경영학 석사 학위논문

Sawing Off Dead Branches: Proactive Divestiture and Innovation Performance

기업의 능동적인 자회사의 매각과 혁신 성과에 관한 연구

2018 년 8 월

서울대학교 대학원

경영학과 전략/국제경영 전공

이 경 석

Sawing Off Dead Branches: Proactive Divestiture and Innovation Performance

지도 교수 이 동 기

이 논문을 석사 학위논문으로 제출함

2018년 5월

서울대학교 대학원

경영학과 전략/국제경영

이 경 석

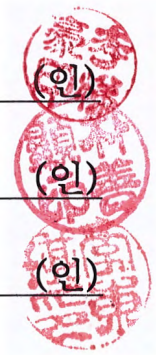
이경석의 석사 학위논문을 인준함

2018년 6월

위 원 장 이제호 (인)

부위원장 박선현 (인)

위 원 이동기 (인)



Abstract

Sawing Off Dead Branches: Proactive Divestiture and Innovation Performance

Kyung Suk Lee

College of Business Administration
Strategy and International Management Major

The Graduate School

Seoul National University

We investigate the impact of post-divestitures on innovative activities at firm-level. In an extremely competitive environment such as high-tech industries, innovation is required for a firm to achieve sustainable competitive advantage and thus survival of the organization. While divestiture has been treated as only a mirror image of M&A and merely a tool to overcome past mistakes, in a recent business practice, it has been recognized as a significant independent strategy for firms to gain growth of core competency. Consistent with recent positive-view on

divestiture, we further investigate divestiture as a proactive strategic option as opposed to a traditional perspective that illustrates divestiture as a reactive action owing to settle inner organizational problems. Research concerning the relationship between proactive divestiture and innovation performance remains unexplored and requires a close investigation. To explore such relationship, this study integrated research on knowledge-based view and organizational inertia and encompassed the model of financial distress in order to evaluate firm's proactive-ness. We hypothesize that proactive divestiture increases both firm's R&D intensity and number of patents. Furthermore, we propose that prior divestiture experiences and divested-unit size would moderate this relationship. Results indicate that proactive post-divestiture firms have increased in R&D inputs but not significantly in output. This relationship was more significant for input as prior experiences increased but not in output. Moreover, when divested-unit size was bigger, both R&D input and output have decreased. This study contributes to our understandings of how proactive divestiture can reinforce knowledge capacity, distant from a traditional resource-based view that, particularly, regarded divestiture as a responsive action vis-à-vis financial pressure.

.....

Keywords : post-divestiture, proactive-ness, innovative performance, relative size, prior experiences, M&A

Student Number : 2014-20409

Table of Contents

List of Tables

List of Figures

CHAPTER 1: INTRODUCTION

Divestiture increased its awareness as a strategic option (Duhaime & Grant, 1984; Montgomery, Thomas, & Kamath, 1984) since it is apprehended as an essential means to grow firm's core business and to exploit growth opportunities (Hamilton & Chow, 1993). Portfolio-management approach further highlighted the significance of divestiture as a legitimate management decision for its broad applicability in business practice despite firm's "scope, size, age, and industry background" (Gibbs, 1993; Hoskisson & Johnson, 1992; Markides, 1995; Montgomery et al., 1984). Thus, in recent years, divestiture transactions have expanded substantively as a global phenomenon. In 2009, divestiture activities increased by 15% reaching 12,000 deals worldwide compared to 2005 (Deloitte, 2010).

The interest of existing literatures on divestiture were mainly on three realms; motives of divestiture (Chatterjee, Harrison, & Bergh, 2003; Markides, 1992), determinants of divestiture transaction (Buchholtz, 1999; Dranikoff, Koller, & Schneider, 2002) and post-divestiture firm performance (Boudreaux, 1975; Dawley, Hoffman, & Lamont, 2002; Hoskisson & Johnson, 1992; Montgomery & Thomas, 1988). These studies, in general, considered divestiture as a reactive action by the firm due to poor financial performance. Divestiture was treated as a tool that is needed for firms to correct strategic mistakes in order to pursue better and stable cash flows to operate (Hoskisson & Hitt, 1990). Hayward & Shimizu (2006) argued that if any firm is

wishing to engage in divestiture, most transaction would occur in reaction to financial pressure (Kim & Roh, 2014). Similarly, Dranikoff et al. (2002) argued that when firms decide to divest in response to some sort of pressure they often do it reactively.

However, several literatures suggested that there could be a different interpretation on divestiture, urging as a proactive organizational action rather than a reactive one (Cohen, Gaynor, Krishnamoorthy, & Wright, 2007; Eisenhardt & Brown, 1999; Rose & Ito, 2005; Siggelkow, 2002). Kim & Roh (2014) argued that proactive divestiture can be executed without financial pressure and thus cannot be solely considered as a responsive action by firms. Darnall & Edwards (2006) further highlighted the importance of divesture as a proactive strategy which is a necessity to sustain firm's profitability and growth over the long term. Specifically, Peruffo, Pirolo, & Nenni (2014) argued that divestiture is suitable for starting new business initiatives, reinforcing growth and creation of firm value. Similar assertions are found in the studies of Brunetta & Peruffo (2014) and Rose & Ito (2005) that divestiture can improve firm's innovation process as a proactive decision, which is practical for firms to engage in new business tasks or promote further growth.

Despite alternative interpretations on divestiture in the proactive perspective, empirical studies reflecting this view are rare. Most of finance and strategic management studies were using financial variables such as accounting (return on sale or return on assets) and market (Jensen's Alpha, Treynor or Sharpe Ratio) measures (Brauer, 2006) as post-divestiture performance, as they were based on the

traditional view of divestiture as firm's reactive action. Thus, it seems evident that proactive market-oriented performance measure such as innovation (Narver, Slater, & MacLachlan, 2004) was not given an adequate attention as a key resulting variable of divestiture. Contrast to traditional viewpoint that firms participate in response to financial pressure, we extend this line of research by asserting that firms engages in divestiture for increasing innovation performance to be a proactive transaction. More specifically, we examine the relationship between divestiture and innovation performance via research and development (R&D) intensity and patents as innovative activities.

Furthermore, we examine how size of the business unit relative to the firm and prior divestiture experiences could influence on firm's innovative performance within firms who engaged in proactive divestiture. Through this research we expect to explore that divestiture in fact could be an efficient means to intensify knowledge-building capability to create new value for parent firms. In this line, the purpose of our study is to enlarge the scope of divestiture as a proactive transaction and to provide us with more thorough comprehension of innovation relatedness to divestiture phenomenon.

This article is thus structured as follows. First, we review the literature on divestiture based on traditional view of reactive action and alternative view as a proactive action, with a focus on two theories (resource-based view and knowledge-based view) that could explain proactive divestiture. Second, we develop theoretical model and hypotheses that explore the relationship between post-divestiture and innovation performance based on the alternative perspective on

divestiture as a proactive action. To do so, we perform empirical test on R&D intensity, patents, size of the business unit and prior divestiture experiences to show how innovation performance is affected by divestiture. Finally, at the last section, we illustrate results and discussions.

CHAPTER 2: THEORY AND HYPOTHESES

Traditionally, divestiture has been more focused to be a financial mechanism or a tool in order to improve firm's efficiencies (Peruffo et al., 2014). Therefore, firms divest business in order to reduce debt and reconfigure their portfolio of assets (Markides, 1992). Markides & Singh (1997) further states that by understanding divestiture as only a means of retreating previous errors that firm made would diminish divestiture's true meaning as a strategically purposeful action. These were considered reactive action by the firms since divestiture was means to correct error to improve efficiency of the firm and thus re-stabilize stream of cash flow. Dranikoff et al. (2002), in their study of 50 of the largest divestiture transactions, they found that between 1998 and 2002, over three-quarters of them engaged in reactive divestiture. Majority of them executed after long delays when such transaction turned out to be inevitable for firms to resolve problems. Ravenscraft & Scherer (1989) further supported this by discovering that divested units were suffering from below average returns for seven years before they were sold.

Reactive response of firms engaging in divestiture could be because of reluctance, since a business unit may generate stable cash flow and thus bring market advantages to the current firm (Dranikoff et al., 2002). Therefore, this belief within the firms increases the likelihood that those firms perform divestiture at the last moment when financial pressure becomes obvious and hinders overall performance of company. Jensen (1989) argued that financial pressure encourages firms to promote efficiency enhancing activities in order to retrieve from decreasing firm performance. Furthermore, Whitaker (1999) argued that "financially distressed firms frequently undertake major asset divestitures to raise cash to satisfy creditor demands or more efficiently structure the operations of the firm." These notions imply that firms which divest their part of business are reactive response in order to resolve financial problems rather than executing as a proactive action. This institutionalized mechanism within the firm may lead to appraise firms to support the current way of doing things (Huff & Thomas, 1992; Louis & Sutton, 1991) including divestiture.

However, Dranikoff et al. (2002) argued that firms being reactive towards divestiture could result costs that could be inflicted on both the entire firm and the business itself. Specifically, for the post-divestiture companies, it can discourage firms from its' wants to generate new and high-growth businesses. Therefore, alternative view of divestiture was introduced to explain the process that firms engage regardless of financial pressure. Proactive divestiture is defined as "Divestiture initiated in advance in more positive performance context." while reactive divestiture is "The one

conducted in response to some kind of pressure such as low profitability." "The key standard that distinguishes reactive and proactive divestitures is whether the firm initiated divestiture under financial pressure or not." (Kim & Roh, 2014). Thus, firms engaging in divestiture to re-configure and re-construct their existing assets or resources to promote further growth of the firm had to be considered proactive action, since its purpose is to strengthen its core business and exploit opportunities in order to gain sustainable competitive advantage regardless of financial pressure. Graebner & Eisenhardt (2004) argued that business sectors that are divested from parent firms are considered to be "unimportant, unsuccessful, and reluctant" compared to acquiring firms. Therefore, divestiture promotes growth of the firm and the re-creation of firm-value for survival of the parent company (Brunetta & Peruffo, 2014). From the survey by Hamilton & Chow (1993) to CEOs, divestiture was reflected as a viable means to grow firm's core business and to exploit growth opportunities. More recent survey highlights that in a business practice, divestiture is a significant activity in order to refocus and grow firm's core business (Accenture, 2004, 2013; Dranikoff et al., 2002). Aforementioned studies imply that divestiture can be viewed as proactive action in order to strengthen firm's core business and exploit opportunities to gain competitive advantage rather than fixing past mistakes in order to re-gain stable cash flow as majority of traditional studies viewed. This is also consistent with more general view of the literature on resource-based view, particularly the subject on Barney's (1991) introduction of sustainable competitive advantage. This is because

divestiture, through reconfiguration process, promotes firm's resources to be valuable, rare, and non-imitable since process of divestiture improves efficiency of the firm to more focus on its unique competency.

Reconfiguration of resources is not the only advantage that proactive divestiture could improve firm's sustainable competitive advantage over rivals. Knowledge-based view also suggests that accrual of knowledge can aid firms to further growth since such process makes firms to identify and exploit new opportunities (Penrose, 1959). Kogut & Zander (1992) argued that a firm could be considered as huge depositories of knowledge. Thus, accumulative knowledge and learning could be considered as a basis for sustainable competitive advantage (Grant, 1996; Kogut & Zander, 1992). In a similar fashion, divestiture has been mentioned in several international literatures as an activity which can make firms to finance more on internal knowledge or R&D by further investigating and seeking for latest information outside any capabilities that the firm already has and thus improve firm's sustainable competitive advantage (Moschieri & Mair, 2011). Furthermore, firm-level theories regarding to technological change argues that firm's innovative output is affected by accumulation of knowledge (Ahuja & Katila, 2001; Griliches, 1984, 1990; Henderson & Cockburn, 1996). Hoskisson & Johnson (1992) argued that divestiture and innovation performance are proved to be in a positive relationship among corporate control literature, since divestiture can make firms to re-allocate assets and resources focusing on R&D activities which in turn improve process of innovation

and thus results in firm's competitive advantage (Capron, 1999; Jensen, 1988).

Combining the two theories, we concluded that established firms can promote poor innovation via reconfiguring process of their resources and knowledge. Indeed, innovation is dedicated from active and creative courses, which support firms to restructure internal and external resources. Put it differently, the actions that is taken by firms to reconstruct their portfolio of asset can be regarded as a means to recognize novel innovative opportunities (Capron & Mitchell, 2009).

Divestiture is considered to be the most practicable strategies to promote corporate restructuring program to refocus on their core competencies or business assets which makes it more possible for firms to observes new opportunities and thus push forward innovative activities. In this viewpoint, proactive perspective of divestiture highlights the prevailing positive effect of divestiture on innovation. As firms gets bigger in size and holds more separate businesses, it is difficult for managers to take control effectively. This results in lessening the value of the firm and thus seeks to reconsolidate its assets toward core competency by divesting unrelated business sectors (Johnson, 1996). Furthermore, divestiture results in excess of financial asset which could be utilized to promote developing new products and activities (Hoskisson & Johnson, 1992). In short, alternative viewpoint on divestiture implies that divestiture increases the depth of innovation level. Thus, as aforementioned studies have suggested, increasing the slack resources to be invested in R&D and redesigning of resources in order to explore and exploit new

opportunities, accumulation of knowledge and innovative capabilities will direct firm resources headed for enhancing any knowledge and technological capacity that the firm already possesses.

Meanwhile, within firms who perform proactive divestiture, we expect that there could be dissimilar results regarding the number of prior divestiture experiences and relative size of the divesting unit. Prior divestiture experiences may influence innovative activities since routines and recognized arrays of beliefs and behaviors can result in organizational inertia which promotes firms to carry out way things are (Hannan & Freeman, 1984; Nelson & Winter, 1982). These institutionalized mechanisms may provide lack of experiences regarding to divestiture and in return insufficient commitment of innovative activities (both input and output) by the firms compared to those who have past involvements on such transactions. Furthermore, business unit size is crucial for firms when preparing divestment judgements (Grinyer & Yasai-Ardekani, 1981; Koch & Fox, 2014). This may due to intensive commitment that have been put to the business unit involving allocation of capital such as R&D financing or labor force (Duhaime & Baird, 1987). Therefore, size of the divesting unit is also an important variable that is profound to organizational decision making. Based on a review of the existing studies we anticipate that two variables; prior divestiture experiences and size of the business unit would moderate the effects on the relationship between proactive-divestiture and innovation performance and are needed for closer attention to deliver better comprehending of the specific features of proactive-divestiture phenomenon as a whole.

2.1 Proactive Divestiture and R&D Inputs

Technological know-how inside the company and in-house R&D are considered to be vital factors of innovation process (Campisi, Mancuso, & Nastasi, 2001; Canzano & Grimaldi, 2012). Technological know-how and R&D promote firms to generate, foster and convert novel knowledge to develop new products or processes (Graves & Langowitz, 1996; Keizer, Dijkstra, & Halman, 2001; Landry, Amara, & Lamari, 2002; Li & Simerly, 2002; Sternberg & Arndt, 2001). Thus, improvements in technological know-hows amplify launching new investments and likelihood of creating internal innovations rather than earning from outside sources (Beneito, 2003; Hitt, Hoskisson, & Kim, 1997; Love & Roper, 1999). This process of innovation effort is needed for firms since the optimum utilization of resources and knowledge results in the profitability of the firm as firms could be reflected as "huge depositories of knowledge" (Kogut & Zander, 1992).

Moreover, accumulation of knowledge can benefit firms to promote further growth as such procedure creates opportunities for firms to recognize and to discover novel opportunities (Burgelman, 1988; Penrose, 1959). Therefore, not only what firms acquire and hold is important but ways to utilize those resources and assets in order to develop new products and processes have been also important (Franko, 1989). Capron (1999) also argued that if asset divestiture could be entrenched in broader scope of corporate reformation efforts, it can promote development of innovation (Beers & Sadowski, 2003).

Divestiture is considered to be one of the most effective perspective regards to promoting reconfiguration of strategy, which

leads to innovative input since it can encourage firms to finance more on R&D activities (Moschieri & Mair, 2011). These points may lead to explain why reconfiguring resources is important for innovation as such process promotes firms to utilize resources in different and new ways for firms to engage in innovative activities (Karim & Mitchell, 2004). Aforementioned literatures lead us to argue that divestiture could further push forward innovative input activity by firms which could be extended to be argued through proactive divestiture.

Hypothesis 1: Proactive divestiture has a positive relationship with innovative activities, specifically R&D input (R&D intensity).

2.2 Proactive Divestiture and R&D Outputs

Firms engaging in acquisition may interrupt internal knowledge development or R&D activities (Burgelman, 1988). This is because, despite how such process is financed, managerial distribution of residual resources might turn out to be constrained, instigating managers to omit other investment chances such as R&D opportunities (Harrison, Hitt, Hoskisson, & Ireland, 1991). In a similar fashion, Hitt, Hoskisson, & Ireland (1990) argued that acquisition process and innovation have substitution effect as managerial devotion is further dedicated to size building rather than allocating resources, which result in development of novel products and technological procedures in line with marketplace opportunities. Moreover, R&D resources have to be treated efficiently in order for new products or process ideas to be established in to patentable products or processes (Burgelman,

1988; Harrison et al., 1991). However, acquisition results in lack of managerial commitment for such development. On the other hand, divestiture opposed to acquisition promotes growth of the firm and the re-creation of firm-value (Peruffo et al., 2014) through reconfiguration of assets and resources, resulting managerial commitment to be more focused on internal knowledge or R&D developments (Jensen, 1988). While firm-level theories argue that firm's innovative outcome is influenced by accrual of knowledge (Ahuja & Katila, 2001; Griliches, 1990; Henderson & Cockburn, 1996) as mentioned earlier, we argue that as divestiture provide opportunities to increase the innovative input activities, it can also have positive effect towards the outcome of the innovation process.

Aforementioned literatures lead us to argue that divestiture could further push forward innovative output activity by firms, which could be extended to be argued through proactive divestiture.

Hypothesis 2: Proactive divestiture has a positive relationship with innovative activities, specifically R&D output (Number of Patents).

2.3 Moderation of Prior Divestiture Experiences

When firms make organizational decision, prior practices and habitual routines perform vital role (Cyert & March, 1963; Nelson & Winter, 1982). Prior experiences on divestiture may assist firms to engage in divestiture by instituting routines (Shimizu & Hitt, 2005). On the contrary, with firms which have little or no divestiture experiences may view divestiture as irrational decision since it violates past

routines of the firm (Amburgey, Kelly, & Barnett, 1993; Hannan & Freeman, 1984). Particularly, parent firm's prior divestiture experiences have substantial effect on its judgement on whether to divest or not. This is because, as parent firms have sufficient divestiture experiences, the managers are able to well apprehend not only the advantage and disadvantage of a divestiture, but also organizational procedures concerned with implementation (Kim & Roh, 2014). In the similar context, firms engage in internal and external knowledge acquisition activities since marginal return of one action improves other activities simultaneously (Cassiman & Veugelers, 2006). Thus, internal know-how could improve marginal return to external know-how as accumulation process goes on. This concept can also be explained by absorptive capacity, which is defined as an ability to assimilate and recognize the new valuable information in order to implement on firm's operation based on prior related knowledge that the firm already has (Cohen & Levinthal, 1990). As firms accumulate absorptive capacity from one point to another, it is more efficient for firms to acquire and assimilate as the event occurs.

Therefore, better understanding permits firms to evaluate and implement technologies, which would further enhance the new technological development. By combining aforementioned studies, they indicate that firms may accrue technological know-how or invest in R&D as number of divestitures occurs (Makri, Hitt, & Lane, 2010).

As mentioned above in two hypotheses divestiture allows and promotes innovative activities on both input and output. Accumulation of divestiture thus allows firms to stimulate internal know-how as

firm's overall R&D capacity may increase, because of internal knowledge acquisition activities, which could improve firm's overall prospective knowledge development.

Hypothesis 3: Positive relationship between proactive divestiture and innovation performance (both input and output) becomes stronger as the number of prior divestiture experiences increases.

2.4 Relative Size of the Divested Business Unit

Within numerous studies of firm-level, size of the business unit has been understood as a vital factor (Cook & Rozeff, 1984; Lioukas & Xerokostas, 1982). This is because size of the unit may affect strategy-structure linkage (Grinyer & Yasai-Ardekani, 1981), involvement in firm's decisions (Koch & Fox, 2014) and firm performance (Lee & Madhavan, 2010). These influences occur since business unit itself could be connected via psychological and financial bond with parent firms (Duhaime & Baird, 1987). Furthermore, complex affiliation amongst numerous divisions and individuals makes firms more demanding to detach business unit as it generates problems among remaining units (Tushman, Virany, & Romanelli, 1985).

Therefore, these bonds cause firms to hesitant to divest part of their business unit. Particularly, divesting a large unit could turn out to be more difficult since the procedure itself is potentially more complicated and less routinized compared to divesting a small unit. In very few instances, it has a large corporation systematically divested

itself of a major division as part of a planned strategy (Leontiades & Tezel, 1980). Moreover, Lovejoy (1971) asserted that companies would divest units, which are considerably less in size. As large units have greater possibility of close relationship with firm's core business, high investment (e.g. R&D funds), and managerial effort their divestment would result in discontinuity of crucial supply relationships and difficulty of replacement (Duhaime & Baird, 1987; Shimizu & Hitt, 2005). Thus, in a firm perspective, it would be more appealing to divest smaller unit, since resource commitment and effects on the remaining units would be smaller. Consequently, we anticipate relative size of the divesting unit to moderate the relationship between proactive divestiture and innovation performance.

Hypothesis 4: Positive relationship between proactive divestiture and innovation performance (both input and output) is negatively moderated by the relative size of the divesting unit.

CHAPTER 3: DATA AND METHODS

3.1 Sample Selection

Our sample was derived from U.S. based and publicly held firm, which have engaged in divestiture between the years of 2006 to 2011. Specific time period was chosen based on previous studies (Bergh, 1998; Ilmakunnas & Topi, 1999; Latham, 2009) argument that firms were more likely to engage in divestiture in order to sell their less

related business as a strategic goal in economic downturn. As main reason for high level of divestitures between the years of 2008 and 2009 were considered economic downturn (Accenture, 2013; Deloitte, 2010), we proposed time window of ±2 years of economic downturn in order to better apprehend proactive divestiture.

This study constrained the sample to U.S. based public firms in order to make certain that we can retrieve financial information on divested units and its parent firms and circumvent any possible perplexing issues, for instance different country risks and legal or regulatory matters regarding to divestiture. Moreover, distant from previous studies, which limited sample lone to the units which were formerly acquired, Brauer (2006) has measured entire division divestitures comprising business units that the parent firm initially started with. Furthermore, firms' performance less than US$ 50 mil. in terms of revenue, were removed from this study with the purpose of eliminating any small firms' effects (Hoskisson, Johnson, & Moesel, 1994) that might occur.

Particularly, high-tech firms were chosen in this study since R&D and innovation is considered vital source for companies' competitiveness and survival as such industries are portrayed by short product life cycles and high uncertainty that leads to severe competition (Qian & Li, 2003). More specifically, in an exceptionally competitive situation (e.g. speedy pace of technical change) such as high-tech industries, survival and sustainable advantage of high-tech firms resides on R&D capacity (Duysters & Hagedoorn, 2000; Thornhill, 2006; Wan, Ong, & Lee, 2005). Thus, it seems evident that

high-tech firms require R&D enhancement and innovative output to accomplish these objectives (Wang & Wang, 2012). Moreover, as numerous reports demonstrate that divestiture were vigorous in high-tech industries, it seemed more appropriate to restrict sample based on high-tech firms.

In previous high-tech divestiture studies (Benou, Madura, & Ngo, 2008; Reuer & Shen, 2004), firms in SIC 28 (biotechnology and manufacturing), SIC 35 (industrial and commercial machinery and computer equipment), SIC 36 (electronic and other electrical equipment and components, except computer equipment manufacturing), SIC 38 (measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks manufacturing), SIC 737 (computer programming, data processing, and other computer related services) have been commonly observed..

Involving with sample selection, we gathered entire divestiture transactions that had been competed between the years of 2006 through 2011. U.S. based publicly held parent firms, which possessed operating revenue exceeding US$ 50 mil. and industries in SIC 28, 35, 36, 38, 737 were found from “Bureau van Dijk Zephyr” database resulting total of 392 deals. Subsequently, we collected financial information including R&D expenditure and total revenues from COMPUSTAT data. In this process we have removed 140 deals because of lack of information. Then, so as to calculate number of patents, data were collected from “USPTO” database. Final assessment of eliminating samples with omitted data yielded with final

sample size of 149 transactions with 117 equivalent parent firms.

3.2 Dependent Variables

R&D intensity. R&D intensity was calculated by dividing R&D expenditure by total revenues (i.e., parent firm's). This measure is consistent with the measure that Hoskisson & Johnson (1992) have applied to calculate R&D intensity. Both of R&D expenditure and total revenues were found on "Wharton Research Data Services" using COMPUSTAT data.

Number of patents. In the case of innovation output, it is well known that patent represents the amount of applicability throughout scientific and technological fields. It is identified as a vital means to have important role in demonstrating innovative performance (Hagedoorn & Cloodt, 2003). Furthermore, Harrison et al. (1991) argued that firms engaging in acquisition have negative relationship with innovative output. This notion provides that divestiture could have a positive influence on firm's innovation outcome. Thus, examining innovative output by number of patents seemed necessary.

Patent indicates the magnitude as an innovation output created by firm's R&D input which is developed from the existing states of know-how (Valentini, 2012). Consequently, the outcome of the innovative activity can be measured by number of patents that represents newly exploited inventions (Ornaghi, 2009). Number of patents was collected from "U.S Patent and Trademark Office" database. They were calculated as average number of annual patents after divestiture was completed for 3 years

3.3 Independent Variables

Firm's Proactive-ness. We reaffirm that proactive divestiture is defined as "Divestiture initiated in advance in more positive performance context" while reactive divestiture is "The one conducted in response to some kind of pressure such as low profitability." (Kim & Roh, 2014). As we discriminate two constructs through financial pressure, it is vital to understand whether firms were under any financial pressure and if they did the amount of pressure.

Financial distress is defined as "The situation in which the firm's cash flow is insufficient to cover its current obligation." (Whitaker, 1999; Wruck, 1990) in finance research. Jensen (1989) argued that such distress drives firms to engage in efficiency-enhancing activities in order to retrieve from poor firm performance.

Moreover, Whitaker (1999) concluded that "a substantial portion of the effects of financial distress are incurred well prior to default since much of the loss in firm value occurs during the years preceding default or bankruptcy rather than after" and "financially distressed firms frequently undertake major asset divestitures to raise cash to satisfy creditor demands or more efficiently structure the operations of the firm." The explanation of financial distress can be interpreted as financial pressure in strategic management studies regards to feeling of reactive divestiture of vendors. Thus, we also implement the equal measure that majority of finance researchers have applied to compute financial distress (Kim & Roh, 2014; Whitaker, 1999) as below;

Proactive-ness = [cash flow] – [current maturities of long-term debt]

The positive result denotes how much the firm was distant from financial distress which illustrates level of proactive-ness, On the other hand, negative results show how much the firm was under financial pressure which indicates the level of reactiveness.

Relative unit size. Relative unit size to a parent firm was computed by dividing the transaction value by its parent firm's total asset.

Prior divestiture experiences. The prior divestiture experiences were counted until the year of divestiture was competed by parent firms. As prior experiences were frequently calculated as 3-year window (Amburgey et al., 1993; Shimizu & Hitt, 2005) we have also used this measure to calculate prior experiences.

3.4 Control Variables

We have included several control variables in order to exclude any possibility that might alter our explanations in current study. Following variables have been cautiously selected by reviewing prior researches on divestiture, M&A and corporate governance, which were recognized as relevant. 7 variables are as follows:

Firm size. Firm size has been recognized as an influential feature that increases divestiture transactions (Bergh, 1998; Hamilton & Chow, 1993; Sembenelli & Vannoni, 2000). Firm size was calculated by taking the logarithms of the number of employees (Hoskisson et al.,

1994).

Firm age. Firm's age is known to have substantial effect on generating organizational inertia (Hayward & Shimizu, 2006), which may influence divestiture process. Thus, we have included in control variable. Firm age was measured by deducting the year when the firm was established from the year when divestiture occurred.

Deal duration. Goldie (2014) argued that the deal duration for divestiture could arouse riskiness of the transaction and thus influence the responsiveness of the selling company. Majority of past studies on divestiture considers the possibility of divestiture and duration of its process was not a vital aspect. However, as this study is focused on timing of the divestiture, we have included deal duration in control variable.

High-tech industries. The selling firms or vendors in this study are all resides in high-tech industries. However, as sample firms are consisted of 5 separate SIC code industries, these codes may influence differently for the result of this study (Benou et al., 2008; Siegel & Hambrick, 2005). Therefore, five industries were treated as dummy variables which were regarded as two digits (SIC 28, SIC 35, SIC 36, SIC 38, SIC 73).

Divested year. Each divested year (2006-2010) were included as dummy variables in order to control for overall longitudinal tendencies and undetected heterogeneity (Gulati, Lavie, & Singh, 2009; Mariotti & Piscitello, 1999).

Relative size. Relative size of the business unit was controlled because of their significance and visibility of the both acquisition and

divestiture (Duhaime & Baird, 1987).

Deal value. As divestiture phenomenon can be considered opposite of M&A, we also have included deal value as control variable since size of the transaction is normally treated as control variable in empirical observations within M&A studies for performance outcome (Capron, 1999; Seth, 1990a, 1990b).

3.5 Model Estimation

All variables, with the exception of divested years and SIC industry, were continuous and some variables, such as relative size, number of divestiture experience, and proactive divestiture, were centered to test the moderating effect. We then analyzed the sample using ordinary least squared (OLS) regression analysis when the dependent variable is R&D intensity as an innovation input. Meanwhile, when the dependent variable is the number of patents as an innovation output, we adopted negative binomial regression. Since the number of patents is highly likely to follow the Poisson distribution, a negative binomial regression is used to estimate models of counts (occurrences) of an event (Wooldridge, 2002). In this paper, the probability that the number of patents occurred Y_j times is as follows:

$$Prob(Y = yj) = e^{-\lambda_j}\lambda_j^{Y_j}/Y_j!,$$

where $\lambda_j = exp\,(\sum B_i X_{ij})\, exp(u_j)$ *and* $u_j \sim Gamma, 1/\alpha$ *for observed counts of patent* Y_j *with covariates* X_i *produced by* $firm_j$.

CHAPTER 4: RESULTS

In Table 1 and 2, descriptive statistics and correlation results are displayed. In Table 1, most coefficients of correlation are significant ($p<0.05$) using R&D intensity as a dependent variable. In Table 2, the similar significant patterns are described. Firm size, number of divestiture experience, and proactive divestiture are positively significant and correlated with dependent variables. Furthermore, we check out the multicollinearity with VIF (Variance Inflation Factor) and it turns out that the mean VIF was 2.25 ranging from 1.49 to 3.12. Since cutoffs of VIF are less than 10, the model is less likely to have a multicollinearity problem (Hair, Black, Babin, Anderson, & Tatham, 1998).

Insert Table 1 and 2 about here

This study has used both ordinary least squares and negative binomial regression to test the hypotheses. Total of eight models were investigated in Table 3. Model 1 and 2, the baseline model, comprised of R&D intensity and number of patents regressed on the control variables only; Model 3, the moderating effects model for the R&D intensity, comprised the addition of interaction term of proactive divestiture and number of divestiture experience; Model 4, the moderating effect model for the number of patents also comprised the

addition of interaction term of proactive divestiture and number of divestiture experience; Model 5, the moderating effect model for the number of patents comprised the addition of interaction term of proactive divestiture and relative size; Model 6, our last moderating effect model for the R&D intensity also comprised the addition of interaction term of proactive divestiture and relative size. Model 7 and 8, the full model, regressed on the all explanatory variables.

Insert Table 3 about here

In Model 1 and 2, we regressed R&D intensity and Number of Patents on all explanatory variables such as all control variables and independent variables including RS (Relative size), NE (Number of divestiture experience), and PD (Proactive divestiture). In Model 1 and 2, PD is positively significant with R&D intensity (β_{PD}=0.440, p<0.001) whereas it is insignificant with number of patents. Hypothesis 1 is strongly supported, but hypothesis 2 is not supported. In Model 3 and 4, the moderation effect of NDE is tested and it turns out that the interaction effect is positively significant only with R&D intensity ($\beta_{PD\times NDE}$=1.147, p<0.01). Since the moderation effect of NDE on number of patents is not supported, hypothesis 3 is partially supported. In Model 5 and 6, we tested the moderation role of RS to PD on innovation performances and it turns out that each interaction effect is negatively significant. For R&D intensity, the coefficient of

interaction between PD and RS is -0.651 ($p<0.001$) while, for number of patents, it is -0.004 ($p<0.001$); therefore, hypothesis 4 is supported. In Model 7 and 8, as a full model, we regressed R&D intensity and number of patents on all explanatory variables and results were consistent with our hypotheses, except for hypothesis 2 that its significance is changed to 0.01. We plotted all significant interaction results in Figure 1, 2, and 3.

Insert Figure 1, 2, and 3 about here

CHAPTER 5: CONCLUSION AND DISCUSSION

This study was conducted based on the relationship between post-divestiture and innovation performance, which we had a particular interest and believed to have significant relevance. The analysis of our study delivers overall support for all four hypotheses. Firms were shown to increase both of their R&D intensity via divestiture process. Therefore, hypothesis 1 which demonstrated R&D inputs was supported. However, interestingly, hypothesis 2 was not supported as the number of patents showed no relationship. Thus, we were not able to find out that firms who intensively invested on R&D had a higher number of patents holding. In case of hypothesis 3, it showed a mixed supporting result that within proactive-divestiture

firms, firms with numerous past divestiture experiences performed better in innovation input activity, but not an outcome (number of patents) as we expected to increase also. Finally, hypothesis 4 was supported for the negative relationship between relative size of the divested unit and both R&D intensity and number of patents within proactive divesture firms. Consequently, we were able to confirm that in a firm's perspective, it would be more appealing to divest smaller unit, since resource commitment and effects on the remaining units would be smaller.

The result of this research provides understandings into the relatedness between corporate divestiture and innovation performance (Moschieri & Mair, 2011; Peruffo et al., 2014). Existing literatures and our analysis show how divestiture can be used as a means to truly foster innovation performance. Particularly, through our empirical study we revealed how divestiture can support R&D input (intensity) and thus promotes higher R&D output (number of patents). Furthermore, we investigated how number of past divestiture experiences and relative size of the divesting unit can moderate the result of innovation performance among post-divestiture firms.

Furthermore, this study extended the insight of divestiture as a proactive action that can be implemented free of financial pressure contrast to previous studies' assumption that divestiture was a responsive action by such distress. This notion further enlightened us to incorporate knowledge-based view in order to investigate and suggest innovation performance as an active and creative activity, which can be performed by proactive post-divestiture firms (Lee &

Madhavan, 2010; Shin, 2008). Therefore, our results suggest that divestiture does not simply occur in response to in-house problems confronted by firms. Rather it is a proactive strategy which can be implemented not only to resolve in-house problems but also to increase knowledge-base in order to improve innovation performance and thus allow firms to achieve further growth and sustainable competitive advantage.

5.1 Theoretical and Managerial Implications

The present study examined the relationship between post-divestiture and innovation performance, which is of specific interest and significance. A comprehensive review of the previous studies and an assessment of plausible inference regarding to innovative performance of judgments to divestiture demonstrates how divestiture can indeed reinforce innovative performance by firms. Particularly, we have analyzed an exhaustive empirical research to illustrate how firms can benefit to discover novel opportunities for innovation and drive for the establishment of the foundation for prospect development and innovation via divestiture. The results of present research have several crucial implications for theory vis-à-vis the function of divestiture in innovation.

First, we broadened prior works by concentrating on innovative activities of parent firms and examining the purpose and consequences of divestiture decisions. Following Brauer (2006) and Dranikoff et al. (2002) and in accordance with previous researches highlighting the significance of post-divestiture relationships between

parent and divested firms (Semadeni & Cannella, 2011), this study confirmed that proactive divestiture may lead firms to propel innovative input and output activities. This implies that if a business unit is divested in an appropriate period when a firm faces a financial distress, it may help high-tech firms leapfrog to the next step for the advanced knowledge, compared with competitors. Whilst existing realm of M&A studies has highly focused on the value creation in terms of financial performance (Shin, 2008) or innovation output (Peruffo et al., 2014) after buying deal, our study extended it to the selling deal between firms and the post-valuation of innovation. These results show that proactive divestiture can be regarded as a tool for accumulation of knowledge to observe external innovation opportunities (Bergh, Johnson, & Dewitt, 2008; Cohen & Levinthal, 1990) and for application to manufacture new product development with high technology (Makri et al., 2010).

Second, our initial outcomes are in overall coherent with studies that suggest divestitures are positively related with innovation outcome. Moreover, we have argued that divestiture is not only a mirror image of M&As, which is considered merely a tool that is need for firms to correct past mistakes or to acquire better cash flow to operate (Kahan & Rock, 2007; Montgomery et al., 1984). Rather we contend that divestiture is not a product of firm's failure, but it can result from firm's competitive advantage. Although a traditional view regards divestiture as a reactive action, we suggest that divestiture does not develop merely from reacting to the in-house risk by firms, but it can be considered as a proactive action, which can be

implemented as a strategic tool free of internal threats (i.e., financial pressure). That is, since the extent to which firms face financial distress may cause them to immediately sell their business portfolio without reconsideration of the real value, vicious cycle of refocusing is highly likely to occur even though they get paid cash in hand by selling units. In contrast, if a firm knows the "timing to sell" through a number of selling experiences, obsession with cash-flow may be mitigated (Hayward & Shimizu, 2006; Whitaker, 1999). This result may be due to the fact that a greater level of proactive divestiture with prior experience can lower inertial behavior for a firm to lose the opportunity the timing to sell and realize the true value (Cyert & March, 1963; Shimizu & Hitt, 2005); therefore, our finding called "when to sell" can contribute to the theory of "what to sell" in M&A studies.

Third, we were able to find out that prior divestiture experience and relative size of the divested unit does matter. It implies that as firms engage in more divestiture transaction and divest smaller size of the business unit, their innovative activity increases. Divestiture experience is not surprising since it has been identified when firms make organizational decision, prior practices and habitual routines perform vital role (Cyert & March, 1963; Nelson & Winter, 1982). What's interesting is that when firms divest larger unit relative to the firms, they perform closed-innovation. It is likely that both excess funding and increasing managerial resources to focus on internal inventions, post-divestiture firms will be able to further push innovative activities. Khan & Mehta (1996) found that firms may engage in divestiture in order to raise financial resources by trading

some of its assets irrespective of financial distress. Moreover, Shin (2008) asserted that successful divestiture allows firms to invest in positive-NPV projects or otherwise reallocate financial resources to exploit better opportunities. However, as our results indicate, compared to raising financial resources by divesting larger business unit, removing of such unit will cause greater negative affect on strategy-structure linkage (Grinyer & Yasai-Ardekani, 1981), involvement in firm's decisions (Koch & Fox, 2014) and thus overall firm performance (Brauer, 2006; Brauer, Mammen, & Luger, 2014).

Fourth, we have incorporated knowledge-based view to suggest innovation performance as an active and innovative activity which can be performed by proactive divestiture firms. Based on resource-based view, divestiture may widen the span of study from tangible to intangible resources and can be more focused as a mechanism though which a firm improves its complementarity with synergy (Harrison et al., 1991; Harrison, Hitt, Hoskisson, & Ireland, 2001; Makri et al., 2010) and innovative performances (Peruffo et al., 2014). Our empirical findings on relative size effect of target business unit may hint why divestiture *per se* works as a sticky resource with intangible resources. In previous studies, the main role of divestiture was a fast-cashable asset, a kind of tangible asset that is useful for a firm to exchange a business unit with financial asset. In recent days, however, several studies suggest that divestiture has played an important role in sawing off the unrelated resources that might hinder the complementarity among resource bundles. In this vein, we found that a greater size of target (divesting) unit has a negative effect on

the positive relationship between divestiture and innovative performances. It implies that, in a bigger firm, complexity may arise when a firm wanted to cut off the core resource bundle from extant resources with which are largely interwoven (Moschieri & Mair, 2011; Nesta & Saviotti, 2005). In order to develop knowledge in the long-run, therefore, it should be noted that thinning out established resources is as much important as combining resources by acquiring business units.

Lastly, we argue that practitioners can implement divestiture to revitalize their firms only if they can observe further than stigma, which is connected with divesting business units and incorporate as a crucial strategic tool (Dranikoff et al., 2002). The answer to fathom the proper timing for divesting business unit and to make develop in the period of low-growth is to act proactively and determinedly to sell units that are considered healthy but hamper the development of innovation. Divestiture should not be considered as a last resort but as an effective strategic tool that can promote firms to grow and flourish in the long run. Astute managers should divest existing business units not until long delays when such transaction turn out to be inevitable for firms to resolve problems, but to encourage to generate new and high-growth businesses. Excess funds, management times, and accompanying resources, which are unshackled via divestiture, should thus be reinvested and utilized to promote developing new products and activities. This might be considered irrational to some managers since selling an established business and going through harsh periods to start and develop new

products could be considered as unpromising gamble. However, more likely than not, such transaction indicates financing in appealing growth opportunities that no others can foresee. Invention and destruction are inevitable as neither can thrive without including the other.[1]

[1] Acknowledgements: This study was presented at 2015 Strategic Management Society (SMS) Annual Conference and 2017 Academy of Management (AOM) Annual Meeting.

<TABLE 1>

Descriptive statistics using R&D intensity as a dependent variable (N=149)

Variables		Mean	S.D.	1	2	3	4	5	6	7	8
1	R&D Intensity	302.17	1103.12	1							
2	Firm size	1.26	2.05	0.36*	1						
3	Deal duration	53.62	96.41	-0.03	0.09	1					
4	Firm age	35.89	27.37	0.11	0.27*	0.00	1				
5	Relative size	0.36	1.37	-0.05	-0.14	0.05	-0.08	1			
6	Deal value	4.15	1.82	0.14	0.45*	0.22*	0.14	0.21*	1		
7	Number of divestiture experience	4.75	7.2	0.41*	0.51*	0.15	0.07	0.15	0.34*	1	
8	Proactive divestiture	1145.41	4025.52	0.51*	0.47*	0.27*	0.02	-0.07	0.25*	0.54*	1

Note: * $p<0.05$

<TABLE 2>

Descriptive statistics using number of patents as a dependent variable (N=149)

Variables		Mean	S.D.	1	2	3	4	5	6	7	8
1	Number of patents	67.23	238.17	1							
2	Firm size	1.26	2.05	0.37*	1						
3	Deal duration	53.62	96.41	-0.03	0.09	1					
4	Firm age	35.89	27.37	0.05	0.27*	-0.00	1				
5	Relative size	0.36	1.37	-0.05	-0.14	0.05	-0.08	1			
6	Deal value	4.15	1.82	0.13	0.45*	0.22*	0.14	0.21*	1		
7	Number of divestiture experience	4.75	7.2	0.40*	0.51*	0.15	0.07	0.15	0.34*	1	
8	Proactive divestiture	1145.41	4025.52	0.37*	0.47*	0.27*	0.02	-0.07	0.25*	0.54*	1

Note: * $p<0.05$

<TABLE 3>

Results of regression models using R&D intensity and number of patents as dependent variables

Variables (Dependent Variable)	Model 1 (R&D Intensity)	Model 2 (Number of patents)	Model 3 (R&D Intensity)	Model 4 (Number of patents)	Model 5 (R&D Intensity)	Model 6 (Number of patents)	Model 7 (R&D Intensity)	Model 8 (Number of patents)
Industry (SIC_{2digit}=28)	0.014	-0.000	0.003	-0.000	-0.015	-0.000	-0.044	-0.000
	(0.151)	(-0.391)	(0.035)	(-0.377)	(-0.177)	(-0.480)	(-0.586)	(-0.475)
Industry (SIC_{2digit}=35)	0.016	0.001	-0.006	0.001	0.031	0.001	-0.002	0.001
	(0.174)	(1.068)	(-0.068)	(0.989)	(0.356)	(0.896)	(-0.021)	(0.861)
Industry (SIC_{2digit}=36)	-0.015	0.003***	-0.006	0.003***	-0.006	0.003***	0.012	0.003***
	(-0.151)	(3.730)	(-0.061)	(3.563)	(-0.067)	(3.509)	(0.157)	(3.423)
Industry (SIC_{2digit}=38)	-0.021	-0.001	-0.023	-0.001	-0.001	-0.001	0.003	-0.001
	(-0.242)	(-1.515)	(-0.277)	(-1.481)	(-0.007)	(-1.397)	(0.049)	(-1.374)
Divested year 2006	0.044	0.001	0.015	0.001	0.079	0.001	0.042	0.001
	(0.342)	(0.486)	(0.119)	(0.651)	(0.663)	(0.647)	(0.406)	(0.790)
Divested year 2007	0.002	0.000	-0.057	0.001	0.021	0.000	-0.071	0.001
	(0.018)	(0.250)	(-0.444)	(0.655)	(0.175)	(0.232)	(-0.663)	(0.652)
Divested year 2008	0.010	0.002	-0.037	0.002+	0.052	0.001	-0.011	0.002+
	(0.079)	(1.584)	(-0.290)	(1.810)	(0.435)	(1.516)	(-0.102)	(1.737)
Divested year 2009	-0.030	0.000	-0.076	0.001	0.022	0.000	-0.034	0.000
	(-0.262)	(0.226)	(-0.674)	(0.566)	(0.208)	(0.149)	(-0.362)	(0.489)
Divested year 2010	-0.108	-0.000	-0.153	-0.000	-0.011	-0.000	-0.050	-0.000
	(-0.986)	(-0.428)	(-1.435)	(-0.293)	(-0.107)	(-0.393)	(-0.550)	(-0.214)
Firm size[a]	0.067	0.005***	0.160	0.005***	-0.059	0.005***	0.048	0.004***
	(0.655)	(5.820)	(1.552)	(5.879)	(-0.609)	(5.080)	(0.549)	(5.093)
Deal duration	-0.184*	-0.004*	-0.209**	-0.004*	-0.089	-0.003*	-0.096	-0.003*
	(-2.397)	(-2.327)	(-2.808)	(-2.356)	(-1.231)	(-2.095)	(-1.496)	(-2.063)
Firm age	0.059	-0.003***	0.057	-0.003***	0.041	-0.003**	0.030	-0.003***
	(0.759)	(-3.425)	(0.752)	(-3.567)	(0.576)	(-3.268)	(0.477)	(-3.487)
Deal value[a]	-0.020	0.004***	-0.047	0.004***	0.160+	0.004***	0.182*	0.004***
	(-0.224)	(4.563)	(-0.545)	(4.462)	(1.809)	(5.564)	(2.336)	(5.358)
Relative size (RS)	-0.028	-0.002**	-0.000	-0.002**	-0.490***	-0.005***	-0.617***	-0.005***
	(-0.347)	(-3.168)	(-0.003)	(-3.225)	(-4.227)	(-4.267)	(-5.925)	(-4.075)
Number of divestiture experience (NDE)	0.190+	0.000	0.102	0.001	0.121	0.000	-0.054	0.000
	(1.928)	(0.554)	(1.026)	(0.925)	(1.321)	(0.129)	(-0.629)	(0.649)
Proactive divestiture (PD)	0.440***	-0.000	-0.665+	0.004	0.735***	0.001	-1.001***	0.005
	(4.659)	(-0.216)	(-1.918)	(1.174)	(7.081)	(0.569)	(-3.411)	(1.539)
PD × NDE			1.147**	-0.004			1.917***	-0.005+
			(3.303)	(-1.546)			(6.228)	(-1.679)

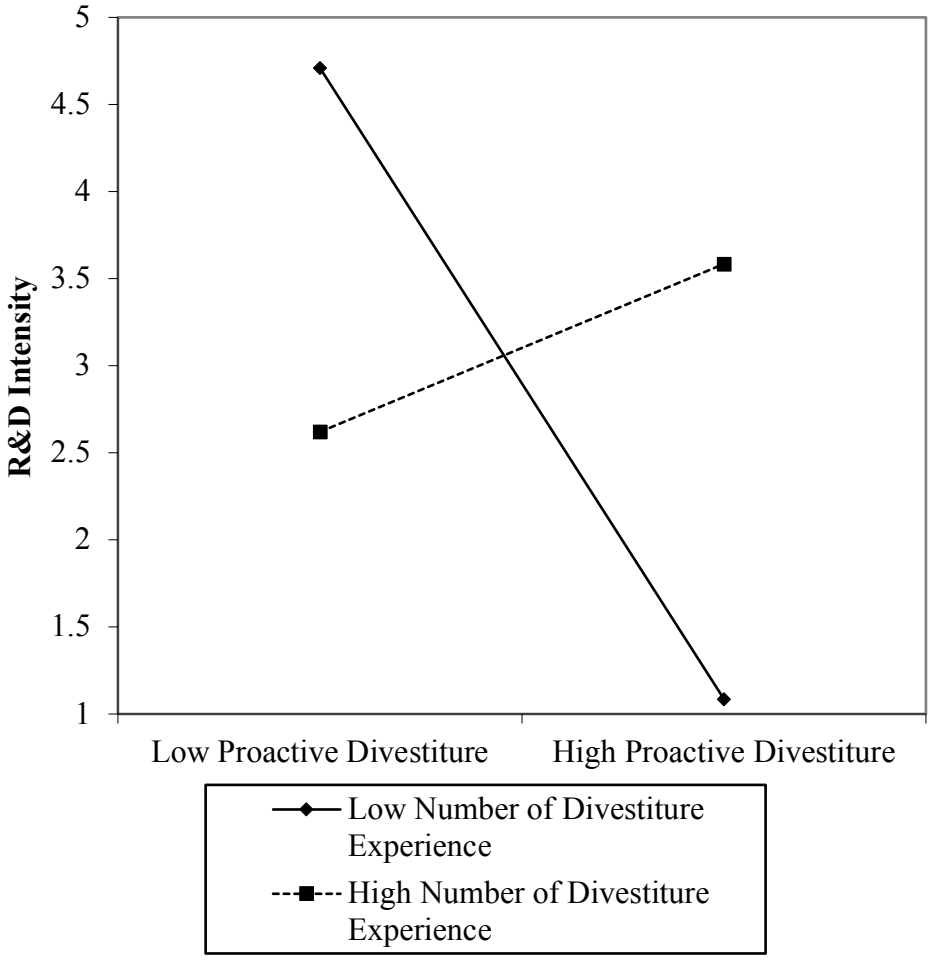
PD × RS					-0.651***	-0.004***	-0.894***	-0.004**
					(-5.137)	(-3.465)	(-7.563)	(-3.190)
Observations	149	149	149	149	149	149	149	149
R^2	0.349		0.399		0.458		0.582	
Adjusted R^2	0.270		0.321		0.387		0.525	
Pseudo R^2		0.088		0.089		0.091		0.092
Chi^2		221.0		230.5		230.3		231.7
F-value	4.415		5.109		6.507		10.07	
Log likelihood	-1224.3	-491.7	-1218.3	-491.0	-1210.6	-490.1	-1191.1	-489.3

[a] logarithm

Note: Base industry is software (SIC_{2digit}=73) relative to other industries.
Base divested year is 2011 relative to other divested years.
Standardized beta coefficients; t statistics in parentheses.
+ p<0.1, * p<0.05, ** p<0.01, *** p>0.001

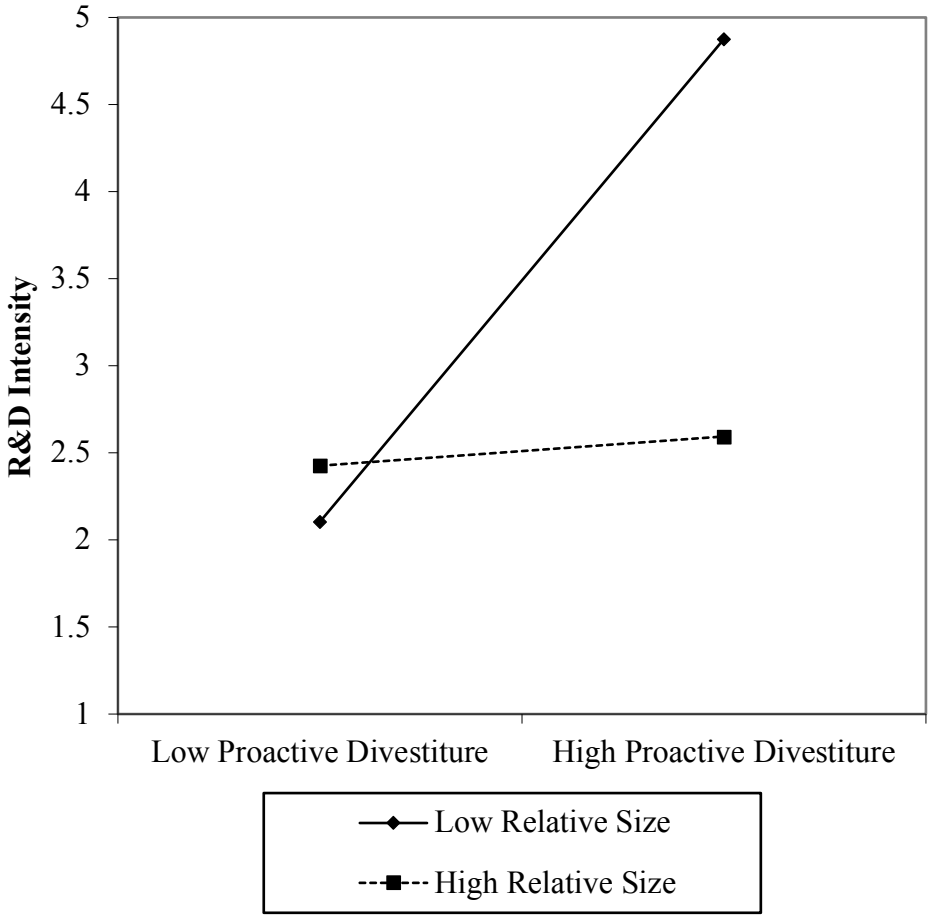
<FIGURE 1>

Interaction between Proactive Divestiture and Number of Divestiture Experience on R&D Intensity



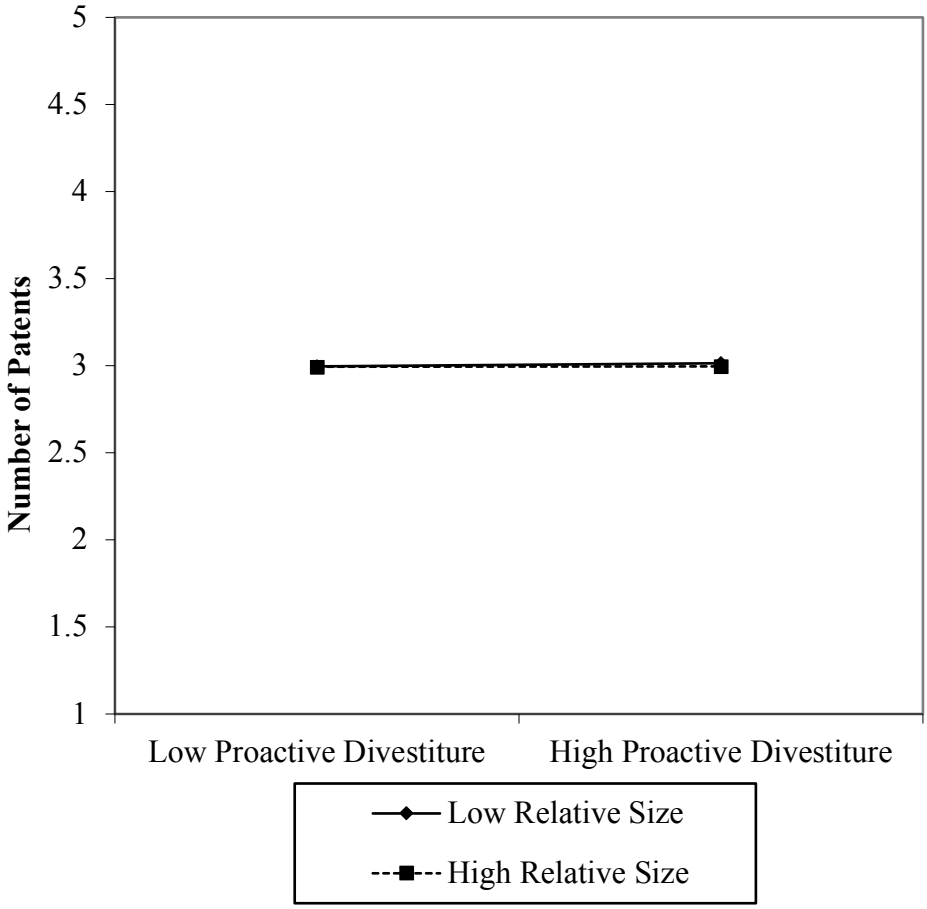
<FIGURE 2>

Interaction between Proactive Divestiture and Relative Size on R&D Intensity



<FIGURE 3>

Interaction between Proactive Divestiture and Relative Size on Number of Patents



REFERENCES

Accenture. 2004. *Global Merger and Acquisition Activity on the Rise*.

Accenture. 2013. *M&A Due Diligence What Corporates Can Learn from Private Equity*.

Ahuja, G., & Katila, R. 2001. Technological Acquisition and the Innovation Performance of Acquiring FIrms: A Longitudinal Study. *Strategic Management Journal*, 22(3): 197-220.

Amburgey, T. L., Kelly, D., & Barnett, W. P. 1993. Resetting the Clock: The Dynamics of Organizational Change and Failure. *Administrative Science Quarterly*, 38(1): 51-73.

Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17(1): 99-120.

Beers, C. van, & Sadowski, B. M. 2003. On the Relationship Between Acquisitions, Divestitures and Innovations: An Explorative Study. *Journal of Industry, Competition and Trade*, 3(1/2): 131-143.

Beneito, P. 2003. Choosing among alternative technological strategies: An empirical analysis of formal sources of innovation. *Research Policy*, 32(4): 693-713.

Benou, G., Madura, J., & Ngo, T. 2008. Wealth creation from high-tech divestitures. *Quarterly Review of Economics and Finance*, 48(3): 505-519.

Bergh, D. D. 1998. Product-Market Uncertainty, Portfolio Restructuring, and Performance: An Information-processing and

Resource-Based View. *Journal of Management*, 24(2): 135-155.

Bergh, D. D., Johnson, R. A., & Dewitt, R. L. 2008. Restructuring through spin-off or sell-off: transforming information asymmetries into financial gain. *Strategic Management Journal*, 29(2): 133-148.

Boudreaux, K. J. 1975. Divestiture and Share Price. *Journal of Financial & Quantitative Analysis*, 10(4): 619-626.

Brauer, M. 2006. What have we acquired and what should we acquire in divestiture research? A review and research agenda. *Journal of Management*, 32(6): 751-785.

Brauer, M., Mammen, J., & Luger, J. 2014. Sell-Offs and Firm Performance : A Matter of Experience ? *Journal of Management*, XX(X): 1-29.

Brunetta, F., & Peruffo, E. 2014. May parents inherit from heirs? towards an understanding of the parent-spun-off relationship. *American Journal of Applied Sciences*, 11(6): 921-928.

Buchholtz, a. K. 1999. Seller Responsiveness to the Need to Divest. *Journal of Management*, 25(5): 633-652.

Burgelman, R. A. 1988. Strategy Making as a Social Learning Process: The Case of Internal Corporate Venturing. *Interfaces*, 18(3): 74-85.

Campisi, D., Mancuso, P., & Nastasi, A. 2001. R&D Competition, Absorptive Capacity, and Market Shares. *Journal of Economics*, 73(1): 57-80.

Canzano, D., & Grimaldi, M. 2012. An integrated framework to implement a knowledge management programme: the role of technological tools and techniques. *International Journal of Intelligent Enterprise*, 1(3/4): 233-247.

Capron, L. 1999. The long-term performance of horizontal acquisitions. *Strategic Management Journal*, 20(11): 987-1018.

Capron, L., & Mitchell, W. 2009. Selection Capability: How Capability Gaps and Internal Social Frictions Affect Internal and External Strategic Renewal. *Organization Science*, 20(2): 294-312.

Cassiman, B., & Veugelers, R. 2006. In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science*, 52(1): 68-82.

Chatterjee, S., Harrison, J. S., & Bergh, D. D. 2003. Failed takeover attempts, corporate governance and refocusing. *Strategic Management Journal*, 24(1): 87-96.

Cohen, J., Gaynor, L. M., Krishnamoorthy, G., & Wright, A. M. 2007. Auditor communications with the audit committee and the board of directors: Policy recommendations and opportunities for future research. *Accounting Horizons*, 21(2): 165-187.

Cohen, W., & Levinthal, D. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1): 128-152.

Cook, T. J., & Rozeff, M. S. 1984. Size and Earnings/Price Ratio Anomalies: One Effect or Two? *The Financial Review*, 19(3): 32-32.

Cyert, R. M., & March, J. G. 1963. *A behavioral theory of the firm*. *Organizational Behavior 2: Essential theories of process and structure*. NJ: Prentice-Hall.

Darnall, N., & Edwards, D. 2006. Predicting the cost of environmental management system adoption: The role of capabilities, resources and ownership structure. *Strategic Management Journal*, 27(4): 301-320.

Dawley, D. D., Hoffman, J. J., & Lamont, B. T. 2002. Choice situation, refocusing, and post-bankruptcy performance. *Journal of Management*.

Deloitte. 2010. *The future of the life sciences industries: Aftermath of the global recession*.

Dranikoff, L., Koller, T., & Schneider, A. 2002. Divestiture: Strategy's missing link. *Harvard Business Review*.

Duhaime, I. M., & Baird, I. S. 1987. Divestment Decision-Making The Role of Business Unit Size. *Journal of Management*, 13(3): 483-498.

Duhaime, I. M., & Grant, J. H. 1984. Factors influencing divestment decision-making: Evidence from a field study. *Strategic Management Journal*, 5(4): 301-318.

Duysters, G., & Hagedoorn, J. 2000. Core competences and company performance in the world-wide computer industry. *The Journal of High Technology Management Research*, 11(1): 75-91.

Eisenhardt, K. M., & Brown, S. L. 1999. Patching. Restitching business portfolios in dynamic markets. *Harvard business review*, 77(3):

72-82.

Franko, L. G. 1989. Global Corporate Competition: Who's Winning, Who's Losing, and the R&D Factor as One Reason Why. *Strategic Management Journal*, 10(5): 449-474.

Gibbs, P. A. 1993. Determinants of corporate restructuring: The relative importance of corporate governance, takeover threat, and free cash flow. *Strategic Management Jouranl*, 14(S1): 51-68.

Goldie, B. A. 2014. Takeovers and the Size Effect. *Quarterly Journal of Finance and Accounting*, 52(3-4): 53.

Graebner, M. E., & Eisenhardt, K. M. 2004. The Seller's Side of the Story: Acquisition as Courtship and Governance as Entrepreneurial Firms. *Administrative Science Quarterly*, 49(3): 366-403.

Grant, R. M. 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(special issue): 109-122.

Graves, S. B., & Langowitz, N. S. 1996. R&D productivity: A global multi-industry comparison. *Technological Forecasting and Social Change*, 53(2): 125-137.

Griliches, Z. 1984. *R&D, Patents and Productivity*. *Cities*.

Griliches, Z. 1990. *Patent Statistics as Economic Indicators: A Survey. Journal of Economic Literature*.

Grinyer, P. H., & Yasai-Ardekani, M. 1981. Strategy, Structure, Size and Bureaucracy. *The Academy of Management Journal*, 24(3): 471-486.

Gulati, R., Lavie, D., & Singh, H. 2009. The nature of partnering experience and the gains from alliances. *Strategic Management Journal*, 30(11): 1213-1233.

Hagedoorn, J., & Cloodt, M. 2003. Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy*.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. 1998. *Multivariate data analysis*. NJ: Prentice Hall.

Hamilton, R. T., & Chow, Y. K. 1993. Why managers divest—evidence from New Zealand's largest companies. *Strategic Management Journal*, 14(6): 479-484.

Hannan, M. T., & Freeman, J. 1984. Structural inertia and organizational change. *American Sociological Review*, 49(2): 149-164.

Harrison, J. S., Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. 1991. Synergies and post-acquisition performance: Differences versus similarities in resource allocations. *Journal of Management*, 17(1): 173-190.

Harrison, J. S., Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. 2001. Resource complementarity in business combinations: Extending the logic to organizational alliances. *Journal of Management*, 27(6): 679-690.

Hayward, M. L. A., & Shimizu, K. 2006. De-commitment to losing strategic action: Evidence from the divestiture of poorly performing acquisitions. *Strategic Management Journal*, 27(6): 541-557.

Henderson, R., & Cockburn, I. 1996. Scale, Scope, and Spillovers: The Determinants of Research Productivity in Drug Discovery. *The Rand journal of economics*, 27(1): 32-59.

Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. 1990. Mergers and acquisitions and managerial commitment to innovation in M-form firms. *Strategic Management Journal*, 11(4): 29-47.

Hitt, M. A., Hoskisson, R. E., & Kim, H. 1997. International diversification: Effects on innovation and firm performance in product-diversified firms. *Academy of Management Journal*, 40(4): 767-798.

Hoskisson, R. E., & Hitt, M. A. 1990. Antecedents and performance outcomes of diversification: A review and critique of theoretical perspectives. *Journal of Management*, 16(2): 461-509.

Hoskisson, R. E., Johnson, R. A., & Moesel, D. D. 1994. Corporate Divestiture Intensity in Restructuring Firms: Effects of Governance, Strategy, and Performance. *Academy of Management Journal*, 37(5): 1207-1251.

Hoskisson, R. O., & Johnson, R. A. 1992. Corporate Restructuring and Strategic Change: The Effect on Diversification Strategy and R&D Intensity. *Strategic Management Journal*, 13(8): 625-634.

Huff, J. O., Huff, A. S., & Thomas, H. 1992. Strategic renewal and the interaction of cumulative stress and inertia. *Strategic Management Journal*, 13(S1): 55-75.

Ilmakunnas, P., & Topi, J. 1999. Microeconomic and macroeconomic influences on entry and exit of firms. *Review of Industrial Organization*, 15(3): 283-301.

Jensen, M. C. 1989. Active Investors, LBOs, and the Privatization of Bankruptcy. *Journal of Applied Corporate Finance*, 2(1): 35-44.

Jensen, R. 1988. Information cost and innovation adoption policies. *Management Science*, 34(2): 230-239.

Johnson, R. A. 1996. Antecedents and outcomes of corporate refocusing. *Journal of Management*.

Kahan, M., & Rock, E. B. 2007. *Hedge funds in corporate governance and corporate control. University of Pennsylvania Law Review*.

Karim, S., & Mitchell, W. 2004. Innovating through acquisition and internal development: A quarter-century of boudary evolution at Johnson & Johnson. *Long Range Planning*, 37(6): 525-547.

Keizer, J. A., Dijkstra, L., & Halman, J. I. M. 2001. Explaining innovative efforts of SMEs. An exploratory survey among SMEs in the mechanical and electrical engineering sector in The Netherlands. *Technovation*, 22(1): 1-13.

Khan, A., & Mehta, D. 1996. Voluntary divestitures and the choice between sell-offs and spin-offs. *The Financial Review*.

Kim, Y., & Roh, T. 2014. Shackles of The Past: Why Firms Divest Too Late and When They Can Free Themselves. *Academy of Management Annual Meeting Proceedings*, 1: 1292-1297.

Koch, J., & Fox, C. 2014. The Industrial Relations Setting, Organizational Forces, and the Form and Content of Worker Participation. *The Academy of Management Review*, 3(3): 572-583.

Kogut, B., & Zander, U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3): 383-397.

Landry, R., Amara, N., & Lamari, M. 2002. Does social capital determine innovation? To what extent. *Technological Forecasting and Social Change*, 69(7): 681-701.

Latham, S. 2009. Contrasting strategic response to economic recession in start-up versus established software firms. *Journal of Small Business Management*, 47(2): 180-201.

Lee, D. D., & Madhavan, R. 2010. Divestiture and Firm Performance: A Meta-Analysis. *Journal of Management*, 36(6): 1345-1371.

Leontiades, M., & Tezel, A. 1980. Planning perceptions and planning results. *Strategic Management Journal*, 1(1): 65-75.

Li, M., & Simerly, R. L. 2002. Environmental Dynamism, Capital Structure and Innovation: an Empirical Test. *International Journal of Organizational Analysis*, 10(2): 156-171.

Lioukas, S., & Xerokostas, D. 1982. Size and administrative intensity in organiational divisions. *Management Science*, 28(8): 854-868.

Louis, M. R., & Sutton, R. I. 1991. Switching Cognitive Gears: From Habits of Mind to Active Thinking. *Human Relations*, 44(1): 55-76.

Love, J. H., & Roper, S. 1999. The determinants of innovation: R and D, technology transfer and networking effects. *Review of Industrial Organization*, 15(1): 43-64.

Lovejoy, F. A. 1971. *Divestment for profit*. NY: Financial Executives Research Foundation.

Makri, M., Hitt, M. A., & Lane, P. J. 2010. Complementary technologies, knowledge relatedness, and invention outcomes in high technology mergers and acquisitions. *Strategic Management Journal*, 31(6): 602-628.

Mariotti, S., & Piscitello, L. 1999. Is divestment a failure or part of a restructuring strategy? The case of Italian transnational corporations. *Transnational Corporations*, 8(3): 25-34.

Markides, C. C. 1992. Consequences of corporate refocusing: Ex ante evidence. *Academy of Management Journal*, 35(2): 398-412.

Markides, C. C. 1995. Diversification, restructuring and economic performance. *Strategic Management Journal*, 16(2): 101-118.

Markides, C., & Singh, H. 1997. Corporate restructuring: A symptom of poor governance or a solution to past managerial mistakes? *European Management Journal*, 15(3): 213-219.

Montgomery, C. A., & Thomas, A. R. 1988. Divestment: Motives and gains. *Strategic Management Journal*, 9(1): 93-97.

Montgomery, C. A., Thomas, A. R., & Kamath, R. 1984. Divestiture, Market Valuation, and Strategy. *Academy of Management Journal*, 27(4): 830-840.

Moschieri, C., & Mair, J. 2011. Adapting for Innovation: Including Divestitures in the Debate. *Long Range Planning*, 44(1): 4-25.

Narver, J. C., Slater, S. F., & MacLachlan, D. L. 2004. Responsive and

Proactive Market Orientation and New Product Success. *The Journal of Product Innovation Management*, 21(5): 334-347.

Nelson, R. R., & Winter, S. G. 1982. *An evolutionary theory of economic change*. MA: Belknap Press.

Nesta, L., & Saviotti, P. P. 2005. Coherence of the knowledge base and the firm's innovative performance: Evidence from the U.S. pharmaceutical industry. *The Journal of Industrial Economics*, 53(1): 123-142.

Ornaghi, C. 2009. Mergers and innovation in big pharma. *International Journal of Industrial Organization*, 27(1): 70-79.

Penrose, E. 1959. *The theory of the growth of the firm* (Fourth edi.). NY: Oxford University Press.

Peruffo, E., Pirolo, L., & Nenni, M. E. 2014. Spin-off and innovation in the pharmaceutical industry. *International Journal of Engineering Business Management*, 6(1): 1-7.

Qian, G., & Li, L. 2003. Profitability of small- and medium-sized enterprises in high-tech industries: the case of the biotechnology industry. *Strategic Management Journal*, 24(9): 881-887.

Ravenscraft, D. J., & Scherer, F. M. 1989. The profitability of mergers. *International Journal of Industrial Organization*, 7(1): 101-116.

Reuer, J. J., & Shen, J. C. 2004. Sequential divestiture through initial public offerings. *Journal of Economic Behavior and Organization*.

Rose, E. L., & Ito, K. 2005. Widening the family circle: Spin-offs in the Japanese service sector. *Long Range Planning*, 38(1): 9-26.

Semadeni, M., & Cannella, A. A. 2011. Examining the performance effects of post spin-off links to parent firms: Should the apron strings be cut? *Strategic Management Journal*, 32(10): 1083-1098.

Sembenelli, A., & Vannoni, D. 2000. Why do established firms enter some industries and exit others? Empirical evidence on Italian business groups. *Review of Industrial Organization*, 17(4): 441-456.

Seth, A. 1990a. Value creation in acquisitions: A re-examination of performance issues. *Strategic Management Journal*.

Seth, A. 1990b. Sources of value creation in acquisitions: an empirical investigation. *Strategic Management Journal*.

Shimizu, K., & Hitt, M. A. 2005. What Constrains or Facilitates Divestitures of Formerly Acquired Firms? The Effects of Organizational Inertia. *Journal of Management*, 31(1): 50-72.

Shin, G. H. 2008. The profitability of asset sales as an explanation of asset divestitures. *Pacific Basin Finance Journal*, 16(5): 555-571.

Siegel, P. A., & Hambrick, D. C. 2005. Pay Disparities Within Top Management Groups: Evidence of Harmful Effects on Performance of High-Technology Firms. *Organization Science*, 16(3): 259-274.

Siggelkow, N. 2002. Evolution toward fit. *Administrative Science Quarterly*, 47(1): 125-159.

Sternberg, R., & Arndt, O. 2001. The Firm or the Region: What Determines the Innovation Behavior of European Firms? *Economic Geography*, 77(4): 364-382.

Thornhill, S. 2006. Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing*, 21(5): 687-703.

Tushman, M. L., Virany, B., & Romanelli, E. 1985. Executive succession, strategic reorientations, and organization evolution. The minicomputer industry as a case in point. *Technology in Society*, 7(2-3): 297-313.

Valentini, G. 2012. Measuring the effect of M&A on patenting quantity and quality. *Strategic Management Journal*.

Wan, D., Ong, C. H., & Lee, F. 2005. Determinants of firm innovation in Singapore. *Technovation*, 25(3): 261-268.

Wang, Z., & Wang, N. 2012. Knowledge sharing, innovation and firm performance. *Expert Systems with Applications*, 39(10): 8899-8908.

Whitaker, R. B. 1999. The early stages of financial distress. *Journal of Economics and Finance*, 23(2): 123-132.

Wooldridge, J. M. 2002. *Econometric analysis of cross section and panel data*. MA: MIT Press.

Wruck, K. H. 1990. Financial distress, reorganization, and organizational efficiency. *Journal of Financial Economics*, 27(2): 419-444.

국 문 초 록

기업의 능동적인 자회사의 매각과 혁신 성과에 관한 연구

최근 하이테크 산업과 같이 극도로 경쟁이 치열한 환경에서 기업은 지속적인 경쟁 우위를 확보하고 조직의 생존을 위한 혁신이 필요하다. 매각은 과거의 실수를 극복하기위한 M&A의 단순한 도구로 취급되었지만 최근의 비즈니스 관행에서는 매각을 통하여 기업의 핵심 역량을 키울 수 있는 중요한 독립 전략으로 인식되고 있다. 매각에 대한 최근의 긍정적인 견해와 일치하여, 본 연구는 매각을 내부 조직 문제 해결을 위한 대응 행동으로 설명하는 전통적인 관점과는 달리 전략적인 사전 행동의 선택으로 바라본다. 능동적인 매각과 혁신성과 간의 관계에 관한 연구는 아직 밝혀지지 않았으며 면밀한 조사가 필요하다. 이러한 관계를 탐구하기 위해 본 연구는 지식 기반 관점 및 조직 관성에 대한 연구를 통합하고 기업의 사전 행동을 평가하기 위해 재정적 곤경의 모델을 포괄하였다. 본 연구는 능동적인 매각이 회사의 연구 개발 집약도와 특허 건수 모두를 증가 시킨다는 가설을 세웠다. 또한, 이전의 매각 경험과 매각 단위 규모가 가설의 관계를 완화시킬 것이라고 제안한다. 본 연구는 기업의 금융 압박과 같은 내부적인 조직 문제에 관련하여 매각을 수동적인 행동으로 간주하는 전통적인 자원 기반

관점과는 달리 사전 예방적 매각이 기업의 지식 역량을 강화할 수 있는 방법에 대한 이해에 기여한다.

……

주요어 : 사후 매각, 능동적 매각, 혁신성과, 인수합병, 지식기반관점, 자원기반관점

학 번 : 2014-20409