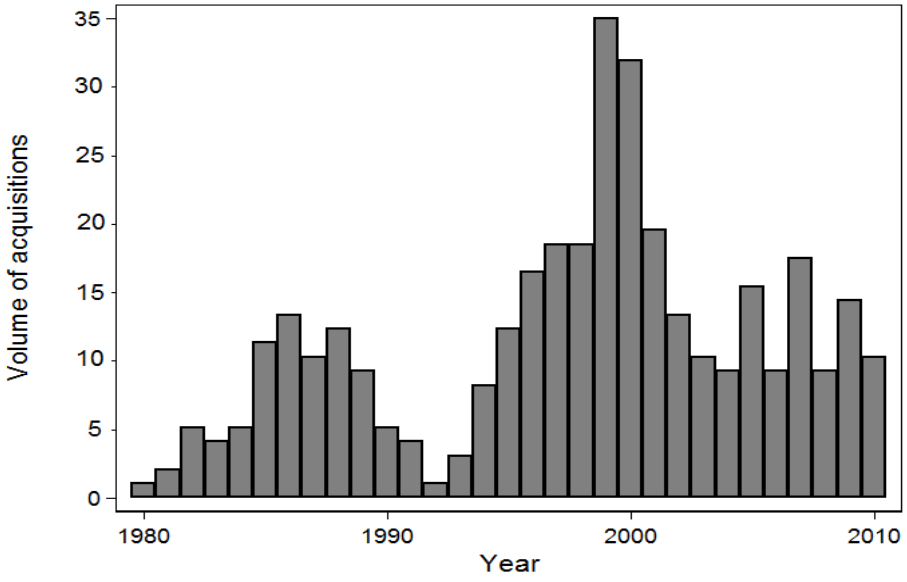


Figure 3: Volume of acquisitions for the Manufacturing and Service Industries (Non-family firms)



Chapter 2

Firm Acquisitions by Family Firms: A Mixed Gamble Approach[2]

2.1 Introduction

It is a well-documented fact that strategic decisions of family firms are not motivated by financial considerations only, but to a large extent by non-financial considerations summarized under the concept of socioemotional wealth (SEW) (Gomez-Mejia, Haynes, Nunez-Nickel, Jacobson & Monyano-Fuentes, 2007; Zellweger, Nason, Nordqvist & Brush, 2011, Kellermanns, Eddleston & Zellweger, 2012; Miller & Le Bretton, 2014). SEW expresses itself in the form of the emotional and non-financial value attached by family members to their firm which fulfils affective needs of the family, such as preserving the family dynasty, values and family identity as well as the ability to exercise control (Gomez-Mejia et al, 2007; Miller & Le Bretton , 2014; Kellermanns et al, 2012).

Family firms' strategic decision making is often analyzed using behavioural agency models (BAM) (Gomez-Mejia et al, 2007; Lim, Lubatkin & Wiseman, 2010; Zellweger, Kellermanns, Chrisman & Chua, 2012; Chrisman & Patel, 2012). BAM predicts that family firms are loss averse and aim at protecting their SEW (Gomez-Mejia et al, 2007). Loss aversion is in turn negatively associated with risk taking and predicts a choice for less risky actions over risky options to avoid SEW losses (Thaler & Johnson, 1990). Therefore, loss aversion is put forward as an explanation for family firms' reluctance to engage in risky activities such as research and development (R&D) (Gomez-Mejia et al., 2007; Chrisman & Patel, 2012; Muñoz-Bullon & Sanchez-Bueno, 2011;

[2] Joint work with Katrin Hussinger, University of Luxembourg

Block, 2012), industry cooperatives (Gomez-Mejia et al., 2007), polluting activities (Berrone, Cruz, Gomez-Mejia & Larraza-Kintana, 2010) and firm acquisitions (Shim & Okamuro, 2011; Caprio, Croci & Del Giudice, 2011; Gomez-Mejia, Patel & Zellweger, 2015).

We argue that previous studies using BAM to predict risky actions by family firms and the presumed lack thereof suffer from two weaknesses. The first one is that heterogeneity of acquisition deals is often not taken into account. Different types of acquisition deals, however, have different implications for expected financial as well as SEW losses and gains. We argue that an acquisition type that allows family firms to face larger expected gains than losses are related acquisitions as a means of related diversification (Anderson & Reeb, 2003a). Related diversification through firm acquisitions promises comparably high financial gains and for family firms additional SEW gains due to a close relation to the core business of the acquiring firm. Since SEW gains are only realized by family firms, we predict that for the specific type of related acquisition family firms are more likely to engage in a takeover than non-family firms.

The second weakness of the prior literature arises from the assumption of BAM that family firms' actions in a gain frame, which is typically measured by an outstanding financial performance, are solely motivated by keeping the status quo, hence avoiding actions that involve risk[3]. We argue that this is an unrealistically strong assumption which seems to not fit corporate

[3] Within a BAM framework, the concept of problem framing can explain that, under specific conditions, family firms nevertheless engage in activities associated with a high risk (Chrisman & Patel, 2012). Problem framing conceives of choices from a standpoint of gains and losses in relation to current endowments (Kahneman & Tversky, 1979). BAM posits that the attitude towards risk taking in decision making depends on the framing of problems (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). When family firms see their SEW threatened, i.e. they are in a loss frame, they are ready to take risk in order to re-establish their aspiration level. When family firms are performing at or beyond their aspiration level, i.e. they are in a gain frame, they aim at protecting the status quo and avoid risks.

reality. On the contrary, family firms just like other firms in a gain frame have an advantage when it comes to risky actions such as innovation[4] or firm acquisitions because the risk of failure will have fewer implications for the firm's future profitability and survival. Being in a financially sound position further helps family firms to keep control by using internal means to finance the acquisition (Patel & King, 2015).

Taking these considerations into account, we suggest the concept of mixed gambles as an alternative theoretical framework. In contrast to BAM, the concept of mixed gambles weighs expected gains and losses when analyzing strategic options. Here, we view firm acquisitions as mixed gambles (Gomez-Mejia, Campbell, Martin, Hoskisson, Makri, & Sirmon, 2014) and allow different acquisition types to be reflected by different types of gambles.

The flexibility of the theoretical concept of mixed gambles allows us to derive predictions that differ from predictions derived from commonly used BAM. First, we hypothesize that for related acquisitions as a specific type of acquisition, family firms are expected to be able to derive greater value than non-family firms because only family firms realize SEW gains. Second, we derive that family firms in a gain frame are more likely to engage in related acquisitions than family firms in a loss frame since the ability to finance an acquisition using internal means leads to an increase of the expected SEW gains relative to the potential SEW losses and implies a limited risk of losing control. Third, we hypothesize that family firms in a gain frame are more likely to engage in related acquisitions than non-family firms in a gain frame. This is because family firms have the longer time horizon which allows them to attach greater value to acquisition gains that are realized in the

[4] Under certain conditions, family firms have been found to be more innovative than non-family firms (De Massis, Di Minin, & Frattini, 2015; Patel & Chrisman, 2014, Classen et al., 2014, Duran et al., 2016, Kosmidou & Ahuja, 2019).

distant future. These hypotheses derived from the concept of mixed gambles stand in sharp contrast to BAM which predicts that family firms are less willing to take risk than non-family firms and that they are only willing to take risk to restore their aspiration level, i.e. when they are in a loss frame (Chrisman & Patel, 2012).

We find empirical support for our predictions using a tailor-made panel dataset that is based on the Standard & Poor's (S&P) 500 firms followed over a period of 31 years (1980-2010). In a final step of our empirical analysis, we show that the acquisition strategies of family firms derived from mixed gambles lead to a superior financial post-merger performance and, hence, outperform BAM strategies. More specifically, we show that family firms face a superior financial post-merger performance than non-family firms, especially when they are in a gain frame. These results are particularly clear if we use Tobin's Q as a forward-looking performance measure that takes future expected gains into account.

We make several contributions to the literature on family firms' strategic decision making. First, our study points out two important limitations of the previous literature based on BAM. The first one is that deal heterogeneity is often not taken into account. We show that acquisitions leading to related diversification are more likely to be conducted by family firms then by non-family firms as they promise high SEW increases. The second shortcoming is related to the BAM assumption that family firms in a gain frame are solely interested in preserving the status quo, hence avoiding actions that involve risk. As an alternative theoretical concept we rely on mixed gambles, a concept that was only recently applied to the context of family firms (Kotlar, Signori, De Massis & Vismara, 2018; Martin, Gomez-Mejia, Wiseman, 2013; Gomez-Mejia, Patel, & Zellweger, 2015; Gomez-Mejia et al, 2014). The concept of mixed gambles allows a more holistic evaluation of family firms' decision making than BAM since it has the flexibility to define different acquisition types as different gambles and since it takes expected SEW gains for firms in a gain frame into

consideration. Our study, hence, contributes to the first empirical evaluations of the performance of the mixed gambles concept (e.g. Gomez-Mejia et al, 2015).

Second, in that the predictions derived from the concept of mixed gambles stand in sharp contrast to BAM predictions, we illustrate a conflict between the commonly used BAM framework to analyze family firms' strategic decision making (e.g. Chrisman & Patel, 2012; Patel & King, 2015; Gomez-Mejia, Makri & Larraza-Kintana, 2010) and the recent theoretical alternative of mixed gambles (e.g. Gomez-Mejia et al, 2015; Kotlar et al, 2018; Martin et al, 2013). Therewith, we highlight the importance of model choice for the empirical researcher which should be based on a careful study of competing theories and the fit of theoretical assumptions and corporate reality.

Third, we analyze financial performance implications of acquisitions. Therewith, we go an important step further than prior research (Gomez-Mejia et al, 2018, 2010; Kotlar, De Massis, Frattini, Bianchini & Fang, 2013; De Massis, Frattini & Lichtenthaler, 2013). The investigation of the success of corporate strategies enables us to better draw conclusions about the more appropriate theoretical framework.

Finally, we contribute to the literature on M&As which has paid little attention to differences in acquisition behaviour of family firms and non-family firms. Notable exceptions include Shim & Okamuro (2011), Caprio et al (2011), Miller, Le Breton-Miller & Lester (2011), Miller & Le Breton-Miller (2014), Chrisman & Patel (2012) and Gomez-Mejia et al (2015). These studies indicate differences in the acquisition behaviour of family and non-family firms which we investigate further in our study. With our conflicting predictions of BAM and mixed gambles and focus on deal heterogeneity, we contribute to a better understanding of the influence of ownership types on strategic actions such as firm acquisitions (e.g., Connelly, Hoskisson, Tihanyi & Certo, 2010; David, O'Brian, Yoshikawa & Delios, 2010; Lane Canella & Lubatkin, 1998; Ramaswamy, Li Veliyath, 2002; Gomez-Mejia et al, 2015).

2.2 Theoretical Framework and Hypotheses Development

The BAM framework has for a long time been the most important theoretical framework for analyzing family firms' strategic decision making (e.g. Gomez-Mejia et al, 2007; Lim et al, 2010; Zellweger et al, 2012; Chrisman & Patel, 2012). BAM views family firms as loss averse rather than risk averse aiming at avoiding SEW losses.[5] This leads to the prediction that family firms are reluctant to engage in risky activities such as firm acquisitions (Shim & Okamuro, 2011; Caprio, et al, 2011).

Recent literature has, however, shown that decision making of family firms is more complex involving financial as well as SEW goals (Kotlar et al, 2018). This speaks to the acquisition literature which emphasizes financial performance gains as the main reason for acquisitions (see. Haleblian, Devers, McNamara, Carpenter, & Davison, 2009; McNamara, Haleblian, & Dykes, 2008), but also shows various other goals of firms' engagement in corporate acquisitions such as the access to new technologies (Ahuja & Katila, 2001; Graebner, 2004), intellectual property rights (Grimpe & Hussinger, 2008, 2014), as well as access to R&D related expertise beyond the boundaries of the firm (Kotlar, et al, 2013; Calantone & Stanko, 2007), gains from economies of

[5] The BAM incorporates elements tapped from the prospect theory in to agency models of incentive alignment (Martin et l, 2013). For instance. Prospect theory deals with choices under risks and uncertainty. This stems from the expected utility principle which posits that individuals "maximize their expected utility by weighting the utility of each possible outcome of a given course of action by the probability of its occurrence, summing over all possible outcomes for each strategy, and selecting that strategy with the highest expected utility" (Levy, 2007:88). There is an assumption of risk aversion where certainty is certainty is entertained over a gamble of equal value (Kahneman & Tversky, 1979).

Individuals are more sensitive to changes in assets than to changes in net asset levels; to gains and losses from a references point rather than to levels of wealth. This reference dependence is central to the analytic assumption of Prospect theory.

BAM departs from this notion by replacing the assumption of risk aversion with loss aversion (Martin et al, 2013) where the decision maker aims to protect losses to SEW in the case of family firms, even at the cost of higher risk or uncertainty (Tversky & Kahneman, 1991). BAM particularly integrates the concept of endowments to its predictions (Martin et al, 2013) which refers to SEW in the case of family firms.

In sum the BAM refers to the combined insights of the prospect theory and agency models of incentive alignment (Chrisman & Patel, 2012, Martin et al, 2013). Recent studies including this thesis have failed to use prospect theory as the basis of theorizing, thus only relying on BAM as the foundation of their theories. Scholars are entreated to go beyond the BAM and explicitly incorporate notions prospect theory in their theories.

scale and scope as well as market power increases (Hitt, Ireland, & Harrison, 2001), market discipline (Rhodes-Kropf, Robinson, & Viswanathan, 2005) and efficient resource deployment (Uhlenbruck, Hitt, & Semadeni, 2006). The well-documented variety of acquisition goals and the observation that family firms are, in fact, well engaged in the market for corporate control (Family Capital, 2015, Worek, 2017) suggests that the acquisition decision of family firms cannot be solely motivated by SEW considerations.

Prior studies in the field of M&A further suggest that firms engage in acquisitions according to rational decision criteria, but that the acquisition likelihood and success is also positively influenced by behavioural factors such as acquisition experience and a solid resource endowment and the availability of slack (King, Dalton, Daily & Covin, 2004). Firms with acquisition experience, for instance, repeat a strategic action and benefit from learning effects independent of whether the past experience was successful or not (e.g., Franks, Hariss & Titmans, 1991; Haleblian & Finkelstein, 1999; Hayward, 2002; Kroll et al, 1997). A better resource endowment and slack, for instance, allow firms to commit excess resources to pursue new opportunities supporting acquisition success (Levinthal & March, 1981, Iyer & Miller, 2008; Tyler & Caner, 2016). While BAM allows for firms' risk attitude to change with regard to the reference point, i.e. the aspiration level, which is typically defined in terms of the financial performance of the firm (Chrisman & Patel, 2012), behavioural factors that might well impact the expected success of acquisitions are often not considered in the previous literature based on BAM (Kotlar et al, 2013). If considered, a rich resource endowment often exists within firms performing above their aspiration level for which BAM would predict that they are particularly risk averse being only motivated by preserving the status quo (Caprio et al, 2011).

The M&A literature also indicates that returns to acquisitions are rather uncertain (e.g. Capron & Pistre, 2002; King et al, 2004; Masulis, Wang & Xie, 2007). In fact, the available evidence shows

that about half of the acquisitions turn out to be failures mirroring the substantial level of risk involved (Schoenberg, 2006; Krug & Aguilera, 2005). Many acquisitions result in lower cost reduction than anticipated (Graham, Lemmon & Wolf, 2002), inefficient resource deployment (Uhlenbruck et al, 2006) and less market power gains than projected (Hitt et al, 2001). This is why BAM predicts that family firms stay away from the market for corporate acquisitions.

While the reasons for the failure of acquisitions are often difficult to determine (Ellis, Reus, & Lamont, 2009), there is robust evidence that post-merger performance is moderated by several factors such as whether the acquisition was hostile, the pre-merger performance of both acquired and acquiring firms, the acquisition premium paid, whether the merger was horizontal or vertical, whether the merger was regulated or unregulated, related or unrelated, the acquiring firm's acquisition experience, the method of payment (cash/equity), the relative size of acquirer and target firm, complementarities of firm resources, and whether the acquiring firm is a conglomerate (King et al, 2004). This suggests that acquisition deals are very heterogeneous, a fact that is also often not accounted for in prior studies (De Massis et al, 2013).

These observations challenge the BAM-based prediction that family firms show a low involvement in the market for corporate control due to loss aversion (Shim & Okamuro, 2011, Caprio et al, 2011), eagerness to preserve the status quo and to keep control thus protecting their SEW (Miller et al, 2011; Chrisman & Patel, 2012). First, while SEW refers to the noneconomic benefits that accrue to only family members as a result of their ownership, involvement and control of a firm (Miller & Le Breton- Miller, 2014) just like non-family firms, family firms may have multiple goals of firm acquisitions including financial performance gains (Worek, De Massis, Wright & Veider, 2018, Kotlar et al, 2018). Second, the long-term planning horizon of family firms may encourage family firms to undertake actions with potential short-term losses, but with potential long term gains (Gomez-Mejia et al, 2018). M&As are such an action that may promise long-term

gains. In comparison to other forms of external venturing, acquisitions are attractive for family firms because they guarantee ownership (Titus, House, & Coven, 2017), hence safeguarding or increasing SEW. Third, heterogeneity of acquisitions can lead to different considerations for different deal types so that expected SEW losses do not always dominate financial gains and potential long-term SEW gains. Fourth, factors such as a rich resource endowment and slack may positively influence M&A considerations as they allow the firm to mitigate potential negative acquisition consequences (Iyer & Miller, 2008) and might even help family firms to increase SEW gains (Patel and King, 2015). These observations are in line with evidence that shows that family firms use acquisitions as a vehicle for external resource acquisitions (Kotlar et al, 2013) and that there is a surge in the participation of family firms in acquisition activities (Family Capital, 2015, Worek, 2017). They are, however, not in line with BAM. This is why we turn to the concept of mixed gambles to better explain the observed phenomena.

2.2.1 The Notion of Mixed Gambles and M&As

The concept of mixed gambles, in contrast to BAM, treats strategic decisions as moments with likely outcomes of both gains and losses (Bromiley, 2009). It acknowledges that, in practice, there is hardly any strategic decision with a pure likelihood of gain and loss outcomes (Bromiley, 2010). Many strategic decisions promise financial gains but entail losses of SEW such as international diversification (Gomez-Mejia, Makri, & Larraza-Kintana, 2010), investments in R&D (Chrisman & Patel, 2012) and IPOs (Kotlar et al, 2018). This means that in practice, decision makers face a trade-off and need to weigh potential gains and losses with regard to different value dimensions (Kim, Hwang & Burgers, 1993; Martin et al, 2013). In the context of family firms' involvement in the market for corporate control this implies that family firms need to weigh both potential financial and SEW gains and losses as a consequence of a firm acquisition when deciding to engage in a

firm acquisition. Taking both of these dimensions into account allows to develop a more sophisticated understanding of family firms' engagement in the market for corporate control using non-family firms as a benchmark for comparison. Recent literature has started to investigate the trade-off between avoiding SEW losses and realizing financial gains in family firms (Chrisman & Patel, 2012; Gomez-Mejia, Cruz, Berrone & De Castro, 2011; Miller & Le Breton-Miller, 2014; Zellweger et al, 2012; Kotlar et al, 2018).

Through a mixed gambles lens, both family firms and non-family firms view risky decisions as mixed gambles weighing the potential gains and losses against each other (Kim et al, 1993). The difference is that family firms consider next to the financial risks and benefits, which are the same for both types of firms, potential losses in SEW as well as potential SEW gains. When focusing on the average acquisition deal, we most likely find family firms less inclined to make a positive acquisition decision since the expected financial returns are uncertain (e.g. Capron & Pistre, 2002; King, Dalton, Daily & Covin, 2004; Masulis et al, 2007) and since there might be SEW losses to be expected (Gomez-Mejia et al, 2010). The latter is only taken into account by family firms.

Acquisition heterogeneity provides a unique opportunity to get a better understanding of the different strategic considerations of family and non-family firms in the market for corporate control through a mixed gambles' lens because the type of mixed gamble differs for different acquisition types. In the following, we focus on related and unrelated diversification through firm acquisitions (Gomez-Mejia et al, 2018; Miller, Le Breton-Miller & Lester, 2010; Cefis, Marsili & Rigamonti, 2019; Capron, Dussauge & Mitchell, 1998). Prior literature has established that, overall, related acquisitions refer to high risk-high return strategies (Amit & Livnat, 1988), while unrelated acquisitions are a means to reduce firm specific risk with lower associated financial returns (Amihud & Lev, 1981, Anderson & Reeb, 2003). Nevertheless, the financial performance outcomes of unrelated acquisitions have been found to be difficult to predict (Gomez- Mejia et al,

2018) and there is also evidence for a tendency of performance shortfalls (see King, Slotegraaf & Kesner, 2008; Amihud & Lev, 1981). A potential superior financial performance following related acquisitions can be caused by a transfer of core capabilities between acquisition target and acquiring firm (Rumelt, 1982).

As family firms are typically characterized by undiversified ownership, reducing business risk through unrelated acquisitions looks attractive (Miller et al, 2010; Anderson & Reeb, 2003a). However, we note that family firms tend to be less diversified than non-family firms (Anderson & Reeb, 2003a; Gomez-Mejia, Makri & Larraza-Kintana, 2010; Essen, Carney, Gedajlovic & Heugens, 2015). This is because family firms often lack the ability to judge the quality of other, especially unrelated ventures (Anderson & Reeb, 2003b). The lack of competence and capabilities of family firms is caused by family priorities which dictate to fill board and management positions with often less qualified family members. In consequence, we observe conservative decision making and fewer available capabilities to act upon new opportunities in family firms (Miller & Le Bretton-Miller, 2014). In the aftermath of an unrelated acquisitions, the lack of competence leads family firms to face a risk of loss of control with implications for SEW. It follows that the potential SEW losses of unrelated acquisitions exceed the potential SEW gains so that family firms are typically less likely to be involved in unrelated firm acquisition than non-family firms which only consider financial acquisition implications.

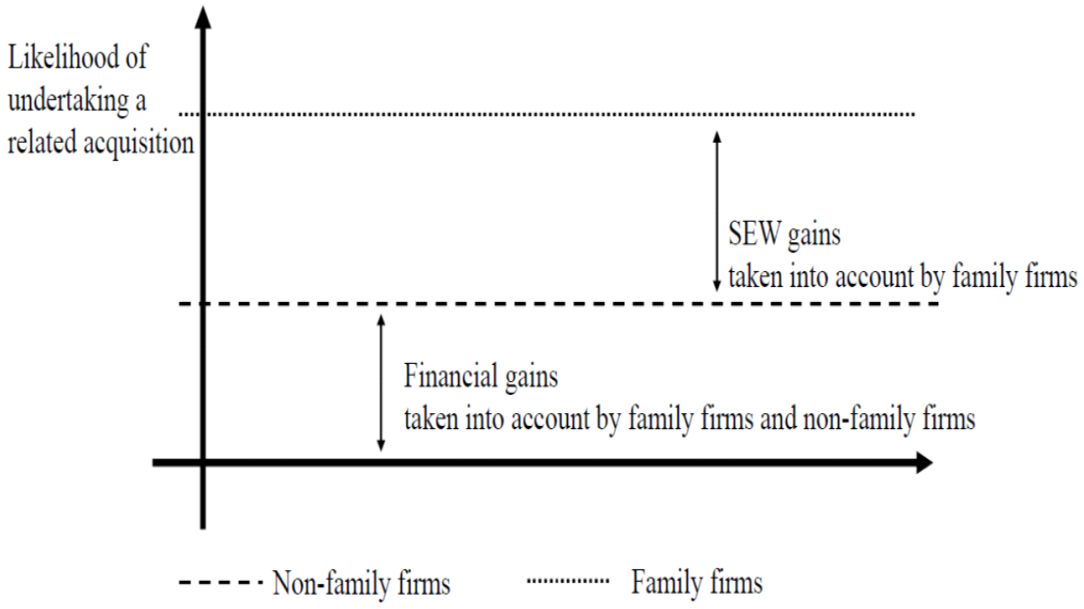
Prior research shows that family firms diversify in related industries (Gomez-Mejia et al, 2018). Related diversification allows the managers of family firms to stay close to their core businesses (Gomez-Mejia et al, 2010; Anderson & Reeb, 2003a) while realizing gains from an efficient transfer of core capabilities (Rumelt, 1982). With time, family members may have developed affection and emotional attachment for the core technology, products as well as the domain knowledge and expertise needed to succeed in the industry. Lacking the competence to

venture into new markets, diversifying into related industries allows family firms to apply their accumulated experience to the new venture (Anderson & Reeb, 2003a). The well-acknowledged age-old established knowledge held in the firm is preserved (Duran, Kammerlander, Van Essen, & Zellweger, 2016). There will be no need to recruit new external executives in order to acquire new relevant skills and the family firms can stay within their routines and time proven methods (Eisenmann, 2002; Vermeulen & Barkema, 2001). Furthermore, related acquisitions help to maintain the familial control or SEW in family firms as no major restructuring will be needed in order to integrate the target as it is often the case with unrelated acquisitions (Barkema & Schijven, 2008). This therefore has a long-term effect of preserving or increasing the value and reputation of firms which consequently has the potential to strengthen SEW (Gomez-Mejia et al, 2014).

In line with the logic of mixed gambles, we derive that given the mix of strategic choices of family firms, the expected SEW gains of related acquisitions are not negative while unrelated acquisitions are associated with expected SEW losses. Expected SEW gains associated with related acquisitions should render them more attractive for family firms than for non-family firms (see Figure 1). The prospective SEW gain from acquisitions predominates in this mixed gamble decision context (Martin et al, 20013). In essence the mixed gamble approach allows for prospect of losses in SEW to be weighted less in comparison to gains which also suggests a SEW net gain for family firms. Hence, we hypothesis that family firms are more likely to engage in related firm acquisitions than non-family firms.

Hypothesis 1: Family firms are more likely to engage in related firm acquisitions than non-family firms.

Figure 1
Hypothesis 1: Family firms versus non-family firms



Acquisitions often require large amounts of capital and other financial and knowledge resources. This means that a family firm may have to look within for funds to finance this strategy. Only firms that are financially viable will be able to finance such risky and resource demanding strategies with internal funds. For those who are constrained due to low profitability, the alternative to internal financing is to seek external (either debt or equity) financing that presents its own set of challenges such as giving up substantial part of ownership, control and influence in decision making to external actors (Gomez-Mejia et al, 2014). External financing makes acquisitions of any kind unattractive for family firms since it undermines family control or influence in the strategic direction of the firm, which is fundamental to SEW (Zellweger et al, 2012; Gomez-Mejia et al, 2018). Financially healthy family firms can rely on internal sources to execute activities including

acquisitions. This should increase the expected gains to SEW relative to the expected losses and render related acquisitions as a means for related diversification more attractive for financially healthy family firms than for financially less healthy family firms, a prediction that is contrary to the BAM prediction (Gomez-Mejia et al, 2014; Chrisman & Patel, 2012).[6]

Hypothesis 2: Family firms with a healthy performance (gain frame), are more likely to engage in related firm acquisitions than family firms with performance deficits (loss frame).

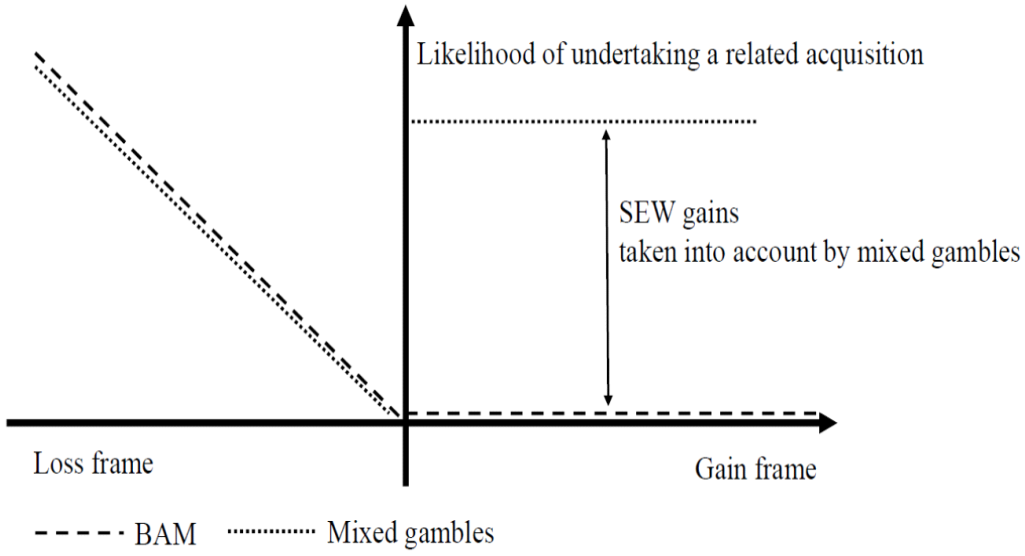
Figure 2 illustrates how family firms would decide differently for a risky action when applying a BAM or mixed gambles framework. As argued above, mixed gambles predict that the likelihood to engage in a related acquisition is higher for family firms in a gain frame based on the weighing of expected gains and benefits. Positive SEW gains are taken into account in a gain frame. In contrast, BAM assumes that in a gain frame family firms are solely interested in preserving the status quo.

We noted above that financially well performing family firms face greater expected gains from related acquisitions due to higher expected SEW gains. Related diversification enables them to stay with activities close to their core business (Anderson & Reeb, 2003a) and to transfer capabilities directly and efficiently (Rumelt, 1982) potentially deriving substantial SEW gains. Here, we argue that the potential SEW gains that family firms can realize in a gain frame also imply that they are more likely to engage in related acquisitions in a gain frame than non-family firms in a gain frame. The main reason is that a large share of the benefits of related acquisitions is only realized in the

[6] Chrisman & Patel (2012) derive from BAM that family firms only engage in risky activities if they are performing way below their financial aspiration level. The argument is that only when the pressure is significant family firms are taking risk to reach their aspiration level.

long run. The long-term benefits fit well with the long-term horizon of family firms' planning but not necessary with the rather short-term strategic planning of non-family firms (Gomez-Mejia et al, 2014).

Figure 2
Hypothesis 2: BAM Verses Mixed Gambles

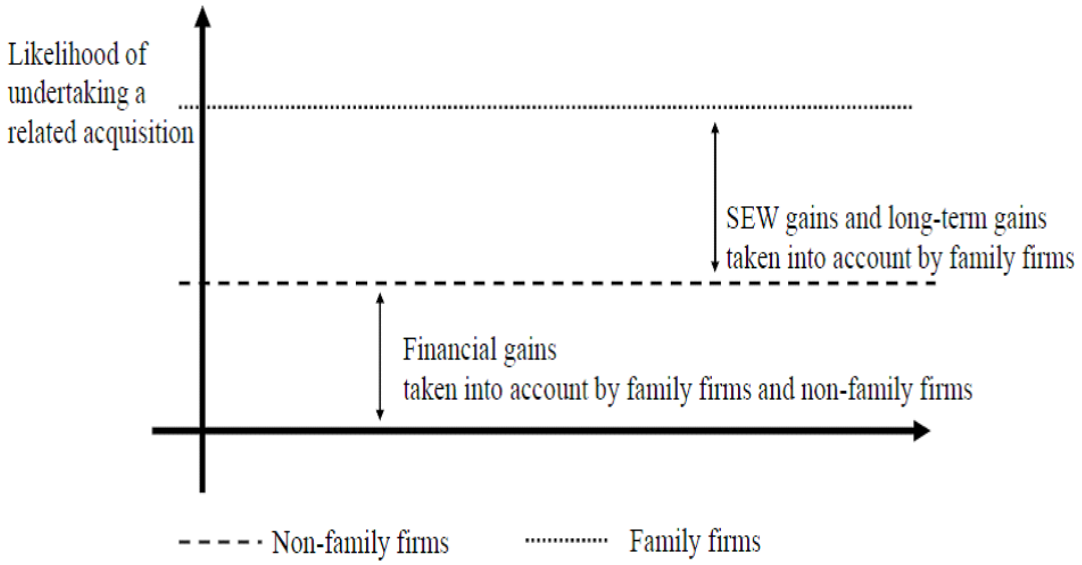


In the presence of a limited downside risk for both type of firms, the gap between expected gains and losses for well performing family firms as compared to well performing non-family firms is, hence, expected to be significant (see Figure 3).

Hypothesis 3: Family firms with a healthy performance (gain frame), are more likely to engage in related firm acquisitions than non-family firms with a healthy performance (gain frame).

In order to be effective, the chosen acquisition strategy – BAM versus mixed gambles - should show superior post-merger performance effects. Following our arguments above we suggest that decision making following the mixed gamble approach leads to a superior outcome as compared to decision making based on BAM. We hypothesize:

Figure 3
Hypothesis 3: Family firms in a gain frame versus non-family firms in a gain frame



Hypothesis 4: Family firms in a gain frame realize higher post-merger performance gains from related acquisitions than non-family firms in a gain frame or family firms in a loss frame.

2.3 Methodology

2.3.1 Estimation Strategy – Acquisition Strategy

In order to test hypotheses 1-3, we estimate probability and count data models to determine the acquisition strategy of family firms. We apply random-effect panel logit and poisson regressions. Our choice of random-effect models is influenced by the fact that our main independent variable, the family firm status, is binary and time-invariant. We note that the coefficients of time invariant firm specific effects are not defined in a fixed effect model.

2.3.2 Estimation Strategy - Performance Effects

In order to estimate performance implications of M&A strategies (hypothesis 4), we employ a non-parametric nearest neighbour matching approach (see e.g. Imbens & Wooldridge, 2009, for a methodological overview). The matching accounts for the fact that the decision to engage in a related M&A is not exogenous, but depends on firms characteristics which our panel logit models strongly confirm for the present sample. We match acquiring firms involved in related acquisitions to two sets of "twin firms" with the same characteristics as the focal firm. The first set of twin firms, i.e. the first control group, is chosen from all firms that were not engaged in any acquisition in the focal year. The second control group is drawn from firms that were involved in unrelated acquisitions in the same year. We match the firms engaged in related acquisitions, i.e. the treatment group, to twin control observations based on the probability of engaging in a related M&A arising from a probit estimation for the likelihood to conduct a related M&A. This so-called propensity score matching has the advantage of summarizing different factors such as firm size, return on assets and debt in our score, hence avoiding the problem of multidimensionality that arises if treated and control firms are required to be exactly identical with regard to several characteristics (Rubin, 1977). We then compare the post-merger performance of our treatment group, i.e. the firms engaged in related acquisitions, to the performance of both control groups. The performance difference is called the average treatment effect on the treated and can be given a causal interpretation.

After having obtained the treatment effect on the treated which informs us about performance benefits of related acquisitions for the average treated firm as compared to non-M&A firms and firms engaging in unrelated acquisitions, we are interested in finding out whether family firms in gain frames realize greater treatment effects, i.e. post-merger financial performance gains, than

non-family firms and family firms in a loss frame (hypothesis 4). Therefore, we regress the average treatment effect on the treated on a family firm dummy, a gain frame dummy and the interaction of both terms. A set of year and industry dummies is included in the regression as well.

2.3.3 Data Source and Sample

We use the Standard & Poor's (S&P) 500 firms as of July 2003 as the basis of constructing the data sample.[7] The July 2003 issue of the BusinessWeek, published qualitative details of family firms among the S&P 500 firms. These include the management and ownership structures of the 177 family firms among the S&P (Block, 2009).[8] The S&P data is combined with the Compustat database to retrieve financial and market information for firms. This results in a panel dataset for the 500 firms. M&A data was retrieved from Thomson One Banker. We identified majority acquisitions and linked them to the S&P firms.

We focus on manufacturing and service industries. This leads to the loss of 272 of the S&P 500 firms. We also dropped three firms and their corresponding observations since they turned out to be outliers concerning some of their characteristics.[9] The final sample is a panel dataset of 4903

[7] S&P as well as Fortune 500 firms have been used previously to analyze the R&D performance of family firms and non-family firms (Chrisman &Patel, 2012) as well as the performance of family and non-family firms (Anderson & Reeb, 2003a; Miller et al., 2007).

[8] Block (2009) has previously used the Business Week publication of July 2003 to analyze the performance, R&D spending and employment downsizing of family and non-family firms. This study relies on the final list of family and non-family firms provided by Block after a manual search and review of the ownership levels of these firms.

[9] Amgen Inc, a top independent biotechnology firm, was dropped for having a low return on sales ratio (-65.01), which is not comparable to the rest of the sample (the second lowest ROS stood at -5.12). Angen Inc also had a firm level aspiration gap of 62.17, which is about three times the second largest value of 2.63. The outlier in Medimmune was found in its R&D/employment ratio of 824.59, which is more than half the value of the second largest value of 406.77.

observations from 225 firms spanning the period 1980-2010. 1676 observations correspond to 86 family firms and 3226 to 139 non-family firms. The share of family firms in our sample is 38.2%. Out of the 225 firms we recorded 423 acquisitions conducted by 129 firms during this time window, among them 158 acquisitions made by 46 family firms and 265 acquisitions made by 83 non-family firms. In terms of industry classification of firms in our sample, 189 firms, 68 of which are family firms are in manufacturing. Of the 36 firms in the service sector, 18 are family firms.

2.3.3.1 Dependent variables

We employ several dependent variables for our empirical analysis.

Firm acquisitions: Our first dependent variable is a binary variable, which takes the value of 1 if a firm has conducted a firm acquisition in year t and 0 otherwise. In addition, we use the number of firm acquisitions per firm in order to show robustness of our results for a different definition of the dependent variable.

Related firm acquisitions: We use the two-digit standard industry classification (SIC) codes to define acquisitions in related industries. A firm acquisition is declared as related if the core business activities of the acquiring and acquired firm are associated to the same two-digit industry class. Again, we also use the number of related firm acquisitions per year in order to show robustness of our results.

The two-, three- and four-digit SIC codes have been used by prior research to measure relatedness (see Miller et al, 2010). We use the two-digit and four-digit (for robustness tests) SIC codes. We choose the two-digit level because for an acquisition to be useful enough for firms to

Danaher made several acquisitions over the years and displayed a huge R&D/patent ratio of 60.43 being an outlier. All three firms are in the manufacturing industry. Amgen Inc and Medimmune are both in the drug manufacturing sector while Danaher is in Measuring & controlling devises subsectors.

benefit from synergies, they must not be too distant as in operating in completely unrelated industries, but they should also not be too related. There is therefore the need for some level of relatedness for an acquirer to be able to fully benefit from acquisitions (Grimpe & Hussinger, 2014). The four–digit SIC codes are therefore too fined grained to capture the essence of relatedness (Miller et al, 2010). This explains why the conventional four-digit SIC measure of relatedness is less used in the literature (See Martin & Sayrak, 2003).

Financial performance: For the evaluation of the financial success of the strategy we use return on assets (ROA) as a dependent variable. ROA is a commonly used performance measure, also in the family firms literature (see e.g. Bonilla, Sepulveda & Carvajal, 2010; Kowalewski, Talavera & Stetsyuk, 2010; Michiels, Voordeckers, Lybaert & Steijvers, 2013; Graves & Shan, 2014, Holt, Pearson, Carr & Barnett, 2017). ROA describes the current ability of the firm to effectively use its assets and is often used when firm performance in different time periods is compared. We measure ROA as the ratio of net income to total assets in year t + 2. The choice of a two years lead is driven by data limitations.[10]

As an alternative performance measure we use Tobin's Q defined as the market value over the book value of the firms' assets. In contrast to ROA that assesses the current performance of the firm, Tobin's Q is a forward-looking performance measure that takes the expectations of the stock market about the future performance of the firm into account (Griliches, 1981). This means that

[10] We use a lead of two years because of data limitations. If we use a longer lead the sample size becomes smaller than 100 observations and the econometric matching approach that we use does not lead to a balanced sample of treated and non-treated firms. This implies that the matching with a dependent variable based on a 3-years lead is not appropriate to produce causal results. Note that the results of the regression based on the treatment effects variable (see Table 4) are qualitatively similar when based on the invalid matching results based on a 3-years lead, but not significant anymore.

while ROA allows us to assess the short-term post-acquisition performance of the firm, Tobin's Q allows a more long-term assessment. As for ROA, we use two years lead of Tobin's Q.

Treatment effect on the treated: For the last regression, where we are interested in identifying whether family firms in gain frames face greater post-merger performance gains from related acquisitions than family firms in a loss frame or non-family firms in a gain frame, we use the estimated average treatment effect on the treated as a dependent variable which depicts financial performance gains due to the merger.

2.3.3.1 Independent variable & definition of the aspiration gap

Family firm: We measure the family firm status as a binary variable which is equal to 1 for family firms and 0 otherwise. In order to be classified as a family firm the combined stock ownership of the family needs to be not less than 5% and a member of the family needs to be either CEO or chairman of the board of directors (Block, 2009). Based on this definition and the BusinessWeek publication of July 2003, as well as a manual search, Block (2009:237-242) published a list of all family firms and non-family firms in the S&P as at July 2003. This study relies on the aforementioned published list as the basis for determining whether a firm is a family firm or not.

For robustness tests, we use founder family firms as an alternative definition. Here firms are conceived as family firms if a member of the founding family is present in the firm in any of the following capacities: CEO, chairman, chairman emeritus, member of the board and management. This information was also available in the BusinessWeek publication of July 2003.

Aspiration gaps: Organizations depend on performance feedback to adapt their behaviour and also to undertake organizational search such as acquisitions (Iyer & Miller, 2008). Therefore, we measure the aspiration gap as the difference between a firm's financial performance in year t–1

and the median financial performance of firms in the same four-digit industry in year t–2 following Greve (2003); Iyer & Miller (2008) and Chrisman & Patel (2012). Return on sales (ROS) is one of the most commonly used measures of firm performance (Greve, 2003). For our empirical analysis, we perform sample splits distinguishing between firms in a gain frame and in a loss frame. Hence, we use a binary variable that separates firms in gain frame, i.e. those that experience a performance increase as compared to the average firm in the industry, from those in a loss frame. We also use the gain frame variable in the last models to determine the performance implications of acquisitions. The variable is coded 1 if a firm is in gain frame and 0 otherwise.

2.3.3.2 Control variables

We introduce several control variables to account for firm level heterogeneity. Larger firms are, for instance, more likely to have the capacity to implement a firm acquisition (Ellis et al, 2011). In addition, a larger firm size makes it more likely that the acquiring firm retains control after the firm acquisition (Shim & Okamura, 2011). Moreover, the fact that large family firms can maintain control has important implications on the mixed gamble of family firms as the expected SEW gains associated with a related acquisition increase (Patel & King, 2015). We use the natural logarithm of total assets as a measure for firm size. The natural logarithm is used to handle the skewed distribution of the variable. Debt, measured as the ratio of total debt to total assets (Block, 2009), shows whether a firm is highly leveraged and proxies the risk associated with the firm's operations (Shim & Okamuro, 2011). This variable is expected to have a negative relationship with the probability of acquisitions as it also reflects the scarcity of cash flow. ROA controls for overall firm efficiency is measured as the ratio of net income to total assets (Chrisman & Patel, 2012). It is expected to have a positive association with the acquisition probability. The R&D/Assets ratio is used in the present context as a proxy for the firm's readiness to take risk and to engage in long-

run investments. Hence, the measure is expected to have a positive relationship with the likelihood of acquisitions. We also include a variable that controls for the firm's past acquisition experience (e.g., Franks et al, 1991; Haleblian & Finkelstein, 1999; Hayward, 2002; Kroll et al, 1997). A firm that already has some experience with the strategic action of firm acquisitions is likely to repeat it (Haleblian, Kim & Rajagopalan, 2006). The variable is binary and takes the value one if the focal firm has undertaken an acquisition in the past 5 years. Patent R&D ratio controls for technology intensive related activities of firms. It is commonly known that slack resources may influence firms to undertake acquisitions (Iyer & Miller, 2008). Therefore, absorbed slack which is measured as the ratio of selling, general and administrative (SGA) expenses to sales as well as potential slack measured as a firm's ratio of debt to equity are controlled for.

Industry dummies are introduced to control for any industry related variance. Year dummies control for macroeconomic effects, in particular for the fact that mergers and acquisitions tend to occur in waves (Martynova & Renneboog, 2008). We lag all independent and control variables to limit possible endogeneity.

2.4 Empirical Results

2.4.1 Descriptive Statistics

Descriptive statistics are presented in Table 1. Table 1 shows the mean differences for family firms and non-family firms along with t-tests that show whether the means are statistically different from each other. The acquisition dummy shows a mean of 0.10 for family firms as compared to 0.08 for non-family firms. Since the t-test is not significant we cannot conclude that family firms undertake, on average, more or less acquisitions than non-family firms. With respect to the number of deals, we find that family firms make an average of 0.12 acquisitions per year as compared to a 0.10 average for non-family firms. Again, the mean difference is not statistically significant. The

related acquisition dummy shows a mean of 0.08 for family firms 0.04 for non-family firms. The mean difference is statistically significant. Also, with regards to the number of related acquisitions, we find that family firms are significantly leading with on average 0.09 acquisitions per year as compared to a 0.05 average for non-family firms.

In terms of firm size, the mean of 7.60 for family firms is significantly smaller than non-family firms with a mean of 8.20. Family firms in our sample employ less debt over assets than non-family firms. In terms of performance, family firms show significantly higher ROA than non-family firms. Interestingly, family firms also display a significantly higher R&D/asset ratio with an average of 0.07, compared to the 0.05 of non-family firms. Table 2 shows the correlation coefficients among the key variables in our analysis.[11]

[11] Note that the high corrections occur among the different dependent variables, namely merger dummy, number of acquisitions and related acquisitions so that they are not a problem for the regressions.

Table 1: Summary Statistics and Univariate Test

	Non-family firms			Family firms			
Variables	**Mean**	**Median**	**S.D.**	**Mean**	**Median**	**S.D.**	**T-test**
Acquisition dummy	.08	.00	.28	.10	.00	.30	-.01
Number of deals	.10	.00	.37	.12	.00	.40	-.02*
Related acquisition dummy	.04	.00	.21	.08	.00	.26	-.03***
Related acquisitions	.05	.00	.24	.09	.00	.35	-.04***
Firm size	8.20	8.25	1.63	7.60	7.81	1.76	.60***
Debt/assets	.17	.15	.13	.13	.11	.13	.04***
ROA	.06	.07	.09	.07	.08	.10	-.01***
R&D/assets	.05	.03	.05	.07	.06	.06	.02***
Acquisition experience	.28	.00	.45	.29	.00	.45	-.01
Patent/R&D	1.81	1.30	2.05	1.79	.70	3.54	.02
Absorbed slack	.26	.24	.17	.31	.31	.17	-.05***
Potential slack	.68	.34	11.24	.30	.19	1.74	.38
ROA_{t+2}	.06	.07	.09	.07	.08	.09	-.01***
Gain frame	.47	.00	.50	.49	.00	.50	-.02
Family*gain frame	.00	.00	.00	.49	.00	.50	-.49***

This table presents the summary statistics of our main variables and the results of the significance test. The mean differences are reported

*** Statistical significance at 5% level; *Statistical significance at 10% level.

Table 2: Correlations

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Acquisition dummy	1															
2	Number of deals	0.90	1														
3	Related acquisition dummy	0.68	0.63	1													
4	Related acquisitions	0.63	0.69	0.92	1												
5	Family firms	0.02	0.02	0.06	0.07	1											
6	Firm size	0.13	0.14	0.08	0.08	-0.17	1										
7	Debt/assets	-0.05	-0.05	-0.04	-0.05	-0.16	0.19	1									
8	ROA	0.06	0.06	0.05	0.06	0.05	-0.06	-0.27	1								
9	R&D/assets	0.06	0.06	0.09	0.08	0.18	-0.28	-0.37	-0.03	1							
10	Acquisition experience	0.22	0.22	0.14	0.14	0.00	0.25	0.03	-0.08	0.06	1						
11	Patent/R&D	-0.03	-0.03	-0.05	-0.04	0.00	-0.11	0.08	-0.05	-0.20	-0.07	1					
12	Absorbed slack	0.07	0.07	0.11	0.10	0.15	-0.29	-0.23	-0.06	0.51	0.12	-0.14	1				
13	Potential slack	0.00	0.00	0.00	0.00	-0.02	0.02	0.05	0.00	-0.03	0.00	-0.01	-0.03	1			
14	ROA_{t+2}	-0.02	-0.01	-0.02	0.00	0.06	-0.10	-0.16	0.36	0.05	-0.09	-0.04	0.06	-0.01	1		
15	Gain frame	0.07	0.07	0.05	0.06	0.01	0.12	-0.07	0.25	-0.03	0.05	-0.05	-0.04	0.00	0.15	1	
16	Family*gain frame	0.07	0.08	0.11	0.13	0.62	-0.02	-0.15	0.17	0.10	0.07	-0.02	0.06	-0.01	0.11	0.47	1

Note: The high correlations are not an issue because they occur between the different dependent variables (Acquisition dummy, Number of deals, Related acquisition dummy and Related acquisitions)

*** Statistical significance at the 5% level.

2.4.2 Empirical Analysis

Table 3 presents the results of panel logit and poisson random effect regression models predicting firm acquisitions. Models 1 and 2 show regressions for the full sample for the likelihood of engaging in a firm acquisition. These models act as baseline regressions. The results suggest that family firms are not more or less likely to engage in acquisitions than non-family firms. The coefficient of the family firm dummy as depicted by model 1 (ß = 0.15) and model 2 (ß = 0.14) shows a positive but not statistically significant relationship with acquisitions.

Models 3 and 4 test hypothesis 1, i.e. whether family firms are more likely to engage in related acquisitions than non-family firms.[12] Our results show, that the probability and the number of firm acquisitions in related industries are significantly higher for family firms than for non-family firms. Model 3 (ß = 0.47, $p < 0.05$) and model 4 (ß = 0.39, $p < 0.05$), hence, display empirical support for hypothesis 1. Looking at the marginal effects,[13] we find that in comparison to non-family firms, family firms are 47% more likely to engage in related acquisition according to model 3. Model 4 implies that being a family firm increases the number of related acquisitions by 48%.

The next set of regressions (models 5-8 of Table 3) distinguishes between underperforming firms (loss frame) and well performing firms (gain frame). Regressions are presented for both subsamples to test hypothesis 2 and 3. The results show that family firms in a gain frame (model 7, ß = 0.77***, $p < 0.01$; model 8, ß = 0.63***, $p < 0.01$) are more likely to engage in related acquisitions than family firms in a loss frame (model 5, ß = -0.02, $p > 0.10$; model 6, ß = -0.06, $p > 0.10$). These results support hypotheses 2.

[12] Note that the numbers of observations vary for models 3 and 4 as well as models 5 and 6 and 7 and 8 respectively since we do not observe variance in the dependent variable to use all observations for the logit models.

[13] The marginal effects in the poisson model are calculated as follows: exp(coefficient) - 1

Family firms in a loss frame are not more or less likely to engage in related acquisitions than non-family firms (models 5 and 6) while family firms in a gain frame are 77% more likely to engage in related acquisitions than non-family firms with 87% higher number of acquisitions as the marginal effects corresponding to models 7 and 8 indicate. These findings support hypothesis 3.

Table 3: Panel Logit & Poisson Random-Effect Regression Models for Family Firm Acquisitions (Full Sample)

	All acquisitions		**All related acquisitions**		**Related acquisitions - loss frame**		**Related acquisitions - gain frame**	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
	Logit	Poisson	Logit	Poisson	Logit	Poisson	Logit	Poisson
Family firms	0.15	0.14	0.47**	0.39**	-0.02	-0.06	0.77***	0.63***
	(0.17)	(0.15)	(0.20)	(0.19)	(0.24)	(0.24)	(0.25)	(0.24)
Firm size	0.44***	0.41***	0.40***	0.41***	0.23**	0.23***	0.45***	0.43***
	(0.06)	(0.05)	(0.07)	(0.07)	(0.09)	(0.09)	(0.10)	(0.09)
Debt/assets	-1.06*	-0.93*	-0.43	-0.60	-0.64	-0.43	-0.04	-0.57
	(0.61)	(0.52)	(0.73)	(0.65)	(1.04)	(0.97)	(0.94)	(0.88)
ROA	3.22***	2.39***	2.58**	2.00**	0.93	0.79	4.58***	3.84***
	(0.87)	(0.70)	(1.01)	(0.86)	(1.15)	(1.07)	(1.71)	(1.46)
R&D/assets	1.40	0.97	1.34	-0.09	1.71	1.07	-0.14	-2.24
	(1.64)	(1.42)	(1.86)	(1.71)	(2.28)	(2.24)	(2.87)	(2.62)
Acquisition experience	0.60***	0.46***	0.25	0.09	0.71***	0.49*	0.30	0.13
	(0.17)	(0.15)	(0.20)	(0.17)	(0.27)	(0.27)	(0.27)	(0.23)
Patent/R&D	0.02	0.01	-0.02	-0.03	-0.04	-0.05	-0.02	-0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.07)	(0.06)	(0.06)	(0.05)
Absorbed slack	0.95*	0.65	1.52***	1.17***	1.24**	1.06**	1.82*	1.41
	(0.49)	(0.44)	(0.51)	(0.45)	(0.52)	(0.45)	(1.01)	(0.94)
Potential slack	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)	(0.06)	(0.06)
Industry dummy	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	-5.93***	-5.52***	-6.68***	-6.20***	-4.60***	-4.79***	-7.67***	-6.80***
	(0.72)	(0.62)	(0.91)	(0.81)	(1.05)	(1.01)	(1.24)	(1.12)
Observation	4903.00	4903.00	4789.00	4903.00	2390.00	2569.00	2274.00	2334.00
Log likelihood	-1242.24	-1450.45	-886.50	-1005.60	-402.65	-434.21	-472.96	-557.84

Note: Standard errors are reported in parentheses.

* p < .10; ** p < .05; *** p < .01

With regard to our control variables, firm size shows a positive and statistically significant effect on the likelihood and number of acquisitions in all our models. ROA shows a positive relationship with firm acquisitions for the full sample and the subsample of firms in a gain frame. The debt over assets ratio as well as R&D/assets, patent/R&D ratio as well as potential slack do not exhibit a significant effect on related acquisitions. Absorbed slack shows a significant positive effect on acquisitions except for the subsample of firms in gain frame in model 8 of table 1. Acquisition experience matters, in particular, for related acquisitions made by firms in a loss frame. Lastly, the overall effects of industry and year dummies are positive.

Next, we investigate the performance effects of related acquisitions and, in a final step, we relate post-merger performance to family firm status and position vis-à-vis the aspiration level. Therefore, we first estimate a probit model on the likelihood of conducting a related acquisition. In order to retrieve our two control groups we run the probit model twice, once for the full sample (control group 1) and once for the sample of M&A observations only (control group 2). Control variables are the logarithm of firm assets, debt over assets, ROA, R&D over assets as well as a set of industry and time dummies. An important variable here is the pre-merger performance as it has been shown that firms with a better pre-merger performance also show a better post-merger performance (King et al, 2004). The matching leads to balanced control groups, i.e. treated and control observations do not differ systematically at the means of the variables used for the matching.

The matching results reveals that there are no significantly different post-merger performance effects between treatment group, i.e. the firms that engage in related acquisitions, and both control groups. The average treatment effects on the treated for ROA are 0.00 for control group 1 and 0.03 for control group 2 and for Tobin's Q 0.14 for control group 1 and 0.22 for control group 2. All treatment effects are insignificant suggesting that the average firm engaged in a related acquisition is financially not better off than a firm that did not engage in any M&A (control group 1) or a firm

that engaged in an unrelated acquisition (control group 2). The lack of performance differences is most likely caused by a high level of post-merger performance heterogeneity. All results are available upon request, but not reported here due to space limitations.

In the last step, we regress the treatment effects on the treated for ROA and Tobin's Q on a family firm dummy, a gain frame dummy and the interaction of both variables. Table 4 shows the results.

Model 1, 3, 5 and 7 show a basic specification for ROA and Tobin's Q that includes the family firm status and the gain frame status plus industry and time dummies for the two different control groups. Models 2, 4, 6 and 8 also include the interaction of the family firm dummy and the gain frame variable. We do not find that family firms realize a financial performance advantage from related acquisitions as compared to non-family firms as measured by ROA, a contemporaneous performance measure (see model 1 and model 3). Focusing on Tobin's Q as a forward-looking measure that takes expected future performance gains into account we, however, find that family firms well outperform non-family firms after related acquisitions (see model 5 and model 7).

Model 1 shows a weak ROA performance advantage for firms in a gain frame suggesting that firms in a gain frame that engage in related acquisitions outperform firms that have not engaged in any M&A (ß = 0.04*, $p < 0.10$). The result does not hold for the control group of firms engaging in unrelated acquisitions (model 3). The performance advantage of firms in a gain frame is more pronounced for Tobin's Q which takes the expectations about the firm's future performance into account (see model 5 and model 7).

Model 1 shows a weak ROA performance advantage for firms in a gain frame suggesting that firms in a gain frame that engage in related acquisitions outperform firms that have not engaged in any M&A (ß = 0.04*, $p < 0.10$).

Table 4: Regression Results for the Performance Implications of M&As in Family Firms

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Dependent variable	**ROA**	**ROA**	**ROA**	**ROA**	**Tobin's Q**	**Tobin's Q**	**Tobin's Q**	**Tobin's Q**
Control group	All Firms not involved in M&As		Firms involved in unrelated M&As		All Firms not involved in M&As		Firms involved in unrelated M&As	
Family firms	0.02	-0.03	0.02	-0.05	0.86***	0.21	0.63*	0.52
	(0.02)	(0.03)	(0.03)	(0.04)	(0.27)	(0.39)	(0.33)	(0.48)
Gain frame	0.04*	-0.00	0.03	-0.02	0.46*	-0.09	0.76**	0.66
	(0.02)	(0.03)	(0.03)	(0.04)	(0.26)	(0.35)	(0.32)	(0.43)
Family*gain frame		0.09**		0.13**		1.18**		0.21
		(0.04)		(0.05)		(0.51)		(0.63)
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-0.05	-0.03	-0.02	-0.00	-1.36*	-1.68***	-1.36*	-1.33*
	(0.05)	(0.05)	(0.06)	(0.06)	(0.71)	(0.61)	(0.71)	(0.71)
Observation	232	232	198	198	230	230	197	197

The result does not hold for the control group of firms engaging in unrelated acquisitions (model 3). The performance advantage of firms in a gain frame is more pronounced for Tobin's Q which takes the expectations about the firm's future performance into account (see model 5 and model 7).

Model 1 shows a weak ROA performance advantage for firms in a gain frame suggesting that firms in a gain frame that engage in related acquisitions outperform firms that have not engaged in any M&A (ß = 0.04*, $p < 0.10$). The result does not hold for the control group of firms engaging in unrelated acquisitions (model 3). The performance advantage of firms in a gain frame is more pronounced for Tobin's Q which takes the expectations about the firm's future performance into account (see model 5 and model 7).

Model 2 of table 4 shows that family firms who engage in related acquisitions in a gain frame actually observe increases in financial performance post M&A as compared to firms not engaged in any acquisition (ß = 0.09**, $p < 0.05$). The effect is even more pronounced if compared to the control group of family firms that engaged in an unrelated acquisitions in the same year (ß = 0.13**, $p < 0.05$, see model 4). Also, with regard to Tobin's Q model 6 suggests a performance advantage for family firms in a gain frame. The results show that there is a short-term performance advantage for family firms in a gain frame while the long-term advantage is less obvious. This provides support for hypothesis 4.

Robustness tests

We use different types of robustness checks in this study. First, our analysis is based on the classification of S&P 500 firms as family and non-family-firms as of 2003. The previous results are relying on the assumption that the family firm status did not change after 2003. Since this is a strong assumption, we re-ran our analysis using the subsample of observations for our firms before

2003, i.e. for the period of which we can be sure that our family firm classification is accurate. The findings are presented in Table 5 and show a very similar pattern as for the full sample analysis.

Table 5: Panel Logit & Poisson Random-Effect Regression Models for Family Firm Acquisitions (sub Sample)

	All acquisitions		All related acquisitions	Related acquisitions - loss frame		Related acquisitions - gain frame	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
	Logit	Poisson	Poisson	Logit	Poisson	Logit	Poisson
Family firms	0.19	0.13	0.40*	-0.01	-0.06	0.85***	0.65**
	(0.19)	(0.18)	(0.21)	(0.28)	(0.27)	(0.28)	(0.27)
Firm size	0.41***	0.40***	0.39***	0.20**	0.20**	0.47***	0.42***
	(0.07)	(0.06)	(0.07)	(0.09)	(0.09)	(0.11)	(0.09)
Debt/assets	-0.80	-0.88	-0.48	0.02	0.13	0.15	-0.68
	(0.74)	(0.65)	(0.79)	(1.17)	(1.11)	(1.24)	(1.14)
ROA	2.37**	2.02**	1.70*	-0.52	-0.64	5.09**	4.38**
	(1.02)	(0.86)	(1.02)	(1.24)	(1.17)	(2.02)	(1.71)
R&D/assets	2.44	1.32	0.64	1.82	0.80	0.64	-1.51
	(1.84)	(1.60)	(1.87)	(2.56)	(2.49)	(3.33)	(2.97)
Acquisition experience	0.55***	0.37**	0.03	0.58*	0.39	0.08	-0.02
	(0.21)	(0.17)	(0.20)	(0.31)	(0.30)	(0.33)	(0.27)
Patent/R&D	0.03	0.00	-0.03	-0.06	-0.08	0.01	-0.01
	(0.03)	(0.03)	(0.04)	(0.08)	(0.07)	(0.06)	(0.05)
Absorbed slack	1.15**	0.91*	1.25***	1.34**	0.96*	2.14	1.65
	(0.58)	(0.48)	(0.48)	(0.66)	(0.51)	(1.35)	(1.24)
Potential slack	-0.00	-0.00	-0.00	-0.00	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.08)	(0.08)
Industry dummy	Yes	Yes	Yes	No	No	No	No
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	-5.24***	-5.08***	-5.68***	-3.87***	-4.11***	-8.37***	-7.22***
	(0.81)	(0.72)	(0.88)	(1.07)	(1.06)	(1.55)	(1.38)
Observation	3448.00	3616.00	3616.00	1832.00	1974.00	1553.00	1642.00
Log likelihood	-899.17	-1049.42	-749.53	-306.97	-334.81	-336.01	-399.21

Note: Standard errors are reported in parentheses.

* p < .10; ** p < .05; *** p < .01

Second, we estimate pooled cross-sectional poisson estimations with robust and clustered standard errors (see Table 6). The clustered robust standard errors account for over-dispersion and correlation over time for the specific firms (Cameron & Trivedi, 2009). The results confirm our previous findings. This robustness check is not unimportant since tests for over-dispersion cannot reject the null hypothesis of equal mean and variance.

Table 6: Pooled Cross Sections with Robust Clustered Standard Errors

Pooled Cross Sections with Robust Clustered Standard Errors				
	Full sample			
	All acquisitions	**Related acquisitions**	**Related acquisition - loss frame**	**Related acquisition - gain frame**
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Family firms	0.09	0.51***	-0.11	0.84***
	(0.12)	(0.17)	(0.21)	(0.23)
Firm size	0.39***	0.34***	0.23***	0.39***
	(0.04)	(0.06)	(0.08)	(0.08)
Debt/assets	-0.99**	-0.36	-0.32	-0.18
	(0.50)	(0.63)	(0.85)	(0.83)
ROA	2.34***	2.49**	0.79	4.09**
	(0.80)	(1.02)	(1.16)	(1.75)
R&D/assets	1.40	0.70	0.81	-0.11
	(1.54)	(1.69)	(2.38)	(2.32)
Acquisition experience	0.99***	0.74***	0.75***	0.65***
	(0.12)	(0.16)	(0.21)	(0.23)
Patent/R&D	0.02	-0.04	-0.07	-0.02
	(0.02)	(0.05)	(0.07)	(0.05)
Absorbed slack	0.79*	1.37***	1.07***	1.73**
	(0.42)	(0.38)	(0.31)	(0.83)
Potential slack	-0.00*	-0.01*	-0.01	-0.00
	(0.00)	(0.00)	(0.01)	(0.03)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
_cons	-5.46***	-6.00***	-4.68***	-7.06***
	(0.48)	(0.81)	(0.87)	(0.89)
Observation	4903.00	4903.00	2569.00	2334.00
Log likelihood	-1466.95	-1026.34	-435.92	-566.00

Note: Standard errors are reported in parentheses.
* p < .10; ** p < .05; *** p < .01

Also, the 2-digit SIC industry classification has been criticized for being a too broad measure to capture relatedness. Table 7 presents results of related acquisitions as a further robustness check using the 4-digit SIC classification which is more fine-grained than the 2-digit classification.

Table 7: Panel Logit Random-Effect Regression Models for Family Firm Acquisitions (Sub Sample) (4-digit SIC Codes)

	Loss frame	**Gain frame**
Variables	**Model 2**	**Model 3**
Family firms	-0.16	0.68**
	(0.34)	(0.33)
Firm size	0.29**	0.37***
	(0.12)	(0.12)
Debt/assets	0.11	-0.51
	(1.46)	(1.67)
ROA	-0.49	4.83**
	(1.46)	(2.42)
R&D/assets	1.93	0.70
	(3.16)	(3.80)
Acquisition experience	0.84**	0.46
	(0.34)	(0.34)
Patent/R&D	-0.21	-0.55***
	(0.13)	(0.19)
Absorbed slack	1.52*	0.83
	(0.82)	(1.66)
Potential slack	-0.03	0.10
	(0.15)	(0.08)
Industry dummy	Yes	Yes
Year dummy	Yes	Yes
_cons	-4.58***	-6.70***
	(1.25)	(1.55)
Observation	1638.00	1376.00
Log likelihood	-189.79	-183.83

Note: Standard errors are reported in parentheses.

* p < .10; ** p < .05; *** p < .01

Here we find strong support for family firms in a gain frame being more likely to engage in related acquisitions than family firms in a loss frame. We do not find a significant effect for family firms being more likely to engage in related acquisitions (results not presented). Using the 3-digit

SIC classification to define relatedness leads to qualitatively the same results: family firms are more likely to engage in related acquisitions, especially when they are in a gain frame. The results are available from the authors upon request.

We present a further robustness test for founder family firms (Miller, Le Breton-Miller.& Lester., 2011, and Block, 2012), i.e. firms that have a member of the founding family as a CEO, Chairman, chairman emeritus, board member or part of management. The results are presented in the Table 2.8 and show that the results are qualitatively the same as for our simple dummy definition.

Table 8:Panel Logit Regressions for Family Firms in which the Founding Family is Present

	Related acquisitions		
		Loss frame	**Gain frame**
	Model 1	**Model 2**	**Model 3**
Founding family	0.50**	-0.01	0.71**
	(0.24)	(0.27)	(0.31)
Firm size	0.41***	0.24**	0.47***
	(0.08)	(0.10)	(0.11)
Debt/assets	-0.93	-1.61	-0.16
	(0.84)	(1.15)	(1.11)
ROA	2.92***	1.66	4.55**
	(1.11)	(1.26)	(1.85)
R&D/assets	1.91	1.98	0.86
	(2.00)	(2.35)	(3.04)
Acquisition experience	0.34	1.04***	0.32
	(0.22)	(0.25)	(0.29)
Patent/R&D	-0.08	-0.04	-0.19*
	(0.06)	(0.08)	(0.10)
Absorbed slack	1.67***	1.41***	2.41**
	(0.54)	(0.53)	(1.10)
Potential slack	-0.00	-0.00	0.02
	(0.02)	(0.02)	(0.09)
_cons	-6.96***	-4.52***	-8.04***
	(1.00)	(1.05)	(1.37)
Observation	4671.00	2384.00	2038.00
Log likelihood	-726.38	-321.84	-396.62

Note: Standard errors are reported in parentheses. Panel estimators are used for all models

* p < .10; ** p < .05; *** p < .01

2.5 Discussion and Conclusions

2.5.1 Discussion

Our study takes two limitations of the previous literature based on BAM as a point of departure. The first one is acquisition deal heterogeneity which is often not taken into account. While it has been argued that family firms are reluctant to engage in risky actions such as innovation (e.g. Gomez-Mejia et al, 2007), we show that under the specific circumstance of related diversification acquisitions are more likely to be conducted by family firms than by non-family firms as they promise SEW increases. Therewith, we make a related point to recent studies on family firms and innovation (see Röd, 2016, for a recent survey) that show that the involvement of family firms in innovation displays some heterogeneity (Chrisman & Patel, 2012; De Massis, Di Minin, & Frattini, 2015; Classen, Carree, Van Gils & Peters, 2014; Kotlar et al, 2013, Duran et al, 2016, Kosmidou & Ahuja, 2019) and that under certain conditions family firms' innovation efforts are more prevalent and successful than the innovation activities of non-family firms (De Massis et al, 2015; Patel & Chrisman, 2014, Classen et al, 2014, Duran et al, 2016, Kosmidou & Ahuja, 2019).

The second shortcoming of the previous literature on which this study elaborates is related to the BAM assumption that family firms in a gain frame, i.e. those that perform above their aspiration level, are solely interested in preserving the status quo, hence avoiding actions that involve risk. While BAM was for a long time the most important theoretical framework for analyzing family firms' strategic decision making (Gomez-Mejia et al, 2007; Lim et al, 2010; Zellweger et al, 2012; Chrisman & Patel, 2012), recent studies started questioning some of the BAM assumptions and proposed the mixed gamble approach (Bromiley, 2009, 2010) as an attractive alternative (Berrone et al, 2010; Martin et al, 2013; Gomez-Mejia et al, 2014). In some cases, mixed gambles allow to reach the same predictions as BAM. For instance, BAM explains the lesser involvement of family firms in risky endeavours with loss aversion. The concept of mixed gambles can reach the same

prediction for specific cases by weighing expected gains and losses from risky actions, a calculus that involves SEW gains and losses for family firms, but not for non-family firms.

In other cases, BAM and mixed gambles reach opposite predictions. We showcase that BAM and mixed gambles lead to different predictions about family firms' involvement in the market for corporate control when focusing on related acquisitions. We derive from mixed gambles that family firms are more likely to engage in related acquisitions than non-family firms. Related acquisitions are an example of an acquisition type for which the expected SEW gains that only count for family firms can be expected to be substantial. Mixed gambles allow to account for the fact that decision makers need to take into account potential gains and losses with regard to different value dimensions (Kim et al, 1993). In the context of family firms' involvement in the market for corporate control family firms need to weigh both potential financial and SEW gains and losses as a consequence of a firm acquisition when deciding to engage in a firm acquisition (Kotlar et al, 2018). Our paper, therewith, speaks to the recent literature which has started to investigate the trade-off between avoiding SEW losses and realizing financial gains in family firms (Chrisman & Patel, 2012; Gomez-Mejia et al, 2011; Miller & Le Breton-Miller, 2014; Zellweger et al, 2012; Kotlar et al, 2019).

Mixed gambles and BAM further disagree regarding the impact of a firm's position relative to its aspiration level. While BAM predicts that only when far away from the aspiration level family firms are ready to take risks (Chrisman & Patel, 2012), mixed gambles can predict that for a well performing firm expected short-term SEW losses can be easy to digest if the expected long term financial and SEW gains weigh more. This prediction speaks to a recent analysis of IPOs that shows family firms make decisions based on both financial and SEW considerations (Kotlar et al, 2018). Our study is related to this previous analysis shedding light on ambiguities of BAM and mixed gambles.

Having derived hypotheses from the concept of mixed gambles and having shown that in some cases those predictions conflict with BAM predictions, our empirical results for S&P 500 firms speak in both cases clearly for the mixed gambles predictions, rejecting the commonly used BAM framework. We find that family firms are more inclined to engage in related acquisitions than non-family firms (hypothesis 1). Further, family firms in a gain frame are more likely to engage in a risky action than family firms in a loss frame (hypothesis 2) and, than non-family firms in a gain frame (hypothesis 3). These results call highlight the importance of choosing the theoretical framework for empirical studies with care, paying attention to the underlying assumptions of competing model frameworks, and also highlight the importance of deal type heterogeneity influencing family firms' actions.

The fact that family firms are more involved in related acquisitions and especially so when they are well performing does not allow to draw conclusions about the success of this strategy. While firms appear to follow mixed gambles strategies according to our empirical analysis, a BAM strategy where family firms acquire mainly when they are in a loss frame might turn out to be more successful. This is why in the final step of the analysis, we show that financial post-merger performance of related acquisitions is superior for family firms in a gain frame. Family firms outperform non-family firms after a related acquisition when expected long-term gains are considered (as captured by Tobin's Q). There is no effect found when focusing on the current performance only (as measured by ROA). This finding is in line with the concept of mixed gambles as it suggests that family firms include potential short-term SEW losses and expected long-term SEW gains in their strategic calculations, weighting one against the other (Kahneman & Tversky, 1979; Thaler, 1980). This result does not suggest that family firms demand a financial premium for a risky endeavour (Astrachan & Jaskiewicz, 2008; Zellweger & Astrachan, 2008). In case of IPOs, this premium has been found to be substantial ranging from 22% to 75% (e.g., Zellweger et

al, 2012). We find that in case of firm acquisitions family firms are rather compensated by expected long-term gains which we estimate as a Tobin's Q that lies 63%-86% above that of non-family firms.

We further find that the short-term and expected long-term post-merger performance of family firms in a gain frame exceeds that of family firms in a loss frame and non-family firms providing additional evidence for the success of mixed gambles acquisition strategies.

These empirical findings lead us to the conclusion that mixed gambles predictions are more in line with the actual acquisition strategies of family firms than acquisition strategies of mixed gambles. Furthermore, acquisitions in line with mixed gambles promise a superior performance for family firms. The implications for future research is that the concept of mixed gambles as a more flexible theoretical concept that can overcome several shortcomings of prior BAM studies is more appropriate.

The implication for practitioners is that financial and SEW gains in the short and in the long run need to be weighted carefully against each other. Our results show that short-term losses can be well compensated by expected long-term gains. For family firms with their long-term planning horizon this calculus encourages risky actions such as M&As, especially if the firm is in a solid financial situation. Furthermore, this is not a call for non-family firm to mimic family firms. It is nearly impossible for non-family firms to mimic family firms. The long-term outlook of family firms creates dedicated owners who in turn provide patient capital without the need for short-term returns (Block, 2009; Sirmon & Hitt, 2003, Acquaah, 2016). These factors enable family firms to execute acquisitions that non-family firms will not be able to do. This is because of the short-term nature of non-family firms' relationships with institutional investors and other capital providers who aim at short term returns. Institutional investors also diversify and move their portfolio around different firms thereby undermining the competitiveness of non-family firms. That said, non-family

firm competitors of family firms should observe the activities of family firms in the market for corporate control in order to be able to fashion out robust strategic responses for their activities and remain competitive.

Limitations and future research

Our study is not free of limitations. One limitation that our study shares with many others is that we do not have access to all information that we would like to have. For instance, we are limited to a binary measure of family ownership which we obtain from the Business Week Magazine. The difficulty in obtaining continuous measure of family ownership has made the practice of using a binary variable common in family firm studies (Gomez-Mejia et al, 2014; Gomez-Mejia et al, 2010). While our focus has been on showing the differences of the type of firm ownership (family firms versus non-family firms), future studies may investigate the levels of ownership and how that influence the acquisition behaviour of family firms.

Furthermore, it would be very interesting to have more detailed information about decision processes within the firms. Such information is, however, difficult to collect, especially for large sample studies. Hence, we accept that our study has to be seen as complementary to qualitative studies that may have a deeper look into the processes of strategic decision making in family firms (e.g. Kumeto, 2015). In a similar vein, we cannot observe the objective of firm acquisitions and follow prior literature by assuming that related acquisitions are to some extent motivated by the aim of related diversification (e.g. Anderson & Reeb, 2003a). We acknowledge that this is not a perfect measure, but believe that this is the most suitable measure available.

Another potential limitation is that we focus on the S&P 500 firms. These firms are large and well performing and, hence, have access to resources necessary for engaging in firm acquisitions. This implies that the results may not be generalizable to small and medium-sized firms. Our results may challenge prior findings that suggest that firms in a loss frame are less likely to engage in

acquisitions as such. These results may be explained by a lack of resources for acquisitions for samples of small and medium-sized firms rather than by the position of the firms vis-à-vis their aspiration level.

Another avenue for future research would be to investigate the importance of irrational determinants for the decision to acquire another firm. Since Cyert & March (1963) it is known that many firm decisions are irrational and an investigation into what extent this applies to family firms and non-family firms in the market for corporate control would be of great interest. We believe that an investigation of irrational motives would be an interesting topic for a case study.

In recent times and extended BAM framework has been proposed which can be applied to risky decisions that involve mixed gambles such as related acquisitions (Martin et al, 2013). Since this study did not exclusively apply this extended framework, its potential to analyze broader decision mixed gambles is duly recognized and future studies should consider applying and testing its efficacy.

2.5.2 Conclusion

Our study tests predictions derived from the notion of mixed gambles for strategic decision making of family firms. Empirical results for firm acquisition decisions of a sample based on the S&P 500 firms confirm the mixed gambles predictions – namely that family firms are more likely to engage in related acquisitions than non-family firms and that they are even more so when performing above their financial aspiration levels - and therewith stand in contrast to the predictions of the often-used BAM. These results emphasize the significance of potential gains of risky actions for family firms and recommend mixed gambles as a superior approach for understanding family firms' decision making.

Chapter 3
Post-Acquisition Innovation and Merger Waves: The Influence of Family Ownership

3.1 Introduction

Prior research on firm level innovation have examined firm level drivers of innovation in detail while paying inadequate attention to the influence of family ownership and influence on the relationship between innovation activities and innovation outputs (De Massis, Frattini, & Lichtenthaler, 2013). Research also shows that family firms are endowed with distinct resources which can produce enormous benefits in the innovation process (Konig, Kammerlander, & Enders, 2013) and cause family firms to outperform other organizational forms (Classen, Carree, Van Gils, & Peters, 2013). Yet very little is known about the sources of the advantages that allow family firms to gain superior performance over their non-family counterparts in the pursuit of innovation (Bammens, Noelaers, & Van Gils, 2015).

Family involvement has barely been unravelled in innovation research (De Massis et al., 2013), and holds significant prospects for the field of management in terms of pushing forward the frontiers of knowledge (De Massis Di Minin & Frattini., 2015). So far research has brought to the fore the constraints faced by family firms in the use of internal sources of innovation such as R&D expenditures (Block, 2012; Chrisman & Patel, 2012) and the use of external sources of innovation such as technology acquisitions (Classen et al, 2012; Kotlar, De Massis, Frattini, Bianchi, & Fang, 2013).

Prior research shows that there are several motives for which firms including family firms engage in acquisitions (see Worek, De Massis, Wright, & Veider, 2018). These include financial performance and creating barriers of entry, market discipline (Rhodes-Kropf, Robinson, &

Viswanathan, 2005), gaining market power (Hitt, Harrison, & Ireland, 2001), cost reductions (Graham, Lemmon, & Wolf, 2002), resource redeployment (Capron, Dussauge, & Mitchell, 1998) etc. Given that prior studies have shown that family ownership of firms is mostly associated with low R&D investments (Block, 2012; Chrisman & Patel, 2012), and yet these firms must remain innovative in order to be competitive, it is plausible to suggest that acquisitions undertaken by family firms could among other things be geared toward improving future innovations (Ahuja & Katila, 2001). Available knowledge on how family ownership and control influence the ability of family firms to use external sources of innovation such as acquisitions to improve innovation performance is limited and requires further investigation (Kotlar et al., 2013).

The resource based view of the firm is a useful lens through which the acquisition of external resource assets can be analyzed (Lieberman & Montgomery, 1998; Peteraf, 1993). The resource base view conceives of resources as rare, valuable and difficult to imitate that are needed to establish a sustained competitive advantage (Barney 1991, Saxton & Dollinger, 2004). To be able to gain the full potential of acquired resources, firms must leverage and redesign or recombine these resources (Newbert, 2007) through their internal processes in order to fully exploit their potential benefits (Saxton & Dollinger, 2004). However, the resource base view alone offers a limited view about the dynamics of acquisitions on innovation. Lieberman & Montgomery (1998) as well as Carow et al. (2004) envisaged a combined insight of the resource base view and the theory of first mover advantage, which promises to be useful in shedding more light on the timing of entry into merger waves and how that may influence the acquisition and superior appropriation of resources and capabilities as well as synergies from acquisitions (Lieberman & Montgomery, 1998). This line of enquiry remains largely unexplored.

The timing of acquisitions has been widely studied particularly due to the fact that the position of a firm in a merger wave influences the potential benefits or returns on acquisitions (McNamara,

Haleblian, & Dykes, 2008). Carow, Heron, & Saxton, (2004) and Lieberman & Montgomery (1998) investigate the performance implications of acquisitions in merger waves thereby placing the timing of entry into merger waves at the heart of the strategic management literature. As acquisitions occur in waves, prior studies have examined the financial performance implications of acquisitions relative to the movement of the wave or mergers (See McNamara et al, 2008) as well as the characteristics of firms that participate in the various phases of a merger wave (See Haleblian, McNamara, Kolev, & Dykes, 2012). The peculiar attribute of the timing of acquisitions is the early mover advantages or disadvantages that are associated with the acquisition of target resource assets (Carow et al, 2004; Lieberman & Montgomery, 1998). For instance prior research shows the presence of significant early mover advantages as these acquisitions tend to be associated with increases in performance (McNamara et al, 2008).

However, it is also commonly known that information asymmetry and dynamic nature of the market for corporate control may obscure the true potentials of early acquisitions which may turn out be less valuable as the merger wave evolves (McNamara et al, 2008). This underscores the importance of the timing of acquisitions. Family firms are distinctive organizations that invest less in internal R&D and use acquisitions as a resource picking strategy for innovation. In respect of the timing of acquisitions, very little is known about how family firms are able to participate and fully benefit from acquisitions in order to accomplish their innovation targets. Nor how the unique resources of family firms make the utilization of acquired resources different from non-family firms depending on the position of the family firm in a merger wave. This paper addresses this important gap by drawing upon perspectives of the resource base view of family firms and the theory of early mover advantages and focuses on how family firms are better able to appropriate acquired resource assets to improve upon innovation performance considering the timing of the acquisitions.

Using a panel dataset of Standard & Poor's (S&P) 500 firms followed over a period of thirty-one years (1980-2010), the study finds empirical support for the predictions that family firms are more able to appropriate acquired resources better than non-family firms. Furthermore, targets acquired during the upswing of a merger wave are more valuable to family firms and associated with innovation than for non-family firms.

This paper makes three important contributions to the literature on strategy and innovation in family firms. First, by drawing on the resource based view of the firm, the paper shows that family firms invest less in internal development of innovation (Block, 2012; Chrisman & Patel, 2012), and regard acquisitions as a pathway to innovation in order to remain competitive. Acquisitions foster transparent and efficient transfer of the valuable knowledge resources of the targets which are then reconfigured using the internal unique resources of family firms such as employee commitment (Wayne, Shore & Liden, 1997), patient capital and survivability capital both of which support long term innovation (Sirmon & Hitt, 2003). This contributes to a better understanding of the influence of family ownership on the relationship between innovation activities such as acquisitions on innovation outputs (De Massis, Frattini, & Lichtenthaler, 2013). The second contribution is of empirical value explicating the view that that family firms absorb external resources markedly different and more efficient than non-family firms (See Sirmon & Hitt, 2003; Kang, 2003). Third, the predictions of the timing of entry into a merger wave and its association with innovation is particularly made clear by exploring the combined notions of the resource based view, first mover advantages as well as family involvement. In light of this the paper establishes that external resource assets acquired during the upswing of a merger wave are more valuable to family firms in terms of resource synergies for future innovation performance. This adds a theoretical contribution to the question of innovation performance of family firms by deviating

from prior studies that have only considered merger waves in the context of organizational decision making and financial performance thereof.

3.2 Theory and Hypotheses

3.2.1 Involvement of Family Firms in Acquisitions

Acquisitions are risky and anticipated returns are also uncertain. Despite this observation, acquisitions have proven to be one of the instruments with which firms access new or external resources to complement existing ones (Kotlar et al, 2013; Worek, 2017). While acquisitions can be a growth strategy for firms, there is also a likelihood that acquisitions can lead to the dilution of ownership and control (Basu et al, 2009). This aspect of ownership and control is particularly important for family firms and has led to predictions of the reluctance of family firms to engage in acquisitions, especially deals that threaten ownership and control (Caprio et al, 2011; Shim & Okamuro, 2011). In spite of this, recent developments indicate that family firms are participating in acquisition deals in increasing numbers (See Family Capital, 2015). In deed prior studies have examined the involvement of family firms in acquisitions (Andre et al, 2014). Prior findings thus far show the differing acquisition behaviours of family firms from non-family firms where these differences emanate from the differences in governance structures, ownership structures, family related economic goals as well as preferences for non-economic priorities (Gomez-Mejia et al, 2007, Miller et al, 2010). M&A theories should therefore be applied to family firms conditional on the aforementioned differences (Worek, 2017). A consideration of these two dimensions of financial and non-financial goals in acquisition decisions is viewed as a mixed gamble (Gomez-Mejia et al, 2018).

Recent empirical evidence indicates that the desire of family firms to pursue both financial and non-financial goals remains discordant and exacerbates the reluctance to engage in acquisitions

(Gomez-Mejia et al, 2018). In line with this, vulnerability is used as a signal by family firms to engage in acquisitions where increased vulnerability leads to more acquisitions (Gomez-Mejia et al, 2015). Furthermore, as family wealth tend to be concentrated, the quest to reduce the risk associated with the wealth portfolio leads family firms to diversify their businesses through acquisitions (Miller et al, 2010).

3.2.2 Acquisition and Innovation in Family Firms

Industries associated with high R&D and technology dynamism are faced with uncertainties about resources and capabilities that are needed to keep up with changes in the technological landscape (Peteraf, 1993). Innovation has in the past been viewed as an internal development process through investment in R&D (Kohler, Wolfgang & Grimpe, 2012). However, prior research is clear that because of the high level of control and wealth concentration as well as the aversion to loss of non-financial benefits, family firms invest less in innovation related activities such as R&D (Block, 2012; Chrisman & Patel, 2012), even though they tend to have a higher rate when it comes to the conversion of innovation inputs into outputs making them more innovative than non-family firms (Duran et al., 2016). Therefore, a firm risks losing its competitive edge if it fails to adhere to and respond to changes and invest its resources accordingly (Titus, House, & Covin, 2017). However, due to the time and cost associated with generating innovation internally, firms are strategically turning to external sources of knowledge and capabilities in other to remain competitive (West & Bogers, 2014). Internal R&D may take considerably longer period of time to mature or even fail to yield desired results. Therefore, for family firms who are known to invest less in R&D, speedy access to proven and tested technologies from sources outside the firm remain an important avenue for continuous renewal. Relying on external resources makes it possible for firms to gain access to resources that are not available to them locally. Thereby addressing a critical

need of sustaining favourable outcomes in product and process innovations (Kotlar et al., 2013). Even though risks, uncertainties and information asymmetries associated with sourcing technologies and other resources outside the boundaries of the firm may persist, sourcing technology outside the boundaries of the firms grants speedy access to new resources to improve innovation performance (Lichtenthaler, 2011) as well as securing new technology spaces such as patents (Lieberman & Montgomery, 1998). In view of this, access to technological resources beyond the boundaries of the firm can be achieved through different strategic activities including alliances, joint ventures, mergers and acquisitions (De Vrande, Vanhaverbeke, & Duysters, 2009).

Acquisitions have increasingly become one of the strategies used by firms to overcome local search barriers and gain access to external technology assets (De Vrande et al., 2009), as well as some of the hard to replicate capabilities and resources (Grimpe & Hussinger, 2014). Acquisitions are means through which firms can obtain new resources to reconfigure existing resource stocks (Karim & Mitchell, 2000; Kotlar et al., 2013). While acquisitions may lead to the dilution of ownership and control (Basu et al., 2009), recent studies point to the fact that acquisitions bestow control of the targets on the acquirer and enables commitment and openness in the transfer of knowledge resources from the target to the acquirer (Titus et al., 2017). Although this may apply to all kinds of firms, it is particularly greater for family firms for whom control is regarded as an asset and integral part of their resource stocks. Acquisitions grant control over the target, which not only enhances the socioemotional wealth of family firms (Berrone et al., 2010), but also give them the wherewithal to efficiently appropriate the acquired resources and capabilities to boost their innovation performance (Rumelt, 1982).

3.2.3 Resource Based View of Family Firms

Competitive advantage can be gained from resources and capabilities at the disposal of organizations (Barney, 1991). An organization should therefore be able to leverage these valuable, rare and hard to imitate resources and capabilities in order to exploit and maintain its competitive advantage (Barney, 1997). Furthermore, for an organization to gain a sustained competitive advantage from its resources, it should be able to reshape these resources to yield their full potential (Newbert, 2007).

Family firms are endowed with distinct resources and capabilities that can be leveraged to develop competitive advantages over non-family firms (Acquaah, 2016; Rau, 2014). Some of these resources include but not limited to human capital, tangible resources, intangible resources, organizational culture, organizational capabilities, knowledge and information (Barney, 1991; Habbershon & Williams, 1999). Patient financial capital, survivability capital and social capital are other distinct resources of family firms that can be leveraged upon to improve firm performance (Sirmon & Hitt, 2003)

Any capital that is invested for a considerably longer period of time and poses no threat of liquidation can be termed as patient financial capital. This is different from other forms of capital investments due to the planned time (Teece, 1992). Patient capital is a valuable asset for family firms which enables them to undertake innovative activities (Sirmon & Hitt, 2003; Kang, 2000; Teece, 1992). Survivability capital takes the form of pooled resources such as additional equity investments, free labour, dedication, commitment and sacrifices that family members are ready to contribute to a family firm due to their relationship with it .This is particularly useful during periods of difficulties such as decline in profitability, entry into new markets and post-acquisition integration (Sirmon & Hitt, 2003).

In terms of strategic organization of activities, family firms can take advantage of their organizational social capital. In this regard social capital refers to the trust and obligations that are

immersed in the family firm and its relationship with employees and external stakeholders (Sirmon & Hitt, 2003). This can be a source of resource exchange such as valuable information and access to new markets (Hitt, Ireland, Camp, & Sexton, 2002). Also through routines that foster a long term approach to giving befitting treatment to externally hired employees (Konig, Kammerlander, & Enders, 2013; Miller & Le Bretton-Miller, 2005), family firms are able to retain organizational memory that facilitates the transfer of skills and knowledge (including tacit knowledge) between firms and across generations (De Visscher, Aronoff & Ward, 2005).

The assumption is that family firms can reconfigure their unique resources and capabilities (Newbert, 2007) in combination with externally acquired resources to create a sustainable competitive advantage in the form of innovations (Acquaah, 2012; Miller, Lee, Chang, & Le Breton-Miller, 2009) . This implies that external resources obtained from the market can be integrated to create valuable, rare and hard to imitate bundle of new resources (Sirmon & Hitt, 2003). This also applies to family driven intangible resources, which can generate more valuable bundles of resources when combined with acquired complementary resources (Carpenter, Sanders, & Gregersen, 2001).

Employees remain an important source of creativity and innovation for many organizations (Baer, 2012; Grant & Berry, 2011). Employees strive in work environments that support innovation either directly or indirectly (Amabile, et al., 1996; Bammens et al., 2010). Suffice it to mention that family firms have distinguished themselves for having a stronger work climate that motivate the innovation activities of employees (Bammens et al., 2015). Furthermore, family firms are reputed for their preparedness to make special efforts in treating employees well (Konig et al., 2013; Miller, Le Breton-Miller, & Scholnick, 2008). Besides family firms are said to be better employers in term of job security in comparison to non-family firms (Block, 2010; Stavrou, Kassinis & Filotheou, 2007) as well as through benevolent care centred contracts for non-family employees (Cruz,

Gomez-Mejia & Becerra, 2010). This display of concern and care for the wellbeing of employees creates a perception of organizational support for employees (Eisenberger, Armeli, Rexwinkel, Lynch & Rhoades, 2001). This then evolves into a sense of obligation on employees to reciprocate the employer's commitment by acting in ways that support organizational goals (Wayne, Shore & Liden, 1997). This leads to a dedicated work force who take creative initiatives in the best interest of the firm (Bammens et al., 2010; Miller et al, 2009) especially during difficult times (Cennamo, Berrone, Cruz, & Gomez-Mejia, 2012) such as reconfiguring acquired resources with internal resources. The process of recombining acquired resources through the internal processes of a firm can be labourious, heighten uncertainty about the value of the new resource as well as the value of the acquiring firm and lead to the exit of key employees. Part of the uncertainty is that recombining an acquired firm's resources can lead to destruction of the acquiring firm's existing knowledge bases (Ranft and Lord, 2002). This is where the distinctive characteristic of family firms that make them stand out as better employers play a role by invoking employee commitment, obligation and support for organizational goals.

Furthermore, owners of other non-family firms tend to be detached from the running of the firm and lack the information needed to ensure effective monitoring (Duran, Kammerlander, Van Essen & Zellweger, 2016). On the contrary, the high level of control and concentration of resources, coupled with the overlapping owner manager role exhibited by family firms ensures that firm owners or owner managers have high amount of information and the wherewithal needed for efficient monitoring (Duran et al., 2016; Poza, 2007; Uhlaner, 2013) of decisions regarding reshaping acquired resources in order to realize their potential synergies for future innovation (Barkema & Schijven, 2008; Graebner, 2004).

Furthermore, family firms are usually held in the family for a considerably long period of time. The domain knowledge, experience and skills accumulated over the period of time through the

family's association with the firm make the absorption and assimilation of knew knowledge resources from acquisitions more efficient (Cohen & Levinthal, 1990). The effectiveness with which family firms absorb externally acquired new resources is markedly different and more efficient than non-family firms (Sirmon & Hitt, 2003). In light of this, Kang, (2000) observes that the transfer and absorption of new resources is supported by patient and survivability capital in family firms both of which also support long term creative strategies such as innovation. Taken together, it is expected that the association of acquisitions with innovation will be stronger for family firms than non-family firms as family will be able to recombine the acquired resources through internal process aided by distinct resources which support innovation.

Hypothesis 1: Family firms are more associated with post-acquisition innovation than non-family firms.

3.2.4 Merger Waves and Innovation in Family Firms

Acquisitions take place in waves due to several reasons including market shocks, development of capital markets, self-interested managerial decisions etc. (Harford, 2005; Martynova & Renneboog, 2008). Prior research shows that the last century has witnessed about five major merger waves (Martynova & Renneboog, 2008). Acquisition waves are times of increased acquisition activities and a start of a wave is often identified by an upsurge in or intensified acquisition activities as compared to the preceding period (Haleblian et al., 2012; McNamara et al., 2008). This trend continues until merger activities get to the peak and then start to fall until activities return to levels similar to the period prior to the start of the merger wave (Carow et al., 2004).

The theory of early mover advantages underscores the advantages associated with the timing of entry into a merger wave (Lieberman & Montgomery, 1998; McNamara et al., 2008). This becomes even more useful when it is applied within the wider context of the resource based view

(Carow et al., 2004; Lieberman & Montgomery, 1998) to explain the external resource acquisition activities of firms. Market pre-emption is advanced as one of the profound advantages associated with acting early. First, market pre-emption refers to the ability of firms to get ahead of competition by acquiring critical resource assets (including capabilities and competencies) they can capitalize on to improve performance. Second, it also refers to the ability of firms to foresee opportunities in a particular technology space and act before competitors (Carow et al., 2004; Lieberman & Montgomery, 1988).

However, it is widely argued that early movers may also face disadvantages resulting from market dynamics and cost disadvantages (Cho, Kim &Rhee, 1998). As merger wave evolves, early movers may acquire assets that would turn out to be inappropriate or of limited value due to technological, and market uncertainties (Lieberman & Montgomery, 1998). This has the tendency to put early acquirers at a disadvantage in terms of cost and undermine the value of resource bases relative to late movers (McNamara et al, 2008).

In spite of the disadvantages of early participation in merger waves, McNamara et al. (2008) offer more insights and argue that acting early in a merger wave is more likely to lead to increases in performance, where as acting late is associated with negative performance outcomes. Early movers take advantage of asymmetric information over competitors (Peteraf, 1993). The supply of targets is also substantial during the early phase of a merger wave. This implies that information asymmetries provide early movers the opportunity to choose targets with superior potential assets or critical resource assets that reflect the resource needs of the acquiring firm from a large pool of potential targets (Finkelstein, 1997; Saxton & Dollinger, 2004). Acting early thus gives early access to strategically valuable resources often at lower costs, before competitors would even identify their potentials and true value and bid up the cost (Wernerfelt & Karnani, 1987). Being able to pre-empt, acquire and integrate valuable resources give firms performance advantages over

competitors (Sarkar, Cavusgil, & Aulakh, 1999). Furthermore, the advantage of having to choose from a large pool of targets increases a firm's likelihood of acquiring targets that will foster co-specialized assets due to the market power, economies of scale or new knowledge that originates from the combination of assets of the target and the acquirer (Mahoney & Mahoney, 1993).

Building on hypothesis 1, it is suggested that there can also be substantial first mover advantages for family firms because decision makers of family firms tend to possess extensive knowledge of their core industry and activities due to many years of association with the firm as well as the presence of emotional attachment to the firm's core business activities (Chrisman & Patel, 2012; Gomez-Mejia et al., 2013). Establishing stable and lasting networks or relationships with stakeholders including suppliers underlie the essence of family organizational social capital which to a large extent defines the identity of family firms (Konig et al, 2013; Miller & Le Breton-Miller, 2005; Gomez-Mejia, Nunez-Nickel & Gutierrez, 2001). These ties are important sources of privileged information about market opportunities such as new deals as well as general market and industry dynamics. The knowledge of the industry equips managers of family firms with more knowledge and foresight to pre-empt changes and needs specific to that industry (Lieberman & Montgomery, 1988). Family firm managers can then leverage their foreknowledge or organizational social capital for early information about deals, to quickly appraise and acquire superior and valuable targets at relatively lower costs before the true values and synergies are known to all industry participants (McNamara, et al, 2008).

The information asymmetry advantage driven from family owners' foreknowledge and organizational social capital benefit family firms such that it allows them to make full use of opportunities provided by the early phase of a merger wave. The early phase of a merger wave is dominated by a large pool of superior targets from which early acquirers can choose (McNamara et al., 2008). The foreknowledge and information advantage granted by organizational social

capital aids firms in gaining a head start in order to control critical strategic resources (Saxton & Dollinger, 2004) for future innovation activities .

Also the chances of benefitting from co-specialized assets increase during the upswing of a merger wave where the pool of targets are many. The notion of co-specialized assets is that individual firms each have a set of resources which when combined with other firms' resources becomes more valuable (McNamara et al, 2008). These co-specialized assets are vital in increasing innovation prospects (Mahoney & Mahoney, 1993).

Hypothesis 2: Acquisitions in the upswing of a merger wave are positively associated with more innovations in family firms than in non-family firms.

3.3 Methodology

3.3.1 Data Sources and Sample

The data sample is constructed using the Standard & Poor's (S&P) 500 firms as of 2003 as the starting point[14]. This is because the July 2003 issue of the BusinessWeek, published qualitative details of 177 family firms among the S&P 500 firms (Block, 2009).[15]

[14] S&P as well as Fortune 500 firms have been used previously to analyze the R&D performance of family firms and non-family firms (Chrisman and Patel, 2012) as well as the performance of family and non-family firms (Anderson and Reeb, 2003; Miller et al., 2007).

[15] Block (2009) has previously used the Business Week punblication of July 2003 to analyze the perofrmance, R&D spending and employment downsizing of family and non-family firms.. This study relies on the final list of family and non-family firms provided by Block after a manual search and review of the ownership levels of these firms. See pages 237-242 for the list of family and non-family firms as published by Block (2009). The book can be accessed here: https://epdf.tips/long-term-orientation-of-family-firms.html.

To gain access to the financial and market information of firms, the S&P dataset is merged with the Compustat database leading to a panel data of 500 firms. This is further combined with the acquisition data which is obtained from Thomson One Banker. Furthermore, using the GVKEY and CUSIP as common identifiers, the patent data obtained from the NBER U.S patent and citation records is merged with the Compustat database.

The study focuses on the manufacturing sector due to the overwhelming presence of knowledge intensive and innovative firms in that sector (Hagedoorn & Duysters, 2002; Zaheer, Hernandez & Banerjee, 2010). This led to a final panel dataset of 4213 observations from 203 firms spanning the period of analysis, 1980-2010. A total of 297 of the S&P 500 firms were dropped owing to the focus on only manufacturing sector firms as described above. Finally, a total of 118 of the S&P 500 firms in the sample carried out 324 different acquisitions during the period of analysis.

3.3.1.1 Dependent variable

Patent count

Granted patents indicate the knowledge that a firm is recognized as having generated (Jaffe, Trajtenberg and Henderson, 1993). Patents are results of successful R&D that partially shows the relevance of the knowledge generated (Block et al, 2013). Patents are also indicative of the technological, inventive as well as innovative performance of a firm (Hagedoorn & Cloodt, 2003). However, Griliches (1990) acknowledges the presence of a noteworthy 'noise' in granted patents, as this may not be representative of the knowledge base of a firm. In spite of this shortcoming, patents are largely accepted in the innovation literature as a measure to compare the innovative performance of firms (Hagedoorn & Cloodt, 2003). Therefore, patent count is used as a proxy to capture innovation at the firm level. The patent count variable measures the number of patents of the acquiring firm *i* in year *t.* Therefore, in line with Cloodt, Hagedoorn, & Van Kranenburg,

(2006), patent count is estimated as the number of patents of the acquiring firm in the 1-3 years after the acquisition.

Patent citations indicates the technological and economic value of patents (Hall et al, 2005). Citation weighted patents is used for robustness test to account for the economic value of patents.

3.3.1.2 Independent variables

Family firms

The BusinessWeek issue of July 2003 provided a list of S&P 500 family firms as at 2003. The report indicates that *"to start, we asked two scholars whose work provided the impetus for our research—Ronald C. Anderson of American University and David M. Reeb of Temple University—to help us identify family companies. Then, with the help of Spencer Stuart, we examined regulatory filings, company Web sites, and corporate histories. The result: We found 177 family companies in the Standard & Poor's 500-stock index as of July, 2003."* (See BusinessWeek, November 2003:111). Based on the BusinessWeek issue and a manual check, Block (2009:237-242) reaffirmed and published a list of all family firms and non-family firms in the S&P 500 as of July 2003.[16] This study relies on the aforementioned published lists as the basis for determining whether a firm is a family firm or not.

The family firm status is measured as a binary variable which equals to 1 for family firms and 0 otherwise. According to Block (2009) in order to be classified as a family firm the combined stock ownership of the family needs to not be less than 5% and a member of the family needs to

[16] The list of family firms can be found on pages 237-242. And the book can be accessed here: https://epdf.tips/long-term-orientation-of-family-firms.html.

be either CEO or chairman of the board of directors.[17] A similar definition of family firms has been employed by Anderson & Reeb (2003).

Acquisition dummy is a binary variable, which takes a value of 1 if a firm has conducted any firm acquisition and 0 otherwise.

3.3.1.3 Merger wave variables

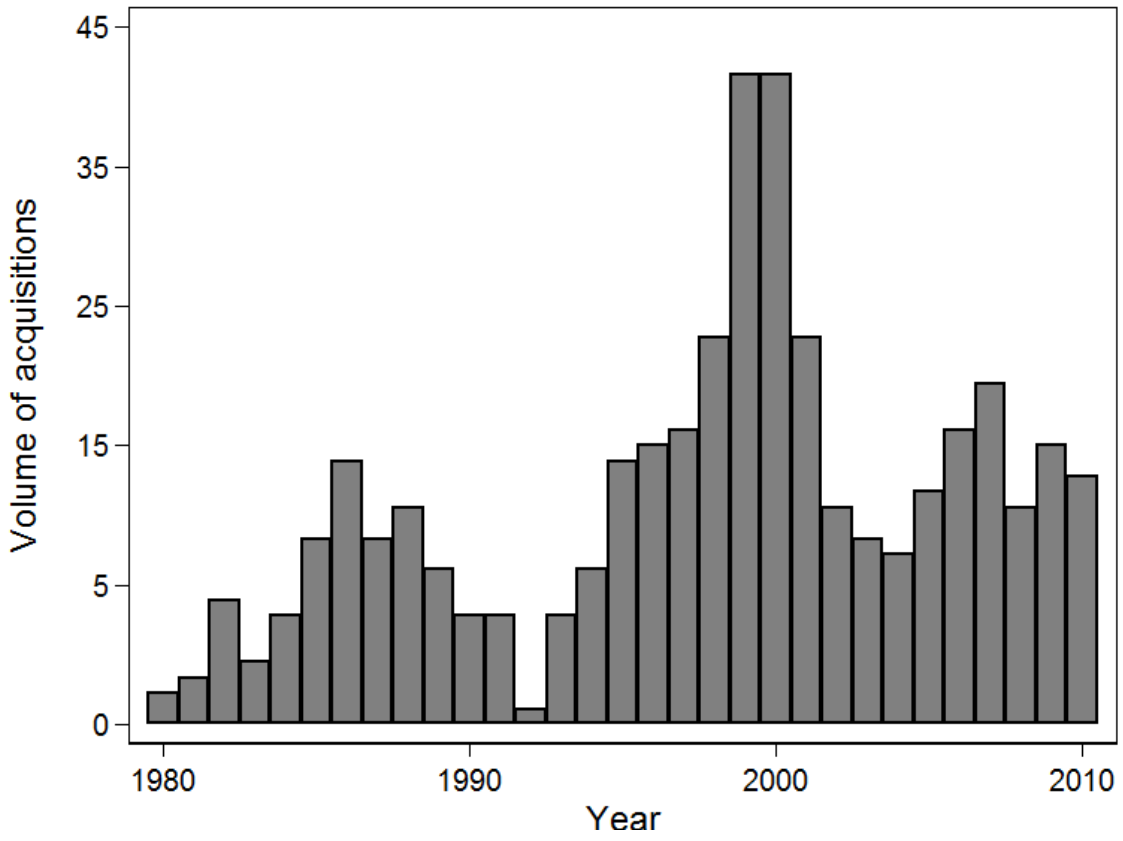
A merger wave is broadly categorized into 3 distinct phases namely, the upswing, peak and downswing. As indicated earlier, a merger wave starts with a period of intensified merger activity relative to the preceding period and continues, usually over a few years. This phase is called the upswing. The trend continues to the zenith which normally also lasts a few years and referred to as the peak. The last phase called the downswing refers to the period where the intensity of merger

[17] It is often explained that the a low family ownership level such as 5%, whether a member of the family is CEO or chairman of and the percentage of family members on the board is suited for the US context which unlike in some European countries runs a one-tier board structure (Tirole, 2006) and an outsider- controlled system of corporate governance (Hackethal et al., 2005). A family can rely on publicly available information and the market for corporate control to push its agenda. So the family does not have to be represented on internal institutions such as the supervisory board which is important in a two-tier system of corporate governance (see Block, 2009: 18). Also the ownership structure of the firm matters when one considers the percentage of share ownership and influence. A 5% ownership in a widely dispersed ownership structure is better than 5% ownership in a concentrated ownership structure. Furthermore, a 5% ownership in listed firm gives more power than a similar ownership stake in a non-listed firm (Claessens and Tzioumis, 2006; Block, 2009). A firm which is listed on a stock market tend to follow some rules and regulations which strengthens the rights and interests of investors. Therefore for listed firms to be considered family firms the ownership stake required should be lower (Jaskiewicz, 2006). Block (2009) also notes that CEOs in US tend to exercise control over the selection of board members which makes the position of CEO powerful.

activity descends to levels similar to the period prior to the start of the wave (Carow et al., 2004; Haleblian et al., 2012).

Three dummy variables are created for the different stages of the acquisition wave (See figure 1 below). The variable upswing takes a value of 1 if the acquisition takes place during the rising period of the wave and 0 otherwise. The variable peak takes the value of 1 if acquisition activities take place during the zenith of the wave and 0 otherwise. Finally, the downswing variable takes the value 1 if acquisitions activities happen during the declining phase of the wave and 0 otherwise.

Figure 1: Volume of M&A transactions in the manufacturing sector.



It is important to note that all observations in the sample are in one of the three parts of the merger waves.[18]

3.3.1.4 Interaction term

An interaction term of the family firms variable with the acquisition dummy is created to supplement the analysis and test the hypothesis.

3.3.1.5 Control variables

Firm level and industry characteristics are controlled for in the analysis using control variables. It is generally accepted that larger firms are more likely to have the capacity to make acquisitions (Ellis, Reus, Lamont & Ranft, 2011). More to the point, the larger the size of an acquirer the more it is able to retain or dominate control after acquisition (Shim and Okamura, 2011). The natural log of total assets as indicator of firm size is used. The natural log handles the skew distribution of the variable.

The acquisition experience of acquiring firms which is estimated as firms who have undertaken an acquisition activity within 5 years prior to the time under consideration has been controlled for. Furthermore, debt /asset ratio estimates the percentage of a firm's assets that is financed by debt (Block, 2009). Highly leveraged firms display high debt/asset ratio and indicates the associated risk involved in the activities of firms (Shim & Okamuro, 2011). It is anticipated that this will have a negative association with innovation. ROA is the ratio of net income to total assets and it controls for overall firm efficiency (Chrisman & Patel, 2012). Its effect on innovation is anticipated to be

[18] The upswing covers the following year: 1980-1985, 1993-1998 and 2005-2006. The peak covers the following years: 1986, 1999-2000 and 2007. The downswing covers the following years: 1988-1990, 2001-2004 and 2008- 2010.

positive. R&D/Assets ratio is used as a proxy for risk and preparedness of firms to engage in long term investments. It is expected to have a positive effect on innovation. Meanwhile, it is estimated as the ratio of R&D expenditure to total assets.

The analysis also controls for slack since it gives insights about the vulnerability of firms. Slack refers to unused resources available to a firm and it serves as a buffer against risks and economic shocks (Gomez-Mejia et al., 2015; Iyer & Miller, 2008). Potential slack which measured as ratio of debt to equity (Iyer & Miller, 2008) and absorbed slack which is measured as is measured as the ratio of selling, general and administrative (SGA) expenses to sales. Finally, industry and firm level variance are controlled for using industry and year dummies.

3.4 Results and Analysis

3.4.1 Descriptive Statistics

Table 1 presents the summary statistics. The dependent variable, patent count shows a mean of 72.94 for non-fami firms and 75.58 for family firms. This indicates that family firms are more involved in technology activities on average than non-family firms in the sample. The firm size variable indicates a mean of 7.94 for non-family firms and 7.25 for family firms, an indication that the non-family firms in the sample are larger relative to the family firms. The acquisition dummy shows a mean 0.26 for non-family firms and 0.23 for family and non-family firms. This indicates that non-family firms are slightly more involved in acquisitions than family firms. Meanwhile, the upswing of the wave shows a mean of 0.70 indicating that on average there are more non-family firms making acquisitions in the upswing than family firms which has a mean of 0.69.

Table 2 presents the correlations of the variables in our sample. The high correlation of -0.80 is between interaction of upswing variable and the acquisition dummy. These variables are not used in the same model. So there is no problem of multicollinearity

TABLE 1

Summary statistics & univariate tests

	Non-family firms			Family firms			
Variables	**Mean**	**Median**	**SD.**	**Mean**	**Median**	**SD.**	**T-test**
Patent count	72.94	20.00	154.33	75.58	8.00	202.67	-0.47
Acquisition experience	0.26	0.00	0.44	0.23	0.00	0.42	2.61**
Firm Size	7.94	8.02	1.48	7.25	7.42	1.64	13.92***
R&D/assets	0.04	0.03	0.05	0.05	0.04	0.07	-6.72***
ROA	0.07	0.07	0.08	0.07	0.08	0.10	-0.54
Debt/assets	0.16	0.15	0.12	0.14	0.12	0.12	5.56***
Potential slack	0.51	0.33	10.18	0.59	0.23	8.68	-0.23
Absorbed slack	0.22	0.15	0.82	0.34	0.22	0.56	4.84***
Acquisitions dummy	0.08	0.00	0.27	0.08	0.00	0.27	-0.12
Family firm*Acquisition dummy	0.00	0.00	0.00	0.08	0.00	0.27	-14.79***
Upswing	0.70	1.00	0.46	0.69	1.00	0.46	0.62
Peak	0.22	0.00	0.41	0.22	0.00	0.42	-0.40
Downswing	0.08	0.00	0.28	0.09	0.00	0.28	-0.43
Citation weighted patents	218385.80	1959.00	1197611.00	330165.30	238.00	1822492.00	-2.37**
Patent stock	405.45	132.38	739.38	335.91	38.69	853.09	2.74***

	Correlations															
	Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	Patent count	1															
2	Acquisition experience	0.10	1														
3	Firm Size	0.32	0.28	1													
4	R&D/assets	0.21	0.01	-0.23	1												
5	ROA	0.03	-0.07	-0.03	-0.16	1											
6	Debt/assets	-0.10	0.10	0.19	-0.31	-0.28	1										
7	Potential slack	0.03	0.00	-0.01	-0.01	-0.01	0.07	1									
8	Absorbed slack	-0.03	-0.03	-0.24	0.19	-0.18	-0.12	-0.01	1								
9	Family firm	0.01	-0.04	-0.21	0.10	0.01	-0.09	0.00	0.08	1							
10	Acquisition dummy	0.11	0.50	0.15	0.02	0.00	0.01	0.00	0.00	0.00	1						
11	Family firm*acquisition dummy	0.09	0.30	0.05	0.06	0.00	-0.01	0.00	0.02	0.22	0.59	1					
12	Upswing	0.04	-0.18	-0.17	0.00	0.03	-0.08	0.00	0.01	-0.01	-0.09	-0.07	1				
13	Peak	0.00	0.14	0.14	0.00	0.03	0.05	0.00	-0.02	0.01	0.11	0.08	-0.80	1			
14	Downswing	-0.06	0.08	0.08	-0.01	-0.08	0.06	0.00	0.01	0.01	-0.02	0.00	-0.46	-0.16	1		
15	Citation weighted patents	0.75	0.02	0.15	0.12	0.03	-0.06	0.01	-0.02	0.04	0.02	0.02	0.05	-0.05	-0.02	1	
16	Patent stock	0.65	0.19	0.47	0.16	-0.06	-0.05	-0.01	-0.05	-0.04	0.13	0.10	-0.07	0.05	0.04	0.35	1

3.4.2 Empirical Analysis

The dependent variable, patent count is a count variable. Because of this I estimate a count data model using negative binomial regression (Verbeek, 2004). Negative binomial regressions are applicable when the sample variance of the dependent variable is greater than its sample mean thus indicating an "overdispersion". The standard deviation/mean =2.35 of the dependent variable points to 'overdispersion' in the variable's distribution. Further checks were carried out to ensure that the zeros in the dependent variable were not as a result of missing variables but are a result of firms who did not successfully apply for patents in the respective years.

A fixed effects model is estimated as the Hausman test rejected the null hypothesis that the unique errors are correlated with the regressors (Verbeek, 2004). This indicates that there is a systematic difference between the coefficients of the random effects model and the fixed effect model. The preferred model for the analysis favours a fixed effect model. The fixed effect models also account for unobserved firm specific fixed effects.

It is commonly known that acquisitions are driven by strategic decisions of managers. This particularly makes it difficult to account for endogeneity. To reduce any possibility of endogeneity, all independent variables are time lagged by 3 years. The consideration is that post-acquisition integration could take a few years to achieve before firms can actually recombine or reconfigure their new resources to produce new innovations in the form of new patent applications. Patent applications also go through a standard waiting period before they are granted. That is why the independent variables are lagged by 3 years. Also note that, the merger wave variables are industry level variables and the study is about firm level innovation. It is therefore certain that the composition of the main variables reduces any possibility of endogeneity that may affect the results of the study.

3.4.3 Results

Table 3 presents results of panel negative binomial regression models predicting the innovation implications of acquisitions in family firms. Model 2 of table 3 shows the influence of acquisitions undertaken by family firms on innovation as compared to non-family firms. Hypothesis 1 predicts that the association of acquisitions with innovation is stronger for family firms than non-family firms. Hypothesis 1 is supported given the coefficient of the interaction of family firms and acquisition dummy in model 1 of table 3 (ß = 0.17, $p < .05$). The results show a positive and significant association of family firm acquisitions with innovation. Thus acquisitions by family firms are 16.67 % positively associated with post M&As innovation.

Furthermore, hypothesis 2 predicts that the association of acquisitions with innovation is stronger for family firms than for non-family firms if the acquisition is conducted during the upswing of a merger wave. Model 2 (ß = 0.20, $p < .05$) of table 3 provides empirical support for this hypothesis. The marginal effect indicates that acquisitions by family firms during the upswing are 19.92 % associated with innovation. This also shows the positive effect of acquisitions in the upswing as in the ability of family firms to appropriate acquired assets efficiently than non-family firms.

3.4.4 Robustness Tests

Further to the results obtained in table 3 for manufacturing sector firms, robustness tests are conducted for high technology intensive manufacturing firms. The results are consistent with the earlier results. However, the split samples for the downswing and peak failed to converge. The results for the technology intensive manufacturing regressions are presented in table 4.

TABLE 3

Fixed-Effect Negative Binomial Models for Post-Acquisition Innovation in Family Firms

	Model 1	Model 2	Model 3
	All acquisitions	Upswing acquisitions	Downswing acquisitions
Acquisition experience	0.09***	0.13***	0.09
	(0.03)	(0.04)	(0.18)
Firm size	0.41***	0.40***	0.49***
	(0.01)	(0.02)	(0.09)
R&D/assets	0.86**	0.71	5.42*
	(0.41)	(0.49)	(3.08)
ROA	0.17	0.28	-3.18***
	(0.18)	(0.23)	(1.21)
Debt/assets	-0.37***	-0.19	-1.37*
	(0.14)	(0.17)	(0.71)
Potential slack	0.00	-0.00	-0.01
	(0.00)	(0.00)	(0.04)
Absorbed slack	0.04**	0.02	0.48*
	(0.02)	(0.02)	(0.25)
Family firms	-0.18***	-0.26***	-0.53
	(0.06)	(0.08)	(0.42)
Acquisition dummy	-0.06	-0.02	0.04
	(0.04)	(0.05)	(0.34)
Family firm* acquisition dummy	0.17**	0.20**	-0.61
	(0.07)	(0.09)	(0.52)
_cons	-2.50***	-2.42***	13.62
	(0.21)	(0.25)	(11531.50)
Observations	4130.00	2863.00	282.00
Log likelihood	-14000.29	-9492.77	-349.64

Note: standard errors are reported in parentheses

* p < .10, ** p < .05, *** p < .01

TABLE 4

Fixed-Effect Negative Binomial Models for Post-Acquisition Innovation in Family Firms (Technology Intensive Manufacturing- Sub Sample)

	Model 1	Model 2
	All acquisitions	Upswing acquisitions
Acquisition experience	0.09***	0.13***
	(0.03)	(0.04)
Firm size	0.37***	0.36***
	(0.01)	(0.02)
R&D/assets	0.32	0.04
	(0.43)	(0.52)
ROA	0.21	0.37
	(0.19)	(0.24)
Debt/assets	-0.27*	-0.10
	(0.14)	(0.17)
Potential slack	0.00	-0.00
	(0.00)	(0.00)
Absorbed slack	0.03	0.01
	(0.02)	(0.03)
Family firms	-0.12*	-0.24***
	(0.07)	(0.08)
Acquisition dummy	-0.05	-0.02
	(0.04)	(0.05)
Family firm* acquisition dummy	0.15**	0.16*
	(0.07)	(0.09)
_cons	-2.22***	-2.16***
	(0.22)	(0.25)
Observations	3831.00	2606.00
Log likelihood	-13542.15	-9141.73

Note: standard errors are reported in parentheses

* p < .10, ** p < .05, *** p < .01

The analysis is limited to the time window of 1980-2003 because the family firm ownership information of sample is not known beyond 2003. A further robustness test is conducted for the full sample of all technology intensive manufacturing sector firms (1980-2010). Here an

assumption is made that the ownership status of the family firms remains the same. The results as presented in table 3.5 are consistent with the results of the subsample.

TABLE 5

Fixed-Effect Negative Binomial Models for Post-Acquisition Innovation in Family Firms (Technology Intensive Manufacturing -Full Sample)

	Model 1	Model 2	Model 3	Model 4
	All acquisitions	Upswing acquisitions	Downswing acquisitions	Peak acquisitions
Acquisition experience	0.06*	0.11***	0.08	0.12
	(0.03)	(0.04)	(0.19)	(0.09)
Firm size	0.43***	0.42***	0.52***	0.43***
	(0.02)	(0.02)	(0.09)	(0.04)
R&D/assets	1.08**	0.80	5.66*	2.53**
	(0.42)	(0.50)	(2.98)	(1.01)
ROA	0.15	0.11	-2.16*	0.11
	(0.19)	(0.25)	(1.28)	(0.41)
Debt/assets	-0.51***	-0.34*	-1.42*	-1.53***
	(0.16)	(0.20)	(0.84)	(0.41)
Potential slack	0.00	-0.00	-0.03	0.03***
	(0.00)	(0.01)	(0.04)	(0.01)
Absorbed slack	0.04**	0.02	0.38	0.68***
	(0.02)	(0.03)	(0.26)	(0.11)
Family firms	-0.15**	-0.20**	-0.38	-0.28
	(0.07)	(0.09)	(0.42)	(0.19)
Acquisition dummy	-0.08*	-0.05	0.08	-0.18*
	(0.05)	(0.06)	(0.35)	(0.10)
Family firm* acquisition dummy	0.20***	0.21**	-0.75	0.17
	(0.08)	(0.10)	(0.55)	(0.15)
_cons	-2.07***	-1.99***	-2.54***	-2.05***
	(0.15)	(0.17)	(0.79)	(0.38)
Observations	3105.00	1941.00	310.00	807.00
Log likelihood	-10611.80	-7163.63	-294.25	-1884.75

Note: standard errors are reported in parentheses

* p < .10, ** p < .05, *** p < .01

For further robustness check, citation weighted patents which controls for the value of patents is used and the results as presented in table 6 are consistent with the prior results. Note that the Hausman test for the models favours random-effects (Verbeek, 2004). This shows a 31.69 % association with increases in citation weighted patents for acquisitions during the upswing. This shows a difference of 11.77 % increase in innovation in comparison to the number of patents.

TABLE 6

Random-Effect Negative Binomial Models for Post-Acquisition Innovation in Family Firms (Citation Weighted Patents)

	Model 1	Model 2	Model 3
	All acquisitions	Upswing acquisitions	Downswing acquisitions
Acquisition experience	0.18***	0.24***	-0.15
	(0.05)	(0.06)	(0.18)
Firm size	0.34***	0.33***	0.61***
	(0.02)	(0.02)	(0.07)
R&D/assets	0.40	0.77	3.39**
	(0.45)	(0.53)	(1.57)
ROA	-0.13	-0.21	-0.83
	(0.25)	(0.32)	(0.77)
Debt/assets	-0.71***	-0.72***	-0.81
	(0.20)	(0.25)	(0.66)
Potential slack	0.00	-0.00	0.02
	(0.00)	(0.00)	(0.02)
Absorbed slack	0.05**	0.04*	-0.01
	(0.02)	(0.02)	(0.11)
Family firms	-0.21***	-0.25***	-0.02
	(0.06)	(0.07)	(0.18)
Acquisition dummy	-0.18**	-0.17	-0.18
	(0.08)	(0.10)	(0.44)
Family firm* acquisition dummy	0.27**	0.32*	-0.14
	(0.13)	(0.17)	(0.59)
_cons	-2.59***	-2.67***	-4.98***
	(0.14)	(0.17)	(0.52)
Observations	2663.00	1837.00	231.00
Log likelihood	-25886.71	-18983.10	-1742.57

Note: standard errors are reported in parentheses
* p < .10, ** p < .05, *** p < .01

The differences in pre-acquisition patent stock of firms are controlled for and the results as presented in table 7 is consistent with the prior results. Note that the model for downswing acquisition does not converge.

Table 7

Random-Effect Negative Binomial Models for Post-Acquisition Innovation in Family Firms (Weighted citations)

	Model 1	Model 2
	All acquisitions	Upswing acquisitions
Patent stock	-0.00	0.00
	(0.00)	(0.00)
Acquisition experience	0.18***	0.23***
	(0.05)	(0.06)
Firm size	0.34***	0.32***
	(0.02)	(0.02)
R&D/assets	0.57	0.88*
	(0.44)	(0.52)
ROA	-0.16	-0.19
	(0.25)	(0.31)
Debt/assets	-0.72***	-0.68***
	(0.20)	(0.25)
Potential slack	0.00	-0.00
	(0.00)	(0.00)
Absorbed slack	0.05**	0.04
	(0.02)	(0.02)
Family firms	-0.17***	-0.21***
	(0.06)	(0.07)
Acquisition dummy	-0.18**	-0.16
	(0.08)	(0.10)
Family firm* acquisition dummy	0.24*	0.27*
	(0.13)	(0.17)
_cons	-2.65***	-2.65***
	(0.15)	(0.18)
Observations	2646.00	1828.00
Log likelihood	-25857.12	-18959.58

Note: standard errors are reported in parentheses
* p < .10, ** p < .05, *** p < .01

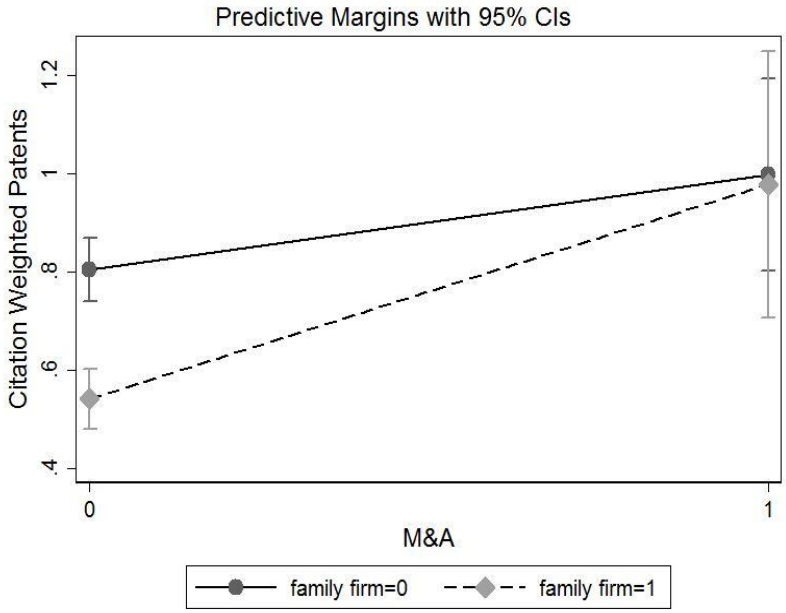
In nonlinear models, the interaction effect cannot be evaluated by examining the sign magnitude and statistical significance of the coefficient of the interaction term. It is required that a cross derivative or cross difference is estimated. The interaction effect thus depends on all covariates in the model. When done properly will prevent wrong inferences in the sample (Ai & Norton, 2002). The chances of non-family firms who did not engage in any acquisitions increasing innovation is 0.803. The chances of non-family firms increasing innovation through acquisitions is 0.997. Following Buis (2010), using the cross difference will imply that the marginal effect of acquisitions for non-family firms is 0.19. The chances of family firms increasing innovation after acquisitions is 0.541 and the chances of family firms increasing innovation after acquisitions is 0.978. The marginal effect of acquisitions for family firms on innovation is 0.44, which is the difference between the marginal effect of family firms who did not engage in M&A in the upswing and family firms who engaged in M&As in the upswing. Table 2 presence the interaction effects.

Table 8: Interaction effects on Citation weighted patents

	Margin	Delta-method Std. Err.	z	P> | z |	[95% Conf.	Interval]
Family firm#acquisitions						
0 0	.803423	.0328343	24.47	0.000	.7390689	.867777
0 1	.9976429	.1001153	9.96	0.000	.8014206	1.193865
1 0	.5414578	.0313128	17.29	0.000	.4800859	.6028297
1 1	.9781657	.1382621	7.07	0.000	.7071769	1.249154

Figure 3 presents the margin plots of the interaction effects showing the marginal effects.

Figure 2: Interaction effects on Citation weighted patents



3.5 Discussion and Conclusion

3.5.1 Discussion

Family firms just like other forms of organizations may engage in acquisitions for a variety of motives (Worek et al, 2018; Iyer & Miller, 2008). Given the poor investment in R&D (Block et al, 2012; Chrisman & Patel, 2012), it is plausible that family firms engage in acquisitions for innovation resources (Ahuja & Katila, 2001).

Family firms are able to appropriate target resources and capabilities with the aid of their endowed distinct resources in order to improve innovations better than non-family firms (Newbert, 2007). The long term nature of patient financial capital makes them valuable in the innovation efforts of family firms (Sirmon & Hitt, 2003). Regarding post-deal integration, patient capital

serves as a source of capital that can be relied up on to carry out activities without any threat of liquidation (Teece, 1992). This would then cause firms to act with confidence and thus enable them to fully appropriate the full potentials of acquisitions. Furthermore, when a family firm undertakes to capture the synergies of an acquisition with a pool of family resources, the dedication and commitment to see it through the difficult times could be reassuring. This survivability capital in the form of additional equities and labour of family members that have been invested creates a sense of motivation and drive to maximize the full potentials of acquisitions (Sirmon & Hitt, 2003). According to Kang (2000), survivability capital aids the efficient absorption of acquired resources as well as long term long term innovation activities (Sirmon & Hitt, 2003).

Family firms create an atmosphere of organizational support for employees which is reflected in job security or generous remunerations (Eisenberger, et al, 2001; Konig et al, 2013). By so doing, family firms are not only able to keep organizational memory and aid the transfer of skills (De Visscher et al, 2005), they also create a sense of obligation for which employees are keen on reciprocating by adopting behaviours that support organizational goals in challenging times such as post-acquisition integration (Cennamo et al, 2012; Wayne et al, 1997). More so, a perception of organizational support unleashes the creative initiatives of dedicated employees in the strategic interest of the firm (Bammens et al, 2010, Miller 2009). Taking together a perception of organizational support which is peculiar to family firms makes it possible for them to appropriate resources and synergies from targets better than other forms of firms.

Family firms are also better able to utilize target assets more than non-family firms because of the organizational social capital that family firms are endowed with (Acquaah, 2016). Long standing relationships with customers and external stakeholders of family firms can serve as a window of information exchange about opportunities and access to resources and give early access

to valuable resources which would ultimately be reconfigured in combination with the other distinct resources (Newbert, 2007; Sirmon & Hitt, 2003).

The literature has it that the early phase of a merger wave though riddled with information asymmetries, tend to be filled with a lot of targets with superior resources that can be acquired at low cost before prices are bid up by competition. Furthermore, the knowledge of the changes in an industry associated with the affective emotions and years of association with the industry by family owners or managers (Gomez-Mejia, Cruz, Berrone, & De Castro, 2011) as well as the organizational social capital in the form of ties and stable relationships with stakeholders also account for the ability of family firms to pre-empt and act accordingly based on their foreknowledge of the changing needs of the industry and access to privileged information . And thus able to make better acquisitions that reflect the needs of the market and provide a better fit for their innovation needs. The fact that family firms are more efficient at absorbing new external resources better than their non-family counterparts proclaims a mechanism that makes the association of family firms with post-acquisition innovation stronger than non-family firms (Sirmon & Hitt, 2003).

Contribution

This paper contributes in three ways to the literature on family firm acquisitions, strategy and innovation. First, the paper shows that family firms use acquisitions as a pathway to innovation. This enhances a better understanding of the role of acquisitions in the innovation performance of family firms (De Massis et al., 2015). Second, the paper makes an empirical contribution that family firms absorb external resources markedly different and more efficient than non-family firms (See Sirmon & Hitt, 2003; Kang, 2003). Third, prior studies on merger waves have mostly investigated the characteristics of firms, the decision and likelihood to engage in acquisitions during a certain stage of the merger wave(See Haleblian et al., 2012), as well the financial

performance implications of acquisitions in merger waves (See McNamara et al, 2008). This study goes a step further and shows that target assets acquired during the upswing of a merger wave are more valuable, and provide better resource synergies for family firms which makes them more innovative than non-family firms. This contributes to the literature on first mover advantages as well as family firm strategy and innovation

Managerial implications

The early phase of a merger wave is associated with information asymmetries and high levels of uncertainty about the potential synergies and complementarity of resource assets of potential targets relative to that of the acquirer (McNamara et al, 2008). The fact that family firms are able to increase innovation through acquisitions in the upswing is an indication of the presence of opportunities in spite of the uncertainty. This clearly indicates that family firms that have any expectations to use acquisitions as a route to innovation must aim and take advantage of the upswing of the merger wave.

Competitors may pay attention to the acquisition activities of family firms in order to inform their own acquisition strategies as early movers have the tendency to shape developments in the market of a particular technology domain or industry (Lieberman & Montgomery, 1998).

Limitations and future research

Similar to many studies about family businesses, detailed data on the ownership structure of the firms was not available to be able to investigate how different levels of ownership influence a firm's ability to benefit more from externally acquired resources in terms of innovation (Gomez-Mejia et al, 2013). Future studies may consider gathering more data to be able to decipher how changing levels of family ownership affect innovation in a similar context. Data on whether the family firms in the sample are multiple generation firms or founder management firms was not also

available. Future studies may consider unpacking this to see how these dimensions affect the results observed in this study.

Also, the family firms in this study are acquirers. There was no information on the family ownership status of the target firms. Future studies may consider this in order to provide clarity about what happens when target family firms are acquired during merger waves and how such acquisitions affect innovation in acquirer family firms.

3.5.2 Conclusion

By linking the conceptual frameworks of the resource based view of the firm as well as the early mover advantages, this study tests predictions about the external acquisitions of resource assets by family firms. Results from a sample of S&P 500 manufacturing firms provide support for the prediction that acquisitions are positively associated with innovation, where this association is stronger family firms than non-family firms. This suggests that family firms are more able to absorb and recombine the acquired resource assets better than their non-family peers and thus lead to more innovations. The results further confirm the prediction that the relationship is stronger for family firms when the acquisition is conducted during upswing of the merger wave which signifies a period of intense acquisition activities. This brings to the fore how family influenced organizations are able to capitalize on their endowed distinct resources to facilitate innovation (Sirmon & Hitt, 2003).

Chapter 4
Distance to Technology Aspiration Levels and the Choice of Acquisition Targets in Merger Waves[19]

4.1 Introduction

Technology development is a strategically important performance goal because it underpins value creation in many industries (Tyler & Caner, 2016). Technology development can be internal, but prior research has identified a multitude of external technology acquisition modes including mergers and acquisitions (Iyer & Miller, 2008; Zaheer, et al., 2010). The acquisitions literature has often shown among other goals that firms use acquisitions as an instrument to redeploy resources (Capron, Dussauge, & Mitchell, 1998), overcome entry barriers to certain technology domains (Iyer & Miller, 2008), and acquire valuable intellectual property or technology (Katila & Ahuja, 2002; Graebner, 2004; Grimpe & Hussinger, 2014). Indeed, technological innovation has often been cited as the stimulus for firms' acquisition decisions (Kotlar et al., 2013; Zhao, 2009; Hagedoorn & Duysters, 2002). This is because merging two firms may establish considerable knowledge synergies through the cross fertilization of ideas (Organghi, 2009). Being in contact with new, diverse ideas and capabilities of an acquired firm does not only present opportunities for organizational learning but can also contribute to a firm's technology performance if it is able to utilize the acquired knowledge well (Cloodt, Hagerdoorn & Kranenburg, 2006 Graebner, 2004). For instance Chrion Corporation, a manufacturer of biopharmaceuticals, vaccines and blood testing products, acquired pathogenesis Corp. in 2000 for its antibiotic drug called Tobi. It also acquired Matrix Pharmaceutical Inc in 2002 for its product Tezacitabine to expand its cancer drug portfolio. Another example of technology driven acquisition was the case of Dell Inc acquiring EqualLogic

[19] Joint work with Christoph Grimpe, Copenhagen Business School and Katrin Hussinger, University of Luxembourg

in 2008 for its internet protocol-based storage networking systems called ISCSI- Internet Small Computer Systems Interface. This and many others show that these acquisitions are partly driven by technology.

Ahuja & Katila (2001) make a distinction between technology acquisitions in which target firms resource assets involve a technology component and targets whose resources have no technology component. Through this line of enquiry prior studies indicate the need for the knowledge bases of the acquirer and target to be complementary if an acquisition is to create value through innovations (Grimpe & Hussinger, 2014). The established relationship about the relatedness between the knowledge bases of the acquirer and target firms on innovation is said to be nonlinear (Ahuja & Katila, 2001; Cloodt et al., 2006; Cefis, Marsili & Rigamonti, 2019), thus indicating the existence of a trade-off between 'exploration of new possibilities and the exploitation of old certainties' (March, 1991, p. 71) in acquisition decisions. In light of this, related acquisitions involve search for solutions aimed at refining and integrating familiar technologies for efficiency gains (Capron &Mitchell, 2004; Ranft & Lord, 2002) while unrelated acquisitions are search for solutions that hinge on diversity, novelty, unfamiliarity as well as uncertainty of the target knowledge resources (Graebner, Eisenhardt & Roundy, 2010, March, 1991). In other words a related acquisition is a form of nonlocal search as it favours incremental changes by limiting variability in search decisions (Baum & Dahl, 2007). An unrelated acquisition represents a form of nonlocal search given that it promotes radical organizational changes by favouring variability and novelty in search decisions (Baum & Dahl, 2007). We note that relatedness of acquisitions remains an important subject in the M&A literature (Cefis et al, 2019). This observed corporate phenomenon shows that technology or product relatedness continue to drive decisions as well as the value of search or acquisitions (Ornaghi, 2009; Lungeanu et al, 2015).

According to the behavioural theory of the firm (BTOF), search or acquisitions are triggered based on organizational performance relative to aspiration levels (Gomez-Mejia, Patel & Zellweger, 2018; Kotlar et al, 2013; Greve, 2003; Ref & Shapiro, 2017). Aspiration level is defined as the minimum level of performance a firm should meet in order to consider its performance satisfactory (Alexy, Bascavusoglu-Moreau & Salter, 2016). Organizational performance above aspiration creates no incentive for major organizational changes. On the contrary performance below aspiration levels will motivate firms to engage in problemistic search for solutions (Cyert & March, 1963). Problemistic search refers to a type of search that is orchestrated by a problem and aimed at obtaining a remedy to the problem (Cyert & March, 1963; Kahneman & Tversky, 1979). Problemistic search often commences with a focus on local search and then moves to nonlocal search (Baum & Dahli, 2007).

In spite of the recognition of the importance of acquisitions to technological development, the acquisition behaviours of organizations remain largely underexplored (Gomez-Mejia et al., 2018; Barkema & Schijven, 2008). Recent interest in the behavioural motives of firms for engaging in acquisitions have focused mainly on the effect of financial performance aspiration gaps (Gomez-Mejia et al., 2018; Chen, 2008; Chen & Miller, 2007; Greve, 2003). While the importance of technology-motivated firm acquisitions on technology performance of acquiring firms cannot be overemphasized (See Ahuja & Katila, 2001; Cloodt, Hagerdoorn & Kranenburg, 2006; Grimpe & Hussinger, 2014), there is a growing interest, although largely unexplored, in how technology aspiration levels influence the search behaviour of acquiring firms (Yu, Minniti & Nason, 2018; Tyler & Caner, 2016; Lungeanu, Stern & Zajac, 2016). For instance Tyler & Caner (2016) investigate how new product introductions below aspiration levels affect the decision to form R&D alliances. Yu et al. (2018) examine how the duration of technology underperformance influences the type of search. Similarly, Lungeanu and colleagues (2016) focus on how slack influences

organizational responses to poor innovation performance as well as search decisions. However, little is known about how technology performance aspiration gaps influence technology sourcing or acquisition decisions of firms. This study fills this important gap by focusing exclusively on technology aspiration levels and argues from the perspective of the behavioural theory that a firm's technology performance above or below aspiration levels is a major antecedent of acquisitions. Our focus on technology aspiration levels stems from the recognition of the saliency of goals where technology performance goals take precedence over financial performance goals in technology intensive firms (Tyler & Caner, 2016). This is because technology is the main driver of value creation upon which financial performance is anchored (Tyler & Caner, 2016; Greve, 1998).

It is widely established that acquisitions take place in waves (McNamara, Haleblian & Dykes, 2008). Prior studies have given considerable attention to the effect of the timing of acquisitions on financial performance (McNamara et al, 2008; Iyer & Miller, 2008). Also, theories of competitive dynamics show that the timing of acquisitions in a merger wave can be influenced by factors such as social or bandwagon pressures (Rosenkopf & Abrahamson, 1999; McNamara et al., 2008), depending on whether a firm is above or below performance aspiration levels (Iyer & Miller, 2008). However, relatively little is known about how the position of a firm in a merger wave affects the decision on whether to conduct a local or nonlocal search through technology acquisitions.

Taking insights from BTOF, competitive dynamics and bandwagon pressures we predict that increases in the distance of technology above aspiration levels are positively associated with related acquisitions especially during the peak of a merger wave. We also predict that increases in the distance of technology performance below aspiration levels are positively associated with unrelated acquisitions. Furthermore, we predict that increases in the distance of technology performance below aspiration levels is positively associated with acquisitions or unrelated acquisitions which defines the start of a merger wave. We find empirical support for our predictions using a panel

dataset that is comprised of the Standard & Poor's (S&P) 500 firms followed over a period of thirty years (1980-2010).

Our study contributes to the field of strategy and acquisitions in several ways. First, we identify that the need for a differentiated competitive strategy is the motivation for unrelated acquisitions. Drawing upon competitive dynamics, we argue that firms below technology aspiration levels seek solutions outside their core domains for new and diverse ideas and that this kind of search is motivated by the need to take actions aimed at restoring performance to reasonable levels and catch up with competitors (Ross & Sharapov, 2015).

Second, acquisitions made by firms below technology aspiration levels signal the emergence of a wave of mergers. Firms below technology aspirations levels engage in differentiated strategic activities such as unrelated acquisitions in periods of non-existent or low acquisition activities. This could set the stage for subsequent imitating behaviours of competitors and thus define the start of a merger wave (Lieberman & Asaba, 2006; Pacheco & Dean, 2015).

Third, we know from the BTOF that firms above technology aspiration levels would ideally engage in related acquisitions because such acquisitions are closely aligned with ongoing activities. However, combining this with insights from competitive dynamics, we predict that pursing a local search strategy should not be seen as "business as usual" or lack of organizational change. This should be conceived as a deliberate effective strategic response to redeploy underutilized resources. As firms below technology aspirations comprehensively appraise technology and R&D options available before engaging in acquisitions, firms above aspiration levels follow social cues and assume that those acquiring may be seizing better opportunities. There is no incentive for firms above aspiration levels to pursue any radically different strategy, for which reason they stick to a familiar or homogenous strategy in the industry. This bandwagon behaviour which is observed

during the period of intense acquisition activities, makes it possible to neutralize the actions of other players in order to maintain dominance or competitive advantage.

The rest of the paper is organized as follows: section two presents the theory and hypotheses development. The methodology is presented in section three and the results are captured in section four. The discussion and conclusion are presented in section five.

4.2 Theory Development and Hypotheses

4.2.1 Technology Performance and Problemistic Search

The behavioural theory (Cyert & March, 1963) provides a lens through which organizational performance evaluation, decision making and search for technologies can be analyzed (Greve, 2003). In light of this, decision makers in organizations pursue goals sequentially based on the prominence of each goal among a multitude of goals where the most salient goal is given attention at a time (Greve, 2008). More to the point, organizational actions are bargained based on the performance of other goals (Cyert & March, 1963). For instance in technology intensive firms, technology goals may take precedence over financial goals. This implies that firms that drive value from technology related products and services would give priority to technology goals since that is the main driver of value creation on which financial performance is anchored (Tyler & Canner, 2016).

The behavioural theory of the firm (BTOF), posits that an organization's technology performance is assessed relative to its aspiration level. We reiterate that an aspiration level is defined as the minimum level of performance a firm should meet (Alexy, Bascavusoglu-Moreau & Salter, 2016). Therefore a firm is said to be above aspiration level when performance surpasses the minimum threshold. A firm is below aspiration level when performance falls short of the minimum threshold (Greve, 2003). Firms resort to inaction or focus on their routines when

technology is at or above the minimum threshold anticipated (Greve, 2003). However firms below aspiration levels have a higher risk tolerance and are thus more likely to make organizational changes or depart from their routines for new ideas in order to restore performance back to reasonable levels (Ref & Shapira, 2017). In the following, we analyze how both performance above aspiration levels and performance below aspirations influence acquisitions.

Performance of technology resources above aspiration levels produces slack resources in a firm's current market context which also affects the diversification strategy of the firm (Levinthal & Wu, 2010). These slack resources trigger slack based-search for "innovations that would not be approved in the face of scarcity but have strong subunit support" (Cyert & March, 163:279). Slack search basically characterises a search driven by excess resources that need to be redeployed in other areas. Slack search particularly underscores the risk taking capacity of a firm (Xu et al, 2019) as well as the capacity to experiment with new ideas for future innovations (Iyer & Miller, Ref & Shapira, 2016). Technology performance above aspiration levels stimulate local search as the search for new innovations focuses in the proximity of organizational practices of the the organization or the subunit responsible (Tyler & Caner, 2016, Greve, 2003; Cyert & March, 1963). Futhermore, the diversification literature underscores that scale free resources are fungible and their value tend to reduce when they are redeployed or leveraged in distant domains (Levinthal & Wu, 2010). In light of this, diversifying or redeploying such technology resources through an acquisition in related domains represents a low risk endeavour and explains the preference of related acquisition by many firms. It also explains why related diversification tends to outperform unrelated diversifications (Robins and Wiersema, 1995; Rumelt, 1974; Levinthal & Wu, 2010).

Viewed differently from the capacity-based logic in the explanation above (Cyert & March, 1963; Levinthal & March, 1981), it has been suggested that a more consistent motivation-based

logic to explain the effects of both performance above and below aspiration levels and their relationship to risk taking be used (Xu et al, 2019).

The motivation-based logic suggests that technology performance above aspiration levels diminishes the pressure on decision makers to restore performance back to acceptable levels. Furthermore, they concentrate on forward looking activities in order to maintain their existing performance, competitive advantage or market leadership (O'Brien & David, 2014; Souder & Bromiley, 2012). This also reassures managers of the effectiveness of their growth strategy (Xu et al, 2019). This confidence drives managers to resort to activities that seek to maintain the status quo and at the same time ensure growth and market leadership, while maintaining the same or similar strategies. (Birhanu et al, 2016). In light of this, firms above technology aspiration levels will be spurred to undertake related acquisitions, as they are not under pressure to do something radically different in order to restore performance to aspiration levels. Note that related acquisition is a form of local search in the core technology domain of the acquiring firm that is aimed at maintain its comparative advantage.

Hypothesis 1: Increases in the distance of technology performance above aspiration levels are positively associated with the likelihood of engaging in related acquisitions.

Organizations initiate search actions for technologies when technology is deemed lower than the minimum threshold that should be achieved (Alexy et al., 2016; Cyert & March, 1963; Greve, 2003). When a search mechanism is orchestrated by a problem and aimed at obtaining a remedy to the problem, it is known as problemistic search (Cyert & March, 1963; Kahneman & Tversky, 1979). Firms increase problemistic search to locate solutions to technology problems when technology aspirations are not met (Greve, 2003).

Thus a firm below technology aspiration level will start a problemistic search for technology solutions by engaging in acquisitions as a means to secure valuable technology resources externally. These include knowledge sources that were previously unknown to the firm (Alexy et al., 2016). With regard to problemistic search, Baum & Dahlin (2007) note that performance outcomes below aspiration levels trigger nonlocal search for solutions to improve performance (Cyert & March, 1963). This implies that problemistic search begins with attention to local search and subsequently moves to nonlocal search depending on the distance to the unmet aspirations (Baum & Dahlin, 2007; Tyler & Caner, 2016; Cyert & March, 1963).

We note that an unrelated acquisition is a form of nonlocal search which involves search in industries different from the core industry of the acquiring firm in areas such as technologies, products, markets and the way business is generally conducted (Gupta 1984; Park, 2002). This form of search makes it possible for a firm to access a new, diverse and unfamiliar R&D projects which can create more technology options for the future (McGrath, 1997; Vassolo, Anand, & Folta, 2004). Thus unrelated acquisitions will become the most preferred strategy for firms below technology aspiration levels given the need to gain access to new and diverse R&D projects.

Hypothesis 2: Increases in the distance of technology performance below aspiration levels are positively related to the likelihood of engaging in unrelated acquisitions.

4.2.2 Bandwagon Pressures and Acquisitions

The search strategy of firms are influenced by several factors such as competitive dynamics. In broad terms, it is commonly known that acquisitions occur in waves due to several reasons including business environment shocks (Haleblian, McNamara, Kolev, & Dykes, 2012; Martynova & Renneboog, 2008). Similar to the adoption and diffusion of innovation (See Rogers, 1995), the market for corporate control is characterized by bandwagon pressures (Fiol & O'Connor, 2003)

manifested through merger waves. Two theoretical streams have been put forward to explain the phenomena of bandwagons. The rational-efficiency theories (Rosenkopf &Abrahamson, 1999; Katz & Shapiro, 1985) and the theories of institutional isomorphism or mimetic isomorphism (DiMaggio & Powell, 1983). In summary, rational efficiency has it that an organization adopts a course of action or technology based on rational assessment of the technical efficiency and the expected returns associated (Abrahamson & Rosenkopf, 1993). This presupposes a certain proinnovation bias as organizations will be deterred from adopting courses of actions or technologies that are deemed unprofitable (Rosenkopf & Abrahamson, 1999). Conversely, mimetic isomorphism theories assert that instead of relying on rational assessment of technical efficiency and returns of an action, an organization adopts a course of action because it has been adopted by certain organizations. Organizations simply imitate others when there is uncertainty about possible courses of action (Lieberman & Asaba, 2006). Bandwagon theories thrive on ambiguity or uncertainty of alternative range of actions as well as the likelihood of occurrence of outcomes of such actions (Milliken, 1987; Abrahamson & Rosenkopf 1999). Organizational theory puts forward two theories that explain the phenomenon of bandwagon pressures, namely institutional bandwagon pressures which is a result of the threat of lost legitimacy as well as competitive bandwagon pressures which is a result of the threat of lost competitive advantage (Abrahamson & Rosenkopf, 1990, 1993).

From the perspective of competitive dynamism, firms that aspire to perform well relative to the competition will pursue one of two strategies. 1) A risky and challenging differentiation strategy which can protect them from the actions of rivals and lead to higher gains should it succeed (Lieberman & Asaba, 2006). 2) Adopt a course of action that is homogeneous with that of competitors (Baum & Haveman, 1997; Deephouse, 1999; Gimeno & Chen, 1998). This later strategy enables firms to match the behaviour of competitors (Lieberman & Asaba, 2006). It is

important to note that performance below aspiration levels generally increases the risk tolerance of firms as they strive to navigate out of the quagmire (Wiseman & Gomez-Mejia, 1998). In light of this, acquisitions can be conceived as a differentiated strategy in an environment where acquisitions are not common place.

Furthermore, the literature on competitive dynamism perceives imitation as a response to a competitor's actions in order to minimize risks and alleviate the intensity of competition in an uncertain environment (Lieberman & Asaba, 2006). Firms also use imitative behaviour to match competitors and as a mechanism to disrupt or maintain the status quo (Ross & Sharapov, 2015; Chen, Smith & Grimm, 1992). While laggards are often thought to imitate market leaders as a means of catching up, Market leaders or firms above technology aspiration levels also imitate as a strategy to maintain market leadership in highly competitive environments (Pacheco & Dean, 2015; Ross & Sharapov, 2015).

We suggest that on the market for corporate control, firms below or above technology aspiration levels differ on the timing of acquisition and are subsequently impacted differently by bandwagon pressures (McNamara, et al, 2008; Pacheco & Dean, 2015). Firms above technology aspiration levels are likely to be motivated by bandwagon pressures (Fiol & O'Connor, 2003). There are institutional bandwagon pressures when firms succumb to peer pressure and choose to imitate the action of early adopters in order not to appear markedly different from their peers in terms of industry participation and technology portfolio (Pacheco & Dean 2015; DiMaggio & Powell, 1983). On the other hand, there are a competitive bandwagon pressures when firms join the fray motivated by the fear of missing competitive opportunities that early acquirers may be optimising (Lierberman & Asaba, 2006; Fiol & O'Connor, 2003; McNamara, Haleblian, & Dykes, 2008).

Where technology performance is at or above aspiration level, firms are more likely to react to competitor actions on the market for corporate control by focusing on social cues, assume others have superior information (Lieberman & Asaba, 2006), and are therefore affected by competitive bandwagon pressures because they fear missing out on competitive opportunities that early adopters appear to be seizing (Abrahamson & Rosenkopf, 1993). Being above technology aspiration level often signals the existence of underutilized resources for which these firms seek to redeploy fully in other areas such as acquisitions (Ref & Shapira, 2016). Yet satisfactory performance or technology above aspiration levels motivate firms to focus on routines and customary practices which moderately fine-tune prior experiences (Baum & Dahl, 2007). Considering that leading firms often seek to strategically maintain the status quo that reinforces their dominance, and the fact that high performance reduces risk tolerance, these firms will not be interested in pursuing a differentiated strategy as this is risky and challenging (Ross & Sharapov, 2015). Instead, firms will adopt a homogenous strategic action by mimicking the prevailing strategic actions of competitors such as acquisitions (Lieberman & Asaba, 2006). In this sense, imitation could be seen as an attempt by firms above technology aspiration levels to neutralize earlier actions of competitors in order to maintain their dominance technologically (Ross & Sharapov, 2015). This indicates that firms will focus on local search as it is coterminous with related acquisitions which is considered less risky in comparison to unrelated acquisitions. Furthermore related diversification or acquisition is proclaimed as the most efficient way to redeploy fungible scale-free technology resources (Asmussen, 2014; Robins and Wiersema, 1995; Rumelt, 1974; Levinthal & Wu, 2010).

Hypothesis 3: Increases in the distance of technology performance above aspiration levels are positively associated with the likelihood of engaging in related acquisitions, and this likelihood increases at the peak of a merger wave.

Being below technology aspiration levels motivate organizations to make a comprehensive analysis of the strategic opportunities and value of alternative courses of action available. As problemistic search encourages attention to nonlocal search depending on the distance to technology aspiration levels, decision makers highlight nonlocal search and favour big changes aimed at restoring performance (Baum & Dahlin, 2007; Tyler & Caner, 2016; Cyert & March, 1963). Firms below technology aspiration levels aim at picking new resources beyond the boundaries of the firm (Cyert & March, 1963, Tyler & Caner, 2016). We reiterate that in competitive dynamism, acquisitions in general or an unrelated acquisition is a differentiated strategy in an environment where acquisitions are not the routine practices of organizations. Therefore, in order to restore performance, firms below technology aspiration levels would most likely adopt a differentiated strategy such as acquisitions (Lieberman & Asaba, 2016). Also, given that performance below aspiration levels increases the risk appetite of managers (Wiseman & Gomez-Mejia, 1998), problemistic search will not only lead these firms to consider acquisitions but will cause them to consider an unrelated acquisition which gives access to diverse and novel R&D resources and have the potential to restore technology performance to levels closer to aspirations (Baum & Dahlin, 2007). Since this action or acquisition takes place at a time when acquisitions are not customary, it will most likely occur at the beginning of a wave of mergers.

Hypothesis 4: Increases in the distance of technology performance below aspiration levels are positively associated with the likelihood of engaging in unrelated acquisitions, and this likelihood increases at the beginning of a merger wave.

4.3 Methodology

4.3.1 Data Sources and Sample

To construct our data sample we combined S&P 500 firms dataset with Compustat database to retrieve the financial and market information of firms, which resulted in a panel data of 500 firms. In the next step, the acquisitions data was drawn from Thomson One Banker. Furthermore, the patent data was retrieved from the NBER U.S patent and citation records and merged with the Compustat database using the GVKEY and CUSIP as common identifiers.

In an attempt to capture sample innovative firms, prior studies on M&As and alliances have focused on the manufacturing and service sectors arguing that a significantly large volume of knowledge intensive firms can be found in these industries (Hagedoorn & Duysters, 2002; Zaheer, Hernandez & Banerjee, 2010). In view of this our analysis focuses on the manufacturing and service industries which led to the loss of 230 firms from the sample. These are firms that have neither been classified as manufacturing nor service sector firms.[20] The final sample is a panel dataset with 4735 observations from 270 firms for the period ranging from 1980 – 2010. 158 of these firms engaged in 408 different acquisitions. 323 acquisitions were conducted by 122 firms in manufacturing and the remaining 85 by 36 firms in the services sector.

4.3.1.1 Dependent variables

[20] The Standard Industrial Classification (SIC) classifies industries by a four-digit code. By focusing on the manufacturing and services industries, all firms in the following indstrial classification were dropped from the sample. These include agriculture, forestry and fishing; mining, construction;wholesale trade; retail trade, finance insurance and real estate; public adminsitrations and those in the miscellaneous and non-classifiable category.

We used nine (9) dependent variables for our analysis. *Acquisition dummy* is the first dependent variable and it is a binary variable, which takes a value of 1 if a firm has conducted any acquisition and 0 otherwise.

Following the Cefis et al., (2019) we measure relatedness based on industry affiliation using the standard industry classification (SIC) codes. This is against the background that acquisitions involve the transfer of resources from one firm to another. The industry relatedness measure is thus suitable in that it captures relatedness in resource profiles of merging firms (Bryce & Winter, 2009; Speckbacher, Neumann & Hoffmann., 2015). Prior studies have applied the two and four digit SIC codes in the measurement of relatedness (see Miller et al, 2010). So the relatedness index is estimated using the four and two-digit (for robustness tests) SIC codes. For the resources of a target to be beneficial to the acquirer there is the need for some level of similarity between the two resource bases in order to enhance their efficient integration. The four digit measure indicates high similarity between resource bases of targets and acquirers. However, the limitation of the four digit measure is that it is too fine-grained (Miller et al, 2010; See Martin & Sayrak, 2003).While the industry of operation of firms should not be too distant for purposes of maximizing synergies, they should also not be too similar so that acquirers will have something new to benefit from for future innovations (Grimpe & Hussinger, 2014). In view of this we use the two digit measure for robustness tests.

The *unrelated acquisition dummy* takes the value 1 if the acquirer and target are in different industry classification using the four-digit SIC industry classification. *Related acquisition dummy* takes the value 1 if the acquirer and target are in the same industry classification using the four-digit SIC industry classification.

4.3.1.2 Acquisition waves

We identify three stages in an acquisition wave using the volume of acquisitions for each year for which we create three dummy variables namely upswing, peak and downswing.[21] The upswing represents a period of increasing acquisition activities in comparison to the period before which may last a few years. The peak represents the phase in a wave where acquisition activities get to the peak and stabilizes in intensity. This may also last a few years. The downswing refers to a period of declining acquisition activities. Acquisition activities decline to levels comparable to what it was before the wave began (Carow et al, 2004; Haleblian, McNamara, Kolev & Dykes, 2012). Figure 1 on page 13 shows the volume of M&A activities depicting the merger waves. The *upswing* variable takes a value of 1 if an acquisition takes place during the rising period of the wave and 0 otherwise. The variable *peak* takes the value of 1 if acquisition activities take place during the zenith of the wave and 0 otherwise. Finally, the *downswing* takes the value 1 if acquisitions activities happen during the declining phase of the wave and 0 otherwise. All acquisitions in the sample belong to one of the three phases of the merger wave. The wave variables are used to construct the other dependent variables as seen below.

Upswing acquisitions is a dummy variable which measures acquisitions that take place in the upswing of the merger wave. In a similar fashion, the *Peak acquisitions* variable also shows acquisitions undertaken during the peak of the wave.

The others are *upswing unrelated acquisitions 4 digit* and *upswing related acquisitions 4 digit* which represents related and unrelated acquisitions occurring during the upswing of the merger

[21] We follow the movement of the years of intensive and decrease M&A activities to construct the wave variables. The upswing covers the following years: 1980-1985, 1993-1998 and 2005-2006. The peak covers the following years: 1986-1986, 1999-1999 and 2007-2007. The downswing covers the following years: 1987-1992, 2000-2004 and 2008 - 2010.

wave using the 4 digit SIC industry classifications. Furthermore, the *peak unrelated acquisitions 4 digit* and *peak related acquisitions 4 digit* are acquisitions that occur during the peak of the merger wave. Those of the downswing are used as the bench mark of comparison.

As indicated earlier for robustness tests, we also constructed four (4) dependent variables for the 2 digit SIC industry classification. They include the *upswing unrelated acquisitions 2 digit* and *upswing related acquisitions 2 digit* which represents related and unrelated acquisitions occurring during the upswing of the merger wave using the 2 digit SIC industry classifications. Also, the *peak unrelated acquisitions 2 digit* and *peak unrelated acquisitions 2 digit* are acquisitions that occur during the peak of the merger wave.

4.3.1.3 Independent variables

Technology above and below aspiration levels

In line with prior research we used granted patents as a proxy for technology performance (See Block, Miller, Jaskiewicz & Spiegel, 2013). Patents are generally conceived as the product of technological and inventive capabilities of firms (Hagedoorn & Cloodt, 2003). Thus, patents could be the outcome of successful R&D (Block et al, 2013). A patent owned by a firm is an indication of the recognition the firm has gained for the new knowledge it has produced (Jaffe, Trajtenberg and Henderson, 1993). Patents are therefore generally accepted in literature as the measure of the innovative or technology performance of firms (Hagedoorn & Cloodt, 2003). Even though patents are indicative of the technological potential of the outcome of R&D, patents may not be representative of the knowledge base of a firm as not all inventions are patented (Griliches, 1990). Therefore, we used the patent count as a proxy to gauge firm level technology performance.

According to the BTOF, a firm's behaviour is determined by the evaluation of its performance relative to its aspiration level (Cyert & March, 1963, Greve, 2003). This calls for identifying a

benchmark of comparison. Establishing the benchmark of comparison raises a fundamental question as to which reference group the focal firm should compare its performance to (Iyer & Miller, 2008). There are two competing views about the benchmark of comparison. The first view compares a firm's performance to the focal firm's own historical performance (Cyert & March, 1963, Levinthal & March, 1981). This is because a firm's recent past performance is a yardstick with which it appraises its present performance. More so, not only is it a measure of how well a firm performs but can also become yardstick of how well a firm should perform (Ref & Shapira, 2017; Greve, 2003). The second view compares a focal firm's performance to other comparable firms and it is called social comparison (Iyer & Miller, 2008; Cyert & March, 1963). This uses the past performance of comparable firms as the yardstick with which a firm appraises its performance (Chrisman & Patel, 2012; Ref & Shapira, 2017). However, prior research indicates that it is often an arduous task to determine which comparable group is suitable (Washburn & Bromiley, 2012). Because firms can choose to compare themselves to others based on technology portfolio, size, strategy or core industry classifications (Ref & Shapira, 2017). This difficulty associated with choosing the appropriate reference group for social comparison may have led to the mixed and inconsistent results in prior studies (Boyle & Shapira, 2012, Ref & Shapira, 2017). To avoid this dilemma some scholars have resorted to the use of a weighted model based on a weighted combination of the historical and social performance (see Tyler & Caner, 2016; Bromiley et al, 2014). Others turn to both the historical performance of firms and that of competitors (see Iyer & Miller 2008; Chrisman and Patel, 2012). Yet in recent times, scholars find the historical performance measure a more preferable approach of predicting a firm's behaviour, as firms are more responsive to their own historical performance gaps (see Choi, Lee & Bae, 2019; Ref & Shapira, 2017; Moliterno & Wiersema, 2007). We estimate our aspiration variable using the self or historical technology performance.

We estimated the patent stock as follows: $Patent\ Stock_{it} = (1-\delta) * Patent\ Stock_{it-1} + Patents_{t.}$ We used a 15% rate of depreciation (δ) per annum given that patents depreciate due to technological obsolescence or being invented around by competitors (Bessen, 2008).[22] In the second step we then applied the following formula to calculate the technology performance aspiration gaps: *Technology aspiration level = (patent stock$_t$ – average patent stock$_{t-3}$) / average patent stock$_{t-3.}$* We subtracted the 3-year average of patent stock from the patent stock in year$_t$. The difference is normalized by the 3-year average of the patent stock. The positive values are taken as the ***technology performance above aspiration levels***. The negative values are taken as the ***technology performance below aspiration levels***. In the third step, for easy interpretation the technology performance below aspiration levels are multiplied by (-1) so that all values are positive (See appendix 2 for details).

This measure is not impacted by differences in the absolute number of patents. Furthermore, in order for a firm to fall below aspiration levels or become negative, the firm needs to deviate downwards by a large amount from a consistently high performance and stay below the previous performance for a longer period.

4.3.1.4 Control variables

We follow prior studies in our choice of control variables to account for firm level and industry characteristics. Larger firms are more likely to have the capacity to make acquisitions (Ellis et al, 2011). We use the natural log of total assets as a measure for firm size. The natural log is used to handle the skew distribution of the variable.

[22] Prior literature suggest the knowledge depreciation rate to be 15% (see Griliches & Mairesse, 1984; Hall, 1990; Czarnitzki & Toole, 2011, Zobel, Bashmeier & Chesbrough, 2016 for details). This is what informed the choice of the 15% rate of depreciation of the patent stock.

Debt/assets is the ratio of total debt to total assets, which reflects the percentage of firm's assets that is financed by debt. A firm is highly leveraged if it has a high debt/asset ratio. It also shows the associated risk involved in the firm's operations (Shim & Okamuro, 2011). We anticipate that this will have a negative relationship with acquisitions. We also used patent R&D ratio to control for technology related activities of firms. We used patent citations to control for the relative novelty of firms technologies. The average of ROA controls for overall firm efficiency. ROA is the ratio of net income to total assets (Chrisman & Patel, 2012). This is expected to have a positive effect on acquisition. The R&D assets ratio as a proxy for firms risk and readiness to undertake long run investments. It is calculated as the ratio of R&D expenditure to total assets. We expect it to have a positive effect on acquisitions. Industry and time dummies are introduced to control for any industry time related variance. Finally, we also control for acquisition experience of acquiring firms.

4.4 Results and Analysis

4.4.1 Descriptive Statistics

Descriptive statistics is presented in table 1 which shows that an average of 0.09 acquisitions in our sample. Furthermore, on average 0.05 acquisitions occur in the upswing while 0.03 acquisitions occur in the peak of a merger wave.

The technology above aspiration levels variable shows a mean of 8.22 while the technology below aspiration level shows a mean of 0.02. This indicates more of the firms in our sample have technology performance above aspiration levels. With a mean of 7.93, the size of the firms in our sample are relatively large.

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Dependent variables				
Acquisition dummy	0.09	0.28	0.00	1.00
Upswing acquisition	0.05	0.21	0.00	1.00
Peak acquisitions	0.03	0.18	0.00	1.00
Downswing acquisitions	0.01	0.08	0.00	1.00
4 digit SIC industry classification				
Related acquisition 4 digit	0.03	0.16	0.00	1.00
Upswing related acquisitions 4 digit	0.01	0.11	0.00	1.00
Peak related acquisitions 4 digit	0.01	0.11	0.00	1.00
Downswing related acquisitions 4 digit	0.00	0.04	0.00	1.00
Unrelated acquisition 4 digit	0.08	0.28	0.00	1.00
Upswing unrelated acquisitions 4 digit	0.05	0.21	0.00	1.00
Peak unrelated acquisitions 4 digit	0.03	0.17	0.00	1.00
Downswing unrelated acquisitions 4 digit	0.01	0.08	0.00	1.00
2 digit SIC industry classification				
Related acquisition 2 digit	0.05	0.21	0.00	1.00
Upswing related acquisitions 2 digit	0.02	0.15	0.00	1.00
Peak related acquisitions 2 digit	0.02	0.14	0.00	1.00
Downswing related acquisitions 2 digit	0.00	0.07	0.00	1.00
Unrelated acquisition 2 digit	0.06	0.23	0.00	1.00
Upswing unrelated acquisitions 2 digit	0.03	0.18	0.00	1.00
Peak unrelated acquisitions 2 digit	0.02	0.14	0.00	1.00
Downswing unrelated acquisitions 2 digit	0.00	0.06	0.00	1.00
Control variables				
M&A experience	0.30	0.46	0.00	1.00
Firm size	7.93	1.49	1.36	13.08
R&D/assets	0.05	0.06	0.00	0.49
Patent/R&D	1.63	2.38	0.00	38.03
Patent citations	11.43	11.90	0.00	205.60
ROA	0.07	0.09	-0.76	0.50
Debt/assets	0.16	0.13	0.00	0.69
Patent stock	467.23	1137.09	0.01	18704.75
Explanatory variables				
Technology below aspiration	0.02	0.05	0.00	0.16
Technology above aspiration	8.22	34.38	0.00	705.16

We also present correlations in table 2 (in the appendix 1). The variables with high correlations are for the various dependent variables. So they have not been used together in the same model. Therefore the issue of multicollinearity does not arise.

4.4.2 Empirical Analysis

In order to test our hypotheses, we employed pooled logit estimators. Table 3 presents results of pooled logit fixed-effect regression models predicting the likelihood of acquisitions. The variable downswing, which describes the declining phase of a merger wave is used as benchmark of comparison, hence it is not included in the models. This is to avoid any incidence of multicollinearity. Furthermore, the variable patent stock is not included in the models as it is used to control for technology intensive firms.

As shown by model 2 of table 3 (ß = 0.58, $p < .05$), we find support for hypothesis 1 which suggests that an increase in the distance of technology above aspiration levels is positively associated with related acquisitions. The marginal effects show that an increase in the distance of technology above aspiration level is 1.01 % positively associated with related acquisitions. Hypothesis 2 suggests that increases in the distance of technology performance below aspiration levels are associated with unrelated acquisitions. Model 6 of table 3 (ß = 4.75, $p < .05$) confirms hypothesis 2. Model 6 of Table 3 as stated also confirms hypothesis 3 which suggests that technology performance below aspiration levels is associated with unrelated acquisitions which could also signal the start of a merger wave. This indicates that an increase in technology performance below aspiration level is 25.75 % positively associated with unrelated acquisitions during the upswing of a merger wave. The results also confirm hypothesis 4 which predicts that increases in the distance of technology performance above aspiration levels are positively associated with related acquisitions during the peak of a merger wave (Model 8 of table 3: ß = 0.74, $p < .05$). This shows a 0.70 % positive association with related acquisitions if the distance of technology performance above aspiration level increases.

4.4.3 Robustness Tests

The results presented in table 3 constitute a more fine-grained measure of relatedness. However, for post M&A integration to culminate into valuable resources synergies, the target resources should ideally not be very similar to that of the acquirer. There is the need for some level of differentiation in order for recombination of the sources to be beneficial. In view of this we used the two digit SIC code as measure of relatedness. This measure ensures that the target and acquirer are different and yet similar enough for resource assimilations to be beneficial. The results as presented in table 4 are consistent with the prior results in table 3.

TABLE 3: Pooled Logit Regression Models for the Probability of Acquisitions (4 digit SIC industry classification)

	Acquisition dummy	**Related acquisitions**	**Unrelated acquisitions**	**Upswing acquisitions**	**Upswing related acquisitions**	**Upswing unrelated acquisitions**	**Peak acquisitions**	**Peak related acquisitions**	**Peak unrelated acquisitions**
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Acquisition experience	0.94***	0.57***	0.90***	0.87***	0.44	0.92***	0.98***	0.62**	0.79***
	(0.12)	(0.21)	(0.12)	(0.18)	(0.36)	(0.17)	(0.19)	(0.30)	(0.20)
Firm size	0.36***	0.32***	0.49***	0.33***	0.28**	0.49***	0.46***	0.36***	0.59***
	(0.05)	(0.08)	(0.05)	(0.07)	(0.13)	(0.07)	(0.08)	(0.12)	(0.08)
R&D/assets	3.87***	6.91***	1.68	4.41**	3.96	3.44	4.40**	9.09***	1.34
	(1.19)	(1.72)	(1.36)	(1.92)	(2.92)	(2.14)	(1.79)	(2.43)	(2.06)
Patent/R&D	0.04	-0.11	0.04*	-0.02	-0.35**	-0.01	0.09*	0.02	0.11**
	(0.03)	(0.08)	(0.03)	(0.04)	(0.17)	(0.04)	(0.05)	(0.10)	(0.05)
Patent citations	0.00	0.00	0.01**	-0.00	-0.00	0.01	0.02	0.01	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
ROA	1.20	1.70	1.72**	2.66**	2.71	3.88***	0.33	2.22	-0.35
	(0.74)	(1.15)	(0.85)	(1.26)	(2.17)	(1.43)	(1.12)	(1.64)	(1.28)
Debt/assets	-1.43**	-1.27	-1.79***	-1.16	-2.23	-1.30	-1.85**	0.04	-2.69***
	(0.56)	(1.02)	(0.60)	(0.93)	(1.88)	(0.96)	(0.88)	(1.38)	(0.97)
Technology below aspiration	0.90	0.61	1.13	3.26	-0.97	4.75**	-0.24	-0.04	-0.56
	(1.43)	(2.48)	(1.53)	(2.09)	(4.35)	(2.12)	(2.22)	(3.46)	(2.48)
Technology above aspiration	0.46**	0.58**	0.41**	0.39	0.28	0.43	0.51*	0.74**	0.42
	(0.18)	(0.26)	(0.20)	(0.28)	(0.40)	(0.29)	(0.28)	(0.37)	(0.31)
_cons	-6.89***	-9.09***	-8.27***	-7.05***	-8.63***	-8.38***	-6.91***	-21.45	-7.77***
	(0.66)	(1.45)	(0.70)	(0.84)	(1.79)	(0.86)	(0.90)	(530.53)	(0.96)
Observations	4735.00	3715.00	4616.00	2389.00	1612.00	2380.00	1424.00	1349.00	1309.00
Log Likelihood	-1290.05	-473.24	-1229.24	-578.99	-170.89	-596.19	-480.04	-219.18	-422.29

Note: Coefficients are reported and standard errors are reported in parentheses
* p < .10; ** p < .05; *** p < .01

TABLE 4: Pooled Logit Regression Models for the Probability of Acquisitions (2 digit SIC industry classification)

	Related acquisitions	**Unrelated acquisitions**	**Upswing related acquisitions**	**Upswing unrelated acquisitions**	**Peak related acquisitions**	**Peak unrelated acquisitions**
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Acquisition experience	0.69***	0.94***	0.50*	1.01***	0.72***	0.79***
	(0.15)	(0.14)	(0.25)	(0.21)	(0.23)	(0.24)
Firm size	0.28***	0.55***	0.21**	0.57***	0.34***	0.65***
	(0.06)	(0.06)	(0.10)	(0.09)	(0.10)	(0.10)
R&D/assets	4.56***	1.55	3.83	2.30	5.13**	2.40
	(1.41)	(1.69)	(2.39)	(2.78)	(2.03)	(2.47)
Patent/R&D	0.02	0.04	-0.09	0.01	0.06	0.11*
	(0.04)	(0.03)	(0.08)	(0.05)	(0.06)	(0.06)
Patent citations	-0.00	0.01**	-0.00	0.01	-0.00	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ROA	1.65*	1.14	3.94**	2.21	0.37	0.24
	(0.94)	(1.01)	(1.75)	(1.71)	(1.33)	(1.55)
Debt/assets	-1.03	-2.15***	-0.16	-2.46**	-0.94	-2.75**
	(0.73)	(0.74)	(1.23)	(1.20)	(1.05)	(1.20)
Technology below aspiration	0.23	2.62	0.42	6.94***	1.04	-0.01
	(1.87)	(1.84)	(2.95)	(2.57)	(2.66)	(3.05)
Technology above aspiration	0.48**	0.46*	0.22	0.67*	0.63**	0.29
	(0.22)	(0.24)	(0.34)	(0.35)	(0.31)	(0.40)
_cons	-6.00***	-10.20***	-6.71***	-9.70***	-6.29***	-9.82***
	(0.83)	(0.89)	(1.16)	(1.07)	(1.09)	(1.22)
Observations	4566.00	4517.00	2228.00	2380.00	1424.00	1281.00
Log Likelihood	-829.01	-904.97	-330.80	-438.19	-350.81	-310.21

Note: Coefficients are reported and standard errors are reported parentheses.
* p < .10; ** p < .05; *** p < .01

4.5 Discussion and Conclusion

4.5.1 Discussion

Acquisitions represent one of several routes of resource redeployment (Capron, Dussauge, & Mitchell, 1998) as well as a vehicle for sourcing technology (Lungeanu et al, 2016). Our study examines under what conditions of technology performance firms make acquisitions. Prior research has reflected largely on how relative financial performance trigger acquisitions depending on whether performance meets minimum threshold of expected firm performance or not (Cyert & March, 1963). While problemistic search has largely underscored the role of unmet technology needs in technology sourcing decisions (Tyler & Caner, 2016), we also acknowledge that technology performance at or above the minimum threshold can lead to the pursuit of strategic activities that ideally would not receive organizational support in periods of poor technology performance (Cyert & March, 1963).

In this regard our findings are in consonance with prior findings as firms above technology aspiration levels engage in related acquisitions in search of future technology projects. Redeploying fungible scale free resources in distant domains tend to impinge on the value of those resources (See Levinthal & Wu, 2010). Related acquisitions come across as a viable strategy as prior research has shown that it is not only a low risk endeavour but also out performs unrelated acquisitions (Levinthal & Wu, 2010; Robins and Wiersema, 1995; Rumelt, 1974). However, contrary to the notion that firms above technology aspiration levels would prefer related acquisitions, we note that these firms also engage in unrelated acquisitions as a way of seeking out diverse and novel knowledge or technology resources. This is consistent with the view that problemistic search begins with attention to local search and subsequently moves to nonlocal search depending on the distance to the unmet aspirations (Baum & Dahlin, 2007; Tyler & Caner, 2016).

While firms performing at or above technology aspiration levels can afford to engage in familiar or routine search for future innovations, firms performing below technology aspirations are often under intense pressure to restore performance to acceptable levels (Greve, 2003). In line with BTOF, this increases the risk tolerance of such firms (Wiseman & Gomez-Mejia, 1998) and they will pursue a risky differentiation strategy in order to restore performance to the status quo (Lieberman & Asaba, 2006). A differentiated strategy such as unrelated acquisitions leads to access to diverse and novel R&D projects for future technologies. Also unrelated acquisition or acquisitions in general in an environment where acquisitions are absent can lead to the emergence of a wave of mergers as other firms begin to imitate such a strategic manoeuvre. Our finding is in line with this constellation as firms below aspiration levels choose unrelated acquisitions as a means of gaining access to new resources thus triggering the onset of a merger wave.

Competitive dynamics give rise to bandwagon pressures as firms imitate rivals (Lieberman & Asaba, 2006). Leading firms such as those above technology performance aspiration levels imitate the actions of laggards such as those below technology aspiration levels. They do this to neutralize the strategy of rivals and to further entrench their dominance (Ross & Sharapov, 2015). Furthermore, technology leaders join the market for corporate control when it is perceived that they could be losing out on potential targets that could enhance their future technology performance (Abrahamson & Rosenkopf, 1993), help maintain their competitive advantage as well as market dominance (Pacheco & Dean, 2015; Ross & Sharapov, 2015). This phenomenon is captured as an imitation of rival action and occurs after the upswing of the wave when merger activities are at their zenith.

Our study makes several contributions to the field of strategy. First, we recognise the need for a differentiated competitive strategy as a driver of nonlocal search. The BTOF literature observes that firms below performance aspiration levels will seek to explore new solutions outside the firms'

core activities (Cyert & March, 1963). However, drawing upon competitive dynamics, we argue that firms below technology aspiration levels do not just seek solutions outside their core domains for new and diverse ideas but that this kind of search is motivated by the need to take actions with the goal of matching up with competitors and restoring performance to acceptable levels (Ross & Sharapov, 2015).

Second, while technology laggards may undertake significantly novel actions such as acquisitions to make up for technology gaps, the timing of such decisions and actions underlie an industry wide phenomenon. Considering that firms below technology aspirations levels engage in radically different strategic activities such as acquisitions in periods when the market for corporate control is not active, could set the stage for subsequent imitating behaviours of competitors thereby defining the emergence of a merger wave (Lieberman & Asaba, 2006; Pacheco & Dean, 2015).

Third, the BTOF asserts that firms above technology aspiration levels would ideally engage in local search for solutions that are within the core activities of their business or not seek any form of organizational change. However, combining this with insights from competitive dynamics, we predict that pursing a local search strategy should not be seen as "business as usual" or lack of organizational change. This should be conceived as a deliberate effective strategic response to redeploy underutilized resources. We note that firms below technology aspirations have the tendency to comprehensively appraise options available to them before making acquisitions as they need to succeed at it in order to restore performance to acceptable levels. As these acquisitions are been made, the need to maintain the status quo or their lead will cause firms above aspiration levels to follow social cues and assume that those acquiring may be seizing better opportunities. Being above aspiration levels does not bring any incentive to pursue a radically different strategy, so a homogenous strategy becomes apparent. Not only does this bandwagon behaviour which is observed during the period of intense acquisition activities, make it possible to neutralize the

actions of other players, it also makes it possible for leaders to deploy scale free resources efficiently to maintain their competitive advantage

Our study is not without limitations. The setup of our study is such that we examined how technology performance aspirations influence acquisitions in different product markets. This may appear as mismatch which may obscure the learning opportunities in technology based acquisitions. Future research may consider decoupling this by focusing exclusively on acquisitions in different technology classifications in order to make the learning implications clear.

4.5.2 Conclusion

Our study combines insights from the BTOF, competitive dynamics and bandwagon pressures to examine how technology aspiration gaps influence the acquisition behaviour of firms as well as the timing of acquisitions relative to the merger wave. Using a panel dataset of S&P 500 firms we find support for our predictions that increases in technology performance above aspiration levels are positively associated with local search in the form of related acquisitions especially during the peak of the merger wave. Our results also support the prediction that increases in the distance of technology below aspiration levels are positively associated with nonlocal search or unrelated acquisitions which also signals the start of a merger wave.

Chapter 5

Conclusions

The aim of this paper is to develop a better understanding of the influence of family ownership on M&As and the effect of such M&As on innovation. The three chapters of the dissertation address this by critically reviewing the relevant literature and in the process identified research gaps. In the next step the questions that arise are empirically examined.

5.1 Overview of Main Findings and Implications

5.1.1 Firm Acquisitions by Family Firms: A mixed Gamble Approach.

It is widely accepted that family firms follow different strategic considerations in their M&As decisions. The purpose of chapter 2 is to understand how these differences in strategic goals impact the decision to engage in M&As. The chapter achieves this by investigating the conditions under which family firms are more likely to engage in M&As.

The BAM for years has been the commonly used theoretical framework to analyze the decision of family firms to engage in M&As. The BAM suggests that FF are loss averse with respect to their socioemotional wealth and willing to preserve that at the expense of economic performance (Gomez-Mejia et al, 2010). Furthermore, it suggests that family firms are only willing to engage in M&As if their financial performance is under threat. Under the BAM assumptions family firms are expected to engage less in M&A transactions than non-family firms (Shim & Okamuro, 2011, Caprio et al., 2011). However, perspectives from the mixed gamble approach departs from the BAM and makes it possible to consider situations of potential gains as well as losses to SEW. Following this we derive and find empirical support for the predictions that family firms are more likely to engage in related acquisitions than non-family firms. This effect is much higher when

family firms are performing above their aspiration levels. Also between family firms that are financially stressed or below aspiration levels and those above aspiration levels, we find that those above aspiration levels are more likely to engage in M&As than those who are financially less endowed.

5.1.2 Firm Post-Acquisition Innovation and Merger Waves: The Influence of Family Ownership

Following Chapter 1 which provides empirical support for the involvement of family firms in M&As, the purpose of Chapter 2 is to empirically examine whether family firms become more innovative than non-family firms after M&As. This is done against the background that mergers occur in waves such that a firm's position in the wave impacts access to potentially beneficial targets for post M&A innovation performance (McNamara et al, 2008).

Family firms are endowed with distinct resources such as organizational social capital (Acquaah, 2016), patient financial capital, survivability capital which all support long term innovation (Sirmon & Hitt, 2003; Kang, 2000). Due to the sense of care and extensive support offered by family firms (Eisenberger, et al, 2001; Konig et al, 2013), their employees feel a sense of reciprocity especially during difficult times and offer support for organizational goals such as during post M&A integration (Cennamo et al, 2012; Wayne et al, 1997).

Drawing on the resource based view, the paper argues that family firms are more able to efficiently appropriate target resources and reconfigure them through their internal processes for future innovation, thus becoming more innovative than non-family firms after acquisitions. The paper finds empirical support for the prediction that acquisitions conducted during the upswing of a merger waves are more valuable to family firms and are positively associated with innovation than for non-family firms.

5.1.3 Distance to Technology Aspiration Levels and the Choice of Acquisition Targets in Merger Waves

Chapter 4 is motivated by the findings in Chapters 2 and 3 which are all about family firms. Chapter 4 presents an opportunity to examine if the dynamics about the involvement of family firms in M&As apply in a different context where no distinction is made between family and non-family firms. Thus the purpose of Chapter 3 is to investigate how technology aspiration gaps influence the search behaviour of acquiring firms to engage in different types of acquisitions. As mergers occur in waves, the timing as well as the type of acquisitions are influenced by external competitive and bandwagon pressures depending on whether the acquiring firm is above or below technology performance aspiration levels. The empirical results support the prediction that increases in the distance of technology performance above aspiration levels are positively associated with related acquisitions especially during the peak of a merger wave. Also, increases in the distance of technology performance below aspiration levels are positively associated with more unrelated acquisitions and acquisitions in general which defines the start of a merger wave.

5.2 Implications of the study

This study adds empirical evidence to prior findings about the involvement of family firms in M&As. Prior studies argue that family firms are reluctant to engage in M&As due to loss aversion and the desire to retain control and preserve SEW (Gomez-Mejia et al, 2018). This thesis highlights the role of firm level performance especially in decision making regarding M&As. Thus suggesting that family firms are simply not reluctant to engage in M&As but that a firm's financial performance above aspiration levels plays a decisive role in influencing a positive decision towards M&A transactions. Additionally this questions the basic assumption of the BAM and suggests the mixed gamble approach as a better theoretical framework for understanding the strategic actions of large family firms.

Furthermore, the study highlights the importance of understanding the motives of firms for engaging in M&A transactions (Worek et al, 2018). It has been noted that while financial performance is said to be the main motive of M&As (Haleblian, Devers, McNamara, Carpenter, & Davison, 2009; McNamara, Haleblian, & Dykes, 2008), resource redeployment (Uhlenbruck, Hitt, & Semadeni, 2006), intellectual property rights, access to new technologies (Kotlar et al, 2013) etc. are other documented goals for which firms engage in M&As. It goes to show that only upon a better understanding of the motives of M&As will scholars be better placed to adequately measure post M&A performance implications of M&As.

5.3 Limitations and Suggestions for Future Research

This study is not free of limitations. There are common limitations that cut across the three chapters of the dissertation especially in relation to the operational definition of family firms as well as the dataset.

One limitation that this study shares with many others is lack access to all information that was needed. For instance, the analysis is limited to a binary measure of family ownership which was obtained from the BusinessWeek Magazine. The difficulty in obtaining continuous measure of family ownership has made the practice of using a binary variable common in family firm studies (Gomez-Mejia et al, 2014; Gomez-Mejia et al, 2010). While the focus has been on showing the differences of the type of firm ownership (family firms versus non-family firms), future studies may investigate the levels of ownership and how that influence the acquisition behaviour of family firms. Furthermore, the 5% ownership used in the thesis is also a limitation. Higher levels of ownership may occasion different acquisition behaviours family firms. There is also concern about the possibility of over estimating the number of firms identified as family firms given the small ownership stake used.

Data on whether the family firms in the sample are multiple generation firms was not also available. Future studies may consider unpacking this to see how these dimensions affect the results observed in this study.

Also, the family firms in this study are acquirers. There was no information on the family ownership status of target firms. It would be interesting to consider the influence of target family firms on the likelihood of acquisitions as well as the innovation outcomes of an acquirer that is also a family firm.

Furthermore, it would be very interesting to have more detailed information about decision processes within the firms. Such information is, however, difficult to collect, especially for large sample studies. Hence, this dissertation accepts that the study has to be seen as complementary to qualitative studies that may have a deeper look into the processes of strategic decision making in family firms (e.g. Kumeto, 2015). In a similar vein, the objective of firm acquisitions cannot be observed. So the study follows prior literature by assuming that related acquisitions are to some extent motivated by the aim of related diversification (e.g. Anderson & Reeb, 2003a). It is acknowledged that this is not a perfect measure, but believe that this is the most suitable measure available.

Another potential limitation is that the study focuses on the S&P 500 firms. These firms are large and well performing and, hence, have access to resources necessary for engaging in firm acquisitions. This implies that the results may not be generalizable to small and medium-sized firms. The results may challenge prior findings that suggest that firms in a loss frame are less likely to engage in acquisitions as such. These results may be explained by a lack of resources for acquisitions for samples of small and medium-sized firms rather than by the position of the firms vis-à-vis their aspiration level.

Another avenue for future research would be to investigate the importance of irrational determinants for the decision to acquire another firm. Since Cyert & March (1963) it is known that many firm decisions are irrational (Martynova & Renneboog, 2008; Harford, 2005) and an investigation into what extent this applies to family firms and non-family firms in the market for corporate control would be of great interest. It is believed that an investigation of irrational motives would be an interesting topic for a case study.

While patent counts are accepted in the innovation literature as a measure of innovation (Hagedoorn & Cloodt, 2003), it is also known that many patentable inventions are not patented for strategic reasons and may not accurately gauge the knowledge base of firms (Griliches,1990). Thus patents are regarded as just a part of a whole of the outcome of a firm's innovation activities (Jaffe et al.1993). To mitigate this future studies may focus on specific industries and explore the contingencies within these specific industries that impinge on patenting of inventions.

With regards to chapter 4, the setup of the study is such that it examines how technology performance aspirations influence acquisitions in different product markets. This may appear as mismatch which may obscure the learning opportunities in technology based acquisitions. Future research may consider decoupling this by focusing exclusively on acquisitions in different technology classifications in order to make the learning implications clearer.

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Appendices

APPENDIX 1

TABLE 2: Correlations

	Variables	1	2	3	4
1	Acquisition dummy	1.00			
2	Upswing acquisition	0.71	1.00		
3	Peak acquisitions	0.61	-0.04	1.00	
4	Downswing acquisitions	0.26	-0.02	-0.02	1.00
5	Related acquisition 4 digit	0.51	0.31	0.39	0.11
6	Upswing related acquisitions 4 digit	0.34	0.48	-0.02	-0.01
7	Peak related acquisitions 4 digit	0.35	-0.03	0.58	-0.01
8	Downswing related acquisitions 4 digit	0.13	-0.01	-0.01	0.49
9	Unrelated acquisition 4 digit	0.76	0.57	0.44	0.18
10	Upswing unrelated acquisitions 4 digit	0.55	0.78	-0.04	-0.02
11	Peak unrelated acquisitions 4 digit	0.47	-0.04	0.78	-0.01
12	Downswing unrelated acquisitions 4 digit	0.19	-0.02	-0.02	0.74
13	Related acquisition 2 digit	0.72	0.45	0.50	0.22
14	Upswing related acquisitions 2 digit	0.49	0.69	-0.03	-0.01
15	Peak related acquisitions 2 digit	0.47	-0.03	0.77	-0.01
16	Downswing related acquisitions 2 digit	0.21	-0.01	-0.01	0.79
17	Unrelated acquisition 2 digit	0.61	0.48	0.34	0.11
18	Upswing unrelated acquisitions 2 digit	0.46	0.65	-0.04	-0.02
19	Peak unrelated acquisitions 2 digit	0.38	-0.03	0.62	-0.01
20	Downswing unrelated acquisitions 2 digit	0.12	-0.01	-0.01	0.49
21	M&A experience	0.46	0.33	0.28	0.12
22	Firm size	0.13	0.06	0.11	0.04
23	R&D/assets	0.03	0.03	0.01	0.00
24	Patent/R&D	-0.04	-0.03	-0.03	0.00
25	Patent citations	-0.04	0.00	-0.04	-0.03
26	ROA	0.00	0.01	0.01	-0.04
27	Debt/assets	0.01	-0.01	0.02	0.00
28	Patent stock	0.14	0.04	0.14	0.07
29	Technology below aspiration	-0.04	-0.02	-0.03	-0.03
30	Technology above aspiration	0.11	0.05	0.12	0.00

TABLE 2: Correlations (continued)

	Variables	5	6	7	8	9	10	11	12	13	14	15	16	17
5	Related acquisition 4 digit	1.00												
6	Upswing related acquisitions 4 digit	0.67	1.00											
7	Peak related acquisitions 4 digit	0.69	-0.01	1.00										
8	Downswing related acquisitions 4 digit	0.25	0.00	0.00	1.00									
9	Unrelated acquisition 4 digit	0.08	0.07	0.06	-0.01	1.00								
10	Upswing unrelated acquisitions 4 digit	0.05	0.10	-0.03	-0.01	0.74	1.00							
11	Peak unrelated acquisitions 4 digit	0.08	-0.02	0.14	-0.01	0.58	-0.04	1.00						
12	Downswing unrelated acquisitions 4 digit	-0.01	-0.01	-0.01	0.00	0.26	-0.02	-0.01	1.00					
13	Related acquisition 2 digit	0.71	0.48	0.49	0.18	0.41	0.26	0.29	0.13	1.00				
14	Upswing related acquisitions 2 digit	0.46	0.70	-0.02	-0.01	0.29	0.41	-0.03	-0.01	0.68	1.00			
15	Peak related acquisitions 2 digit	0.51	-0.02	0.75	-0.01	0.25	-0.03	0.46	-0.01	0.65	-0.02	1.00		
16	Downswing related acquisitions 2 digit	0.15	-0.01	-0.01	0.62	0.12	-0.02	-0.01	0.49	0.29	-0.01	-0.01	1.00	
17	Unrelated acquisition 2 digit	0.05	0.03	0.05	-0.01	0.80	0.61	0.46	0.19	0.06	0.04	0.05	0.00	1.00
18	Upswing unrelated acquisitions 2 digit	0.02	0.05	-0.02	-0.01	0.61	0.82	-0.03	-0.02	0.03	0.07	-0.03	-0.01	0.75
19	Peak unrelated acquisitions 2 digit	0.07	-0.02	0.12	-0.01	0.47	-0.03	0.80	-0.01	0.07	-0.02	0.12	-0.01	0.58
20	Downswing unrelated acquisitions 2 digit	-0.01	-0.01	-0.01	0.00	0.20	-0.01	-0.01	0.78	0.00	-0.01	-0.01	0.05	0.25
21	M&A experience	0.24	0.16	0.16	0.06	0.38	0.26	0.23	0.11	0.33	0.23	0.22	0.10	0.30
22	Firm size	0.06	0.02	0.06	0.02	0.15	0.08	0.11	0.05	0.08	0.02	0.08	0.03	0.14
23	R&D/assets	0.07	0.06	0.04	0.01	0.03	0.03	0.01	0.01	0.05	0.05	0.02	0.02	0.01
24	Patent/R&D	-0.06	-0.04	-0.03	-0.02	-0.02	-0.02	-0.01	0.01	-0.06	-0.05	-0.04	-0.01	0.00
25	Patent citations	-0.01	0.02	-0.03	-0.03	0.00	0.02	-0.03	0.01	-0.03	0.01	-0.04	-0.02	0.00
26	ROA	0.00	0.02	0.00	-0.03	0.03	0.03	0.02	-0.02	0.02	0.03	0.01	-0.04	0.01
27	Debt/assets	-0.03	-0.04	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	0.02	-0.01	-0.01
28	Patent stock	0.05	-0.01	0.08	0.00	0.16	0.07	0.13	0.09	0.05	0.00	0.07	0.03	0.18
29	Technology below aspiration	0.00	-0.01	0.01	-0.02	-0.06	-0.03	-0.05	-0.02	-0.03	-0.02	-0.01	-0.02	-0.05
30	Technology above aspiration	0.10	0.02	0.11	0.00	0.13	0.08	0.10	0.01	0.07	0.02	0.08	0.00	0.15

TABLE 2: Correlations (continued)

		18	19	20	21	22	23	24	25	26	27	28	29	30
18	Upswing unrelated acquisitions 2 digit	1.00												
19	Peak unrelated acquisitions 2 digit	-0.03	1.00											
20	Downswing unrelated acquisitions 2 digit	-0.01	-0.01	1.00										
21	M&A experience	0.22	0.18	0.08	1.00									
22	Firm size	0.08	0.10	0.06	0.25	1.00								
23	R&D/assets	0.01	0.01	-0.01	0.02	-0.24	1.00							
24	Patent/R&D	0.00	0.00	0.00	-0.07	-0.07	-0.08	1.00						
25	Patent citations	0.01	-0.02	-0.01	-0.10	-0.37	0.20	0.02	1.00					
26	ROA	0.01	0.01	0.00	-0.09	-0.08	-0.08	-0.09	0.10	1.00				
27	Debt/assets	-0.01	-0.01	0.00	0.10	0.25	-0.37	0.07	-0.20	-0.27	1.00			
28	Patent stock	0.08	0.15	0.09	0.16	0.46	0.11	0.17	-0.06	-0.07	-0.01	1.00		
29	Technology below aspiration	-0.02	-0.04	-0.02	-0.01	0.03	-0.20	-0.20	-0.07	0.00	0.08	-0.11	1.00	
30	Technology above aspiration	0.10	0.12	0.02	0.08	0.25	0.13	0.11	0.02	-0.02	-0.04	0.63	-0.1341	1.00

APPENDIX 2

Computation of Technology Above and Below Aspiration Levels

In the first step, we subtracted the 3-year average of patent stock from the patent stock in $year_t$. The difference is normalized by the 3-year average of the patent stock. The positive values are taken as the aspiration above aspiration levels while the negative values are taken as the aspiration below aspiration levels. The following formula is used: Technology below aspiration level = (patent $stock_t$ – average patent $stock_{t-3}$) / average patent $stock_{t-3}$. To arrive at a measure for a negative aspiration levels we multiplied the negative aspiration level value by (-1) so that all values are positive. The examples in tables A & B indicate that the measure is not impacted by differences in the absolute number of patents.

TABLE A

Year	Patent count	Patent stock	Frame
6	1	2,24450625	0,23980041
5	0	1,464125	0,088130555
4	1	1,7225	0,44646606
3	0	0,85	0,378378378
2	1	1	2
1	0	0	0

TABLE B

Year	Patent count	Patent stock	Frame
6	100	124,450625	0,23980041
5	0	146,4125	0,088130555
4	100	172,25	0,44646606
3	0	85	0,378378378
2	100	100	2
1	0	0	0

Furthermore, as shown in table C & D, in order for a firm to fall below aspiration levels or become negative, the firm needs to deviate downwards by a large amount from a consistently high performance and stay below the previous performance for a longer time period.

TABLE C

Year	Patent count	Patent stock	Frame
6	0	230,233656	-0,157434402
5	0	270,863125	-0,040372265
4	100	318,6625	0,256369819
3	100	257,25	0,423236515
2	100	185	0,947368421
1	100	100	0

TABLE D

Year	Patent count	Patent stock	Frame
6	0	124,450625	-0,15743
5	0	146,4125	0,088131
4	100	172,25	0,446466
3	0	85	0,378378
2	100	100	2
1	0	0	0