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경영학석사학위논문

**The Outsider Within:**  
**The Impact of Non-Family CEOs on Family Firm**  
**R&D**

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## ABSTRACT

This paper examines *why family firms differ in levels of R&D investment* by analyzing the agency conflict between family owners and non-family CEOs. Using insights from agency and stewardship theory, we find that non-family CEOs invest less in R&D than family CEOs. Compared to family CEOs who have long-term interests in the firm, non-family CEOs are driven by short-term motives and thus, are reluctant to make farsighted investments in R&D. We also find that non-family CEOs are *more* likely to invest in R&D when there are potential family successors involved in management. Moreover, we find that non-family CEOs are more likely to invest in R&D when they have longer career horizons. Findings are supported in Korean manufacturing firms in R&D intensive industries listed on the Korean Stock Exchange from 2009-2018.

**Keywords:** R&D intensity; family firms; non-family CEOs; corporate governance; agency theory; transgenerational control; career horizon

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# I. INTRODUCTION

Family firms exert a significant influence on the global economy (La Porta, Lopez-de-Silanes, & Shleifer, 1999). While many firms are managed by family members, a growing number of firms are managed by non-family professional CEOs (Bennedsen, Nielsen, Perez-Gonzalez & Wolfenzon, 2007; Bloom & Van Reenen, 2007). Despite this trend, the family business literature has not paid enough attention to the distinctive effect that non-family CEOs have on the R&D investments of family firms. Investments in R&D are unique in that their inherent nature puts them at risk for significant agency problems. Their long payoff horizons, uncertainties, and risks make professional CEOs especially reluctant to invest in R&D (Baysinger, Kosnik & Turk, 1991; Fama & Jensen, 1983). Thus, it is imperative to address *how* non-family professional CEOs impact family firm R&D, and *when* they are more or less likely to invest in R&D.

Existing research on family firm R&D has focused on the impact of ownership and the differences between family and non-family firms. However, findings have been mixed. While some studies show that family firms invest more in R&D compared to non-family firms (Gudmundson, Tower, & Hartman, 2003; Kim, Kim & Lee, 2008; Koh & Park, 2013; Schmid et al., 2014), others have shown the opposite (Block, 2012; Chrisman & Patel, 2012; Munari, Oriani & Sobrero, 2010; Munoz-Bullon & Sanchez-Bueno, 2011). Moreover, previous studies fail to consider the considerable variation

that exists *within* family firms (De Massis, Frattini, & Lichtenthaler, 2012). For example, Chrisman and Patel (2012) found that family firms have *more* variation in levels of R&D than non-family firms. We propose that CEO type (family vs. non-family) is a significant source of variation within family firms that can explain the conflicting findings stated above.

The lack of attention given to the distinction between family and non-family CEOs is puzzling given the definition of family firms: family firms are defined as firms in which founders or their family members and affiliated firms control more than 20% ownership, *and* at least one family member occupies top management positions (Choi, Suh, & Park, 2010; Koh & Park, 2013). As such, there are two components used to define family firms—an ownership and a management component. Even though prior studies have used some variation of this definition, they have not theorized about the management component, namely, the impact of family versus non-family CEOs on R&D strategy. Thus, using insights from agency and stewardship theory, we develop and test theories on the impact of non-family CEOs on the R&D investment patterns of family firms.

This study further explores several theoretically driven contingencies concerning *when* non-family CEOs are more or less likely to invest in R&D. First, we examine how potential family successors in the top management team act to hinder or encourage non-family CEOs to invest in R&D. Because potential family

successors have both emotional and financial attachments to the firm (Le Breton-Miller, Miller, & Lester, 2011), they may act as effective monitors, inducing non-family CEOs to spend more on R&D. However, the presence of family successors may also pressure CEOs to deliver strong short-term results, causing non-family CEOs to become risk-averse and thus, invest less in R&D.

We also examine two critical actors in the firm's governance system that might encourage non-family CEOs to make higher investments in R&D: independent directors and institutional investors. Agency theory predicts that independent directors act as superior monitors because they give advice and provide objectivity to CEOs (Kor, 2006). However, research on the effectiveness of independent directors on R&D investments has found a lack of support for this prediction (Hoskisson, Hitt, Johnson & Grossman, 2002; Kor, 2006; Zahra, 1996). The family firm presents an interesting setting to test this relationship because conflicts of interest between family principals and non-family agents are expected to be much greater than that between traditional principals and agents. Institutional owners can also act as effective monitors by exerting influence over management through their large ownership shares (Boyd & Solarino, 2016).

Lastly, we examine how career horizons impact non-family CEOs' propensity to invest in R&D. CEO career horizon is the expected amount of time remaining until a CEO reaches retirement age (Matta & Beamish, 2008). Those who are closer to retirement,

and thus have a shorter expected tenure in the firm, tend to become increasingly risk averse as concerns for preserving their legacy lead them to avoid risky strategic choices. Thus, non-family CEOs with longer career horizons might be more likely to invest in R&D compared to those with shorter career horizons.

## **II. THEORY AND HYPOTHESES**

### **2.1. Agency and stewardship costs of Non-Family CEOs**

Agency theory assumes that actors are self-serving, inherently rational beings who, when given the opportunity, will maximize their own utility. Agency problems occur when the goals and risk preferences of owners and agents diverge (Jensen & Meckling, 1976), such as when agents make decisions based on their preferences (ex. short term, financial gains) rather than the preferences' of owners (ex. long term, sustainable development).

Although it is commonly assumed that ownership and management are aligned in family firms, this is not always the case as a growing number of family firms delegate control to non-family CEOs. (Bennedsen et al., 2007; Bloom & Van Reenen, 2007; Chua, Chrisman & Sharma, 1999; Litz, 1995). Despite this trend, existing research on the R&D activities of family firms does not theorize on the differential impact of family vs. non-family CEOs. To fill this gap, we propose that CEO type (family vs. non-family) has important implications for agency costs in the context of R&D.

As contracted employees of the firm, non-family CEOs are evaluated against short-term performance goals (Davis, Schoorman, & Donaldson, 1997). However, R&D investments have long-term payoffs and are unlikely to yield returns in the immediate future (Baysinger et al., 1991). Moreover, the returns—if any—are highly skewed (Scherer & Harhoff, 2000). For these reasons, non-family CEOs may be reluctant to invest in R&D over projects that have short-term payoffs, such as marketing and acquisition activities that quickly boost sales and firm size (Kor, 2006). Poor investment outcomes also adversely affect their wealth, employment and reputation in the executive job market (Campbell & Marino, 1994; Hirshleifer & Thakor, 1992; Narayanan, 1985). Thus, compared to family CEOs, non-family CEOs are more likely to directly experience the consequences of poor investment outcomes. In fact, research shows that following poor firm performance, non-family CEOs are more likely to be replaced compared to family CEOs (Chang & Shin, 2005). For these reasons, family firms managed by non-family CEOs might face an underinvestment problem in R&D.

Stewardship theory also predicts that non-family CEOs will invest less in R&D compared to family CEOs. According to stewardship theory, some agents are motivated to further the interests of the collective, instead of simply pursuing their own (Davis et al., 1997). For stewards, “pro-organizational, collectivist motivations have higher utility than individualistic, self-serving behaviors” (Davis et al.,

1997, p.24.). Family CEOs act as stewards of the firm because the reputation and continuation of the family dynasty are linked to the family business. As stewards, family CEOs are more likely to cultivate the long-run interests of the firm instead of resorting to short-term gains that might jeopardize the survival of the business (Le Breton-Miller et al., 2011). Moreover, for family CEOs, the firm represents the past, present, and especially the future. Concern for subsequent generations and the desire to pass on control to the next generation instill especially farsighted stewardship in family CEOs (Arregle et al., 2007; Miller & Le Breton-Miller, 2005; Ward, 2004).

Compared to family CEOs, non-family CEOs have significantly less stewardship for the family business. As contracted employees (Davis et al., 1997), they do not carry the responsibility of the family name. The long-term survival and proliferation of the family business is not their fight (Chang & Shim, 2015). While family CEOs have both financial and emotional interests in the firm, non-family CEOs do not have an incentive to look out for the long-run interests of the firm except for their own financial and employment interests. Therefore, non-family CEOs would have *less* concern for the long-term future of the firm. Considering both agency and stewardship predictions, we hypothesize that,

**Hypothesis 1:** Within family firms, management by Non-Family CEOs will have a negative effect on R&D investments.

## **2.2. Intentions for transgenerational control**

*When* would non-family CEOs be more likely to invest in R&D? As the first factor, we examine how intentions for transgenerational control affect non-family CEO's R&D investments. Intentions for transgenerational control are operationalized as a dummy variable indicating whether the first born son or daughter is present in the TMT. Previous studies show that family firms adopt an especially long term perspective, increase risk-taking and invest more in R&D when they have strong intentions to transfer control and ownership to the next generation (Chrisman & Patel, 2012). As families turn their focus to the future, they invest in projects that preserve and strengthen their business for the long-term (Bertrand & Schoar, 2006). Investments in R&D are essential for this purpose because they increase the firm's ability to innovate, which in turn provides opportunities for organizational renewal and growth (David, Hitt & Gimeno, 2001; Kekre & Srinivasa, 1990; Quelch & Kenny, 1994). Capabilities for innovation also do not develop overnight. It takes time to accumulate R&D and innovation capabilities (Dierickx & Cool, 1989; Laverty, 1996; Lee & O'Neill, 2003). Because of these reasons, investments by previous generations most likely benefit subsequent generations. Thus, strong intentions for transgenerational control increase the long-term orientation of family owners and executives, and increase their likelihood of investing in R&D.

While previous studies have found support for the argument

that stronger intentions for transgenerational control increase family firms' R&D spending, they did not theorize on the differential impact of management by a non-family CEO. Would this effect still hold under a non-family CEO? We examine two different possibilities:

First, the family's intentions for transgenerational control could induce non-family CEOs to invest more in R&D. Intentions for transgenerational control enhance stewardship motivations and lengthen time horizons, causing family executives to diligently monitor non-family CEOs (Miller & Le Breton-Miller, 2006). Family owners and executives have significant influence and authority within the firm (Anderson & Reeb, 2004), which they could use to influence non-family CEOs. Namely, their advice and monitoring could curb the myopic investment tendencies of non-family CEOs. Whether it is the potential successor himself or other family executives, everyone has an incentive to ensure that non-family CEOs make investments for the long-run survival of the firm. Successors, to have a firm to take over, and family managers, to maintain their status and have a viable firm to be associated with (Gomez-Mejia et al., 2007).

**Hypothesis 2a:** The negative effect of Non-Family CEOs on R&D investments is weakened when there are potential family successors in the TMT.

However, intentions for transgenerational control might also

have the opposite effect. Although the presence of potential successors on a firm's TMT might strengthen families' monitoring and stewardship motivations, it is also possible that a large family presence pressures non-family CEOs to deliver strong short-term results, making them risk-averse and therefore less likely to invest in R&D.

When potential family successors actively participate in management, the likelihood of choosing a competent successor increases (Calabro, Minichilli, Amore & Brogi, 2018). For non-family CEOs, this possibility exacerbates their employment risk because it implies that the non-family CEO is a temporary placeholder. Moreover, if there are potential family successors within the TMT, non-family CEOs may feel especially pressured to meet short term performance goals because they could be replaced at any time. In support of this argument, Poza, Alfred & Maheshawi (1997) found that non-family managers believe that control will be given to a family member and that non-family managers will be excluded from occupying senior positions. Thus, strong intentions for transgenerational control may pressure non-family CEOs to focus on delivering strong short-term performance at the expense of long-term investments in R&D. Thus, we also hypothesize that,

**Hypothesis 2b:** The negative effect of Non-Family CEOs on R&D investments is strengthened when there are potential family successors

in the TMT.

### **2.3. Monitoring by Independent Directors & Institutional Owners**

As stated earlier, the complexity and high risk inherent to R&D investments lead to significant agency problems in the form of under-investing in R&D. Such agency problems can be mitigated through corporate governance mechanisms such as having an independent board to monitor the actions of executives (Baysinger et al., 1991; Kor, 2006). Prior studies using U.S. contexts have categorized board members into insiders and outsiders, with outsiders further categorized as affiliated and independent directors. Affiliated directors are directors who are not employed at the focal firm but share ties with the firm while independent directors are directors whose only affiliation with the focal firm is their directorship (Coles & Hesterly, 2000; Daily, Johnson, Ellstrand & Dalton, 1998). In this study, we focus on the effect of independent directors on family firm R&D.

An independent board confers significant benefits. First of all, independent directors can contribute their experience, knowledge, and skills when CEOs are making important strategic decisions (Anderson & Reeb, 2004; Miller & Le Breton-Miller, 2006). They also provide objectivity and candor to strategic decision making (Dalton et al., 1998). Additionally, because independent directors are not subordinate

to the firm or its executives, they can ask difficult questions that insiders might be hesitant to ask (Winter, 1977). In regards to R&D investments, independent directors can advise and remind executives that investing in R&D is beneficial for building innovation capabilities and, thus, crucial for the long-run profitability and survival of the firm (Chen & Hsu, 2009; Kor, 2006). For these reasons, agency theory predicts that independent directors act as effective monitors for R&D investments.

Despite the agency theoretic prediction that independent directors are effective monitors for R&D investments, empirical findings show a lack of support for this claim. Zahra (1996) finds that the ratio of outsiders is negatively related to perceived corporate entrepreneurship. Additionally, Hoskisson et al. (2002) and Kor (2006) show that the ratio of independent directors is not statistically related to R&D investments. However, previous studies did not differentiate between family firms and non-family firms. Thus, despite these results, we argue that agency predictions for the monitoring effect of independent directors will hold in family firms.

Conflicts of interest between family owners and non-family agents are expected to be much greater than that between traditional owners and agents (Le Breton-Miller et al., 2011). In non-family firms, where one family does not hold significant control, owners and agents are simply looking out for their own financial interests. However, in family firms, family owners seek to protect both their

financial *and* emotional interests in the firm, while agents are still just looking out for their financial interests. Thus, the gap between the interests of owners and managers increases because of the family's additional emotional attachment to the firm. Due to the especially large conflict of interest between family owners and non-family agents, the monitoring effect of independent directors may be greater in family firms compared to non-family firms. For these reasons, we propose that the family firm presents an appropriate setting to test the efficacy of independent directors as effective monitors of R&D investments.

**Hypothesis 3a:** The negative effect of Non-Family CEOs on R&D investments is weakened as the ratio of independent directors increases.

The agency problem of non-family CEOs underinvesting in R&D can also be mitigated by institutional owners. Large institutional owners can monitor the CEO and reduce the agent's self-seeking behavior through their large ownership shares (Hill & Snell, 1989). For example, large institutional owners can use their voting power or their power over the board to monitor the self-seeking behavior of non-family CEOs. Recent research in support of this claim shows that institutional ownership acts to mitigate agency problems by positively influencing long-term investments (Eng & Shackell, 2001) and

innovation performance (Aghion et al., 2013). Thus, we hypothesize that,

**Hypothesis 3b:** The negative effect of a Non-Family CEO on R&D investments is weakened as institutional ownership increases.

## 2.4. CEO Career Horizon

In the previous sections we examined how characteristics of the TMT and the board impact non-family CEOs' tendency to invest in R&D. We now turn our attention to how CEO characteristics, namely their career horizons, act to mitigate the agency problem of non-family CEOs underinvesting in R&D.

CEO career horizon is the expected amount of time remaining until a CEO reaches retirement age or the end of their expected tenure (Matta & Beamish, 2008). As CEOs approach retirement (through age or tenure), they become risk averse because they are increasingly concerned about preserving their legacy. Towards the end of their careers, CEOs don't have the time or ability to reverse a performance shortfall. Moreover, performance shortfalls might harm CEOs' reputations in the last years of their employment (Matta & Beamish, 2008). Due to these concerns for their legacy and reputation, CEOs who are closer to retirement might be reluctant to pursue risky strategic decisions.

Thus, non-family CEOs with relatively shorter career horizons,

who don't have much time left with the firm, would be more likely to pursue short-term strategic actions that would allow them to collect rewards during their tenure even if they might have adverse consequences for shareholders in the long term. On the other hand, non-family CEOs with longer career horizon, who expect to stay longer in the firm, would be more likely to invest in long-term investments such as R&D. Thus, I hypothesize that,

**Hypothesis 4:** The negative effect of a Non-Family CEO on R&D investments is weakened as CEO career horizon increases.

### **III. METHODS**

#### **3.1. Sample & Data Collection**

The sample consists of Korean manufacturing firms in R&D intensive industries listed on the Korean Stock Exchange (KSE) from 2009 to 2018. Korean Standard Industry Codes (KSIC) are used to identify several industries, including chemicals (KSIC Code 20), pharmaceuticals (KSIC Code 21), electronics (KSIC Codes 26, 27, and 28) and machinery (KSIC Codes 29, 30, and 31). The firms in these industries invest heavily in R&D, and their strategies are influenced by their ownership structures (Kim et al., 2008). The data comes from the Korean Listed Companies Association (KCLA) database, which has been used in previous studies that conducted research with Korean firms (Chang, 2003; Kim et al., 2008).

Following previous research on family firms in the Korean context, family firms are defined as firms in which founders or their family members and affiliated firms control more than 20% ownership and at least one family member occupies top management positions (Choi et al., 2010).

To classify family firms, we used the list of majority shareholders reported on each firm's annual report. One of the categories that majority shareholders are classified into is called "specially related persons," which includes individuals and corporations that have a "special" relationship with the majority shareholder who owns/controls the firm. This includes 1) spouses and family members (limits family members to first and second cousins), 2) non-profit corporations owned by the majority shareholder, 3) affiliated corporations owned by the majority shareholder, and 4) executives who work at non-profit or affiliated corporations owned by the majority shareholder. After excluding non-profit and affiliated corporations that were owned by majority shareholders, we used company websites and news reports to decide which owners were members of the founding family and which owners were non-family members.

After calculating family ownership, we used data on each firm's top management team (TMT) to determine the number of family members who occupy top management positions. We first matched the list of TMT members to the ownership data constructed

earlier. For those names that were unmatched, we used company websites and news reports to determine whether the executives were members of the founding family.

Firms that did not report R&D expenses for more than five years were excluded from the sample (24 firms, 152 firm-year observations dropped). Most of the excluded firms were holding companies that did not actively engage in R&D. The sample that included both family and non-family firms consisted of a total of 194 firms (1385 firm-year observations). From this sample, 147 firms (911 firm-year observations) met the definition of family firms used in this study. There is a one-year time lag between the independent and control variables and the dependent variables. As such, the dependent variables (from 2009-2018) were regressed against the independent and control variables (from 2008-2017) to ensure that the direction of causality was from the family variables to R&D intensity (Chen & Hsu, 2009; Kim et al., 2008).

### **3.2. Dependent Variable**

*R&D Intensity.* In line with previous research, R&D intensity is used as a measure of firms' R&D investments. R&D intensity is calculated as the ratio of R&D expenditures to total sales (Chen & Hsu, 2009; Greve, 2003; Kim et al., 2008; Kor, 2006; Lee & O'Neill, 2003).

### 3.3. Independent Variables

*Non-Family CEO.* Non-family CEO is a binary variable coded 1 when the CEO is *not* a member of the founding family and coded 0 when the CEO is the founder or a member of the founding family. In Korean firms, it is often difficult to identify the CEO because some firms have Co-CEOs. Following previous research on CEOs in Korean firms, we define the CEO as the person who signs off on the firm's annual report (Seo & Chang, 2010). The act of signing one's name, and having the final say on a firm's annual report signifies that one is willing to take responsibility for the validity of its contents. It signifies that he/she will take responsibility for the information that is presented to shareholders, external stakeholders, and the general public. Thus, it was reasoned that a person with such authority would be more likely to take responsibility for and influence a firm's R&D strategy as well as other major decisions that determine the long-run survival of the firm (Seo & Chang, 2010).

*Potential family successors in the top management team (TMT).* Potential family successors in the TMT is measured as a dummy variable indicating whether the first born son or daughter is present in the TMT, as reported on each company's annual report. In line with previous research on TMTs in Korean firms, the TMT is defined as registered executives who are listed on each firm's annual report (Park & Kim, 2015).

*Ratio of independent directors.* The ratio of independent

directors is measured as the proportion of independent directors listed on each firm's annual report. According to the Korean Listed Companies Association, an independent director is defined as someone who is *not* any of the following (Chun, 2016):

- 1) Current directors, executives, and employees of the focal firm or anyone who has held these positions within the last two years.
- 2) Spouses or family members of directors, executives and statutory auditors of the focal firm.
- 3) The largest shareholder, anyone "specially related" to the largest shareholder, spouses and family members of the largest shareholder; directors, executives, statutory auditors of the largest shareholder if the largest shareholder is a company.
- 4) The directors, executives, and statutory auditors of firms that the focal firm's directors, executives and statutory auditors serve as executives or directors.
- 5) Directors, executives and statutory auditors of subsidiary, parent or affiliated firms.
- 6) Major shareholders (shareholders who hold more than 10% if the voting rights) and the spouses and family members of major shareholders.
- 7) Directors, executives, statutory auditors or employees of firms

- a) whose total transactions with the focal firm in the last three business years exceeds 10% of its total assets or total sales,
  - b) whose contract amount with the focal firm exceeds 10% of its total sales,
  - c) whose total amount of borrowing, lending or guarantee exceeds 10% of its legal capital.
- 8) Lawyers, accountants, and consultants providing consulting services to the focal firm.
- 9) Associates and partners of accounting, consulting or law firms providing service to the focal firm.

*Institutional ownership* was measured as the percentage of common stock held by domestic institutional investors, which includes insurance companies, securities firms, and merchant banks that are not affiliated with the focal firm (Kim et al., 2008).

*CEO Career Horizon* was measured using a combination of industry-adjusted age and industry-adjusted tenure. Following Lee, Park & Folta (2018),

$$\begin{aligned}
 &CEO\ Career\ Horizon_{i,y} \\
 &= [CEOage_{ind\ avg,y} - CEOage_{i,y}] + [CEotenure_{ind\ avg,y} - CEotenure_{i,y}]
 \end{aligned}$$

### 3.4. Control Variables

*Firm age* was measured as the difference between the year when a firm is observed in the sample and the year the firm went

public (Kim & Song, 2011). *Firm size* was measured as total assets, logged to correct for skewness (Lee & O'Neill, 2003; Chen & Hsu, 2009). *Average industry R&D intensity* was controlled by taking into account the yearly average R&D intensity by industry (Kim & Song, 2011). *Firm risk* was measured by the beta obtained from the capital asset pricing model (David et al., 2001; Chen & Hsu, 2009). *Debt* was measured as the ratio of total liabilities to total capital. *Current liquidity* was measured as the ratio of current assets to current liabilities and represents the amount of funds available for R&D investments (Chen & Hsu, 2009). *Return on Equity (ROE)* was measured as the ratio of net profits to total capital. *Family ownership* was measured as the percentage of common stock owned by members of the founding family (Block, 2012). *Foreign ownership* was measured as the percentage of common stock held by both foreign firms and foreign institutions (Kim et al., 2008). *CEO tenure* was measured as the difference between the current firm-year and the year that the CEO took office. *Year dummies* were included to control for seasonal effects.

### **3.5. Analysis**

The hypotheses were tested using a two-way fixed effects regression with Huber-White sandwich estimators. A two-way fixed effects model was used to control for unobserved firm-level attributes and time effects (Chen & Hsu, 2009). The Hausman test was used to

compare fixed- and random-effects models. Hausman tests performed for each model yielded statistically significant results, suggesting that fixed-effects models were more appropriate than random-effects models. Possible heteroscedasticity is controlled for by using Huber-White sandwich estimators.

Some studies examining R&D intensity used tobit regression models because select firms do not report R&D investments in certain years, making the data left-censored (Chrisman & Patel, 2012). A random-effects tobit model showed that the percentage of observations that were left-censored was only about 5% (50 observations/911 observations). Therefore, taking into consideration both the small percentage of left-censored observations and the robust results from the Hausman tests, we decided that a two-way fixed effects model using Huber-White estimators to control for heteroscedasticity was appropriate. Moreover, most studies that examine R&D intensity as a dependent variable (Block, 2012; Chen & Hsu, 2009; Kim, et al., 2008; Kim & Song, 2011, Kor, 2006) used the Hausman test to determine whether a fixed-effects or random-effects regression model was appropriate.

## **IV. RESULTS**

Table 1 presents means, standard deviations, and correlations among the variables in this study. Multicollinearity does not appear to be a significant problem as the reported variance inflation factor for

each variable is less than 2 (Cohen, Cohen, West & Aiken, 2003).

Table 2 presents the main effect and interaction effects of *potential family successors in the TMT*, *ratio of independent directors*, *institutional ownership* and *CEO career horizon* on R&D intensity. As the base model, Model 1 introduces all of the control variables. Model 2 includes both control variables and the main effect of non-family CEOs. In Models 3 to 6, the interaction variables are entered one at a time. Model 7 presents the full model. The F-Statistic indicates the overall significance of each model.

Hypothesis 1 proposes that within family firms, management by a *non-family CEO* will have a negative effect on R&D investments. In Model 2, the coefficient for *non-family CEO* is negative and statistically significant ( $p < 0.01$ ), providing support for Hypothesis 1.

Hypothesis 2a and 2b present competing hypotheses about the monitoring or pressuring effect of *potential family successors in the TMT*. Model 3 shows that the interaction term between *non-family CEO* and *potential family successors in the TMT* is positive and statistically significant ( $p < 0.01$ ), supporting the monitoring effect of family members in the TMT. Thus, Hypothesis 2a is supported—the negative effect of a non-family CEO on R&D intensity is weakened when there are potential family successors in the TMT.

Hypothesis 3a proposes that the negative effect of a non-family CEO on R&D investments is weakened as the ratio of independent directors increases. Model 4 shows that the interaction term between

**Table 1: Descriptive Statistics and Correlations**

<b>Variables</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>	<b>(9)</b>	<b>(10)</b>	<b>(11)</b>	<b>(12)</b>	<b>(13)</b>	<b>(14)</b>	<b>(15)</b>	<b>(16)</b>
(1) R&D Intensity	1															
(2) Firm Age	0.04	1														
(3) Firm Size	-0.00	0.00	1													
(4) Avg. Ind. R&D Intensity	0.43	0.02	-0.14	1												
(5) Firm Risk	-0.01	0.03	0.35	0.00	1											
(6) Debt Ratio	-0.00	0.02	-0.00	-0.01	0.05	1										
(7) Liquidity Ratio	0.03	0.09	-0.14	0.17	-0.20	-0.02	1									
(8) ROE	-0.01	-0.00	0.03	-0.01	-0.00	-0.94	0.01	1								
(9) Family Ownership	-0.03	0.02	-0.36	0.01	-0.20	0.01	0.20	0.00	1							
(10) Institutional Ownership	-0.01	-0.10	0.33	-0.07	-0.00	-0.10	-0.02	0.09	-0.17	1						
(11) Foreign Ownership	0.02	0.07	0.56	-0.11	0.03	0.01	0.08	0.01	-0.27	0.12	1					
(12) CEO Tenure	-0.01	0.10	-0.18	0.04	-0.20	0.01	0.16	0.01	0.41	-0.00	-0.03	1				
(13) CEO Career Horizon	0.05	-0.10	0.09	0.01	0.11	-0.00	-0.11	-0.02	-0.35	-0.00	-0.03	-0.90	1			
(14) Family Successors in TMT	-0.01	0.08	-0.14	-0.03	-0.10	0.01	0.03	0.00	0.30	-0.10	-0.08	0.19	-0.13	1		
(15) Ratio of Ind. Directors	0.06	0.02	0.60	-0.02	0.23	0.03	-0.11	-0.02	-0.23	0.16	0.29	-0.20	0.13	-0.12	1	
(16) Non-Family CEO	0.11	-0.10	0.28	-0.04	0.09	0.10	-0.08	0.03	-0.32	0.08	0.14	-0.41	0.25	0.03	0.20	1
<b>Mean</b>	2.65	1.18	11.66	2.26	0.81	70.81	224.7	4.49	17.3	4.66	11.85	13.10	-0.57	0.40	0.30	0.50
<b>Std. Dev.</b>	4.38	0.44	0.73	1.91	0.42	1286.1	271	129.7	17.5	8.95	14.3	12.6	17	0.49	0.20	0.50

**Table 2: Regression Analysis of R&D Intensity**

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Firm Age	0.51 (0.33)	0.48 (0.33)	0.47 (0.33)	0.48 (0.33)	0.46 (0.33)	0.52 (0.33)	0.49 (0.33)
Firm Size	1.07 (0.67)	1.19* (0.67)	1.12* (0.67)	1.19* (0.67)	1.25* (0.67)	1.25* (0.67)	1.24* (0.67)
Avg. Ind. R&D Intensity	0.50*** (0.08)	0.52*** (0.07)	0.51*** (0.07)	0.52*** (0.07)	0.52*** (0.08)	0.51*** (0.07)	0.52*** (0.07)
Firm Risk	-0.08 (0.13)	-0.05 (0.13)	-0.04 (0.13)	-0.05 (0.13)	-0.04 (0.13)	-0.04 (0.13)	-0.02 (0.13)
Debt Ratio	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Liquidity Ratio	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)
ROE	-0.01** (0.00)	-0.01** (0.00)	-0.01*** (0.00)	-0.01** (0.00)	-0.02** (0.00)	-0.02** (0.00)	-0.01** (0.00)
Family Ownership	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)	0.01 (0.01)
Institutional Ownership	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02 (0.02)	-0.02 (0.01)	-0.02 (0.02)
Foreign Ownership	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.03 (0.01)	-0.02 (0.01)
CEO Tenure	0.02 (0.02)	-0.01 (0.02)	0.00 (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.02 (0.02)	0.02 (0.02)
CEO Career Horizon	0.01 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	0.00 (0.01)
Family Successors in TMT	-0.09 (0.23)	-0.18 (0.23)	-0.47* (0.25)	-0.18 (0.23)	-0.19 (0.23)	-0.20 (0.23)	-0.51** (0.25)
Ratio of Ind. Directors	1.19* (0.62)	1.09* (0.62)	1.01 (0.62)	1.16 (0.76)	1.07* (0.62)	1.16* (0.62)	0.96 (0.76)
Non-Family CEO		-0.77*** (0.21)	-1.15*** (0.25)	-0.72* (0.38)	-0.85*** (0.22)	-0.77*** (0.21)	-1.31*** (0.42)
Non-Family CEO X Family Successors in TMT			0.70*** (0.26)				0.72*** (0.26)
Non-Family CEO X Ratio of Ind. Directors				-0.16 (0.92)			0.20 (0.92)
Non-Family CEO X Institutional Ownership					0.02 (0.02)		0.02 (0.02)
Non-Family CEO X CEO Career Horizon						0.02** (0.01)	0.02** (0.01)
Constant	-12.06 (7.65)	-12.65* (7.59)	-11.81 (7.56)	-12.73* (7.61)	-13.27* (7.62)	-13.64* (7.59)	-13.32* (7.61)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	911	911	911	911	911	911	911
R-squared	0.16	0.17	0.18	0.17	0.17	0.18	0.19
F-Statistic	9.25	9.71	9.66	9.13	9.19	9.45	8.52

Standard errors in parentheses \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

*non-family CEO* and *ratio of independent directors* is not significant, thus failing to provide support for Hypothesis 3a. Hypothesis 3b proposes that the negative effect of a non-family CEO on R&D investments is weakened as institutional ownership increases. Model 5 shows that the interaction term between *non-family CEO* and *institutional ownership* is positive but not significant, thus failing to provide support for Hypothesis 3b.

Lastly, Hypothesis 4 proposes that the negative effect of a non-family CEO on R&D investments is weakened as CEO career horizon increases. Model 6 shows that the interaction term between *non-family CEO* and *CEO career horizon* is positive and significant ( $p < 0.05$ ), providing support for Hypothesis 4.

#### **4.1. Robustness Checks**

*Family firm definition.* In the family business literature, there are varying definitions of family firms with most of the variation coming from different ownership thresholds. Thus, we tested the main effect (the negative effect of non-family CEO on R&D intensity) under two alternative definitions of family firms. The first definition defines family firms as firms in which founders or their family members control more than *5% ownership* and at least one family member occupies top management positions (Allan & Panian, 1982; Chang & Shim, 2015). The second definition defines family firms as firms in which founders or their family members control more than

*20% ownership* and at least one family member occupies top management positions (Choi et al., 2010). The main effect was supported ( $p < 0.01$ ) for both definitions (results are available upon request).

*CEO Career Horizon Measure.* Although age and tenure are combined in the equation for CEO Career Horizon, the main effects are supported when age and tenure are entered separately. We also used a measure of CEO tenure that used the industry-adjusted median age and median tenure. The main effects continue to be supported (results are available upon request).

*Excluding business groups.* Many Korean firms are part of large business groups, which are often controlled by the founding family (Bae, Kang & Kim, 2002; Kim et al., 2008). These business groups have complex interlocking group structures, in which, group-affiliated firms can share each other's capital. For example, prior studies show that diversified business groups serve as internal capital markets in which group-affiliated firms share each other's financial resources (Leff, 1978; Khanna & Palepu, 1997). This allows group-affiliated firms to invest more capital than they can afford (Hoshi et al., 1991). Because of such characteristics that are unique to business groups, we tested the hypotheses after excluding large business groups (including all of their affiliates) with more than 10 trillion won in assets that are subject to stricter regulations by The Korean Fair Trade Commission. Similar to the results above, all

hypotheses were supported except for hypotheses 3a and 3b (results are available upon request).

*Excluding founders.* Studies have shown that founders possess skills that correlate with traits important for investing in R&D. For example, founders are known to be innovative, risk-taking and proactive. Block (2012) suggested that firms lose some of their entrepreneurial orientations when a second-generation family member succeeds the founder. Moreover, Chang & Shim (2015) found that the entrepreneurial skills of founders are the main drivers of superior performance for their firms. Thus, it's possible that the difference in R&D intensity between family and non-family CEOs is being driven by founders who are also CEOs of the family firm. We tested the hypotheses after excluding founder-managed firms. The main effect continued to be supported (results are available upon request).

## **V. DISCUSSION & CONCLUSION**

This study finds significant differences in levels of R&D spending between family and non-family CEOs. The results indicate that non-family CEOs, on average, invest less in R&D than family CEOs. R&D investments require a long-term perspective because they are highly uncertain, entail significant amounts of risk and have long payoff horizons. However, the short-term focus of non-family CEOs makes them reluctant to invest in R&D over projects that deliver quick results. Moreover, poor investment outcomes can have

detrimental effects on their financial wealth and current employment. Family CEOs, on the other hand, develop a long-term perspective because they act as farsighted stewards of their firm, have lengthy tenures and are less likely to be penalized for bad performance. Overall, this finding suggests that family firms managed by non-family CEOs might experience less than optimal investments in R&D.

This paper also examines interaction effects between CEO type and intentions for transgenerational control, measured as a dummy variable indicating whether the first born son or daughter is present in the TMT. The results show that when potential family successors are active in the TMT, non-family CEOs are significantly more likely to invest in R&D. These results support the argument that potential family successors in the TMT serve to actively monitor the non-family CEO to make investments in R&D. Both family owners and executives have an incentive to ensure that the non-family CEO makes investments for the long-run survival of the firm. Thus, this study provides support for the argument that strong intentions for transgenerational control make non-family CEOs more likely to invest in R&D.

We fail to find support for the mitigating effect that independent directors and institutional owners have on non-family CEOs. While previous research in Anglo-U.S. contexts find support for the effectiveness of independent directors and institutional

ownership, it's possible that these governance mechanisms are not as effective in Korean family firms. Whereas the Anglo-U.S. shareholder model advocates the separation of ownership from management, transparency and democracy in corporate governance, this isn't necessarily the case in Korean family firms, where the family maintains a large presence within the firm (Chung & Luo, 2008). In Korean family firms, family owners and executives have significant influence and authority within the firm (Anderson & Reeb, 2004). Thus, it's possible that the power and influence of the family overrides the influence of independent directors and institutional owners.

Lastly, we find support for the argument that the negative effect of a non-family CEO on R&D investments is weakened as CEO career horizon increases. Non-family CEOs' claims on the firm are limited to their expected tenure with the firm, which also implies that their investment horizons are limited to their expected tenure with the firm (Martin & Davis, 2010). This implies that CEOs who expect to stay longer with the firm are less likely to succumb to short-termism compared to CEOs with shorter career horizons. Thus, the results support the argument that longer career horizons mitigate non-family CEOs' tendency to underinvest in R&D.

## **5.1. Contributions to Theory**

First of all, this study contributes to the family business

literature by examining how non-family CEOs impact family firm R&D. Despite the significant impact of management on strategic outcomes (Cannella, Finkelstein & Hambrick, 2009), past research on family firms did not consider how the distinction between family and non-family CEOs influenced R&D investments. Previous research comparing the R&D spending of family versus non-family firms, assumed that agency costs were lower in family firms because ownership and management were always aligned (Fama & Jensen, 1983; Jensen and Meckling, 1976). However, the validity of this assumption is violated when the CEO is not a family member. When a non-family CEO manages the firm, agency problems increase because of the divergent interests and risk preferences of family owners and non-family managers (Miller & Le Breton-Miller, 2006). As shown by the results of this study, the distinction between family and non-family CEOs has a significant impact on a firm's R&D investments. Thus, by addressing how CEO type (family vs. non-family) impacts firm-level R&D, this study fills a much-needed gap in the literature.

Second, the results from this study advance the literature on professionalization within family firms. Existing research on the professionalization within family firms is preliminary and fragmented (Chua, Chrisman & Sharma, 2003), with most studies focusing on the antecedents of choosing a non-family CEO and their implications for firm performance (Anderson & Reeb, 2003; Bennedsen et al., 2007;

Bloom and Van Reenen, 2007; Mehrotra et al., 2013; Miller and Le Breton Miller, 2005; Miller et al., 2008; Minichilli et al., 2010; Ward, 2004). However, research is surprisingly sparse on the role that professional managers play in family firms' R&D and innovation strategies. This gap is a significant weak point in the literature because not only are non-family CEOs prevalent and essential to family firms (Huybrechts et al., 2012), but R&D and innovation are also crucial for the long-run competitive advantage of the firm (Kor, 2006). This study sheds light on the professionalization within family firms by developing theory and testing how non-family CEOs impact R&D spending.

Lastly, and perhaps most importantly, this study provides support for the importance of using CEO type (family vs. non-family CEO) as a boundary condition for family firm strategies. The distinction between family and non-family CEOs is important because they each have different stewardship motivations, risk preferences, values, goals and even social circles (Huybrechts et al., 2012; Le Breton-Miller et al., 2011). All these differences have significant implications for family firm strategy and thus warrant more attention.

## **5.2. Limitations and Future Research Directions**

This study has several limitations. First, this study relies on observable characteristics to measure families' intentions for transgenerational transfer of control. The presence of a first born son

or daughter in the TMT is just a proxy and therefore, cannot confirm whether the family has real intentions for transgenerational control.

Second, although this study uses a two-way fixed effects panel regression, which controls for unobserved firm and seasonal characteristics, it cannot completely exclude the possibility of endogeneity. For example, firms with high R&D investments may be more likely to appoint a family CEO and firms with low R&D investments may be more likely to hire a professional CEO. To overcome this problem, future studies should consider using more advanced methodologies such as propensity-score matching and difference-in-differences (DID) methods.

Lastly, the results of this study are based on data from Korean manufacturing firms. Although many Korean firms are major players in the global economy, Korea's business landscape is unique because it has numerous family-owned and -controlled businesses as well as large business groups (Kim et al., 2008). Thus, caution should be exercised when generalizing these results to different settings.

Future studies could categorize non-family CEOs into outsider and insider CEOs to uncover additional implications for family firms' R&D investment patterns. This study does not distinguish between non-family CEOs who were hired from within the firm (insider CEO) and those who were hired from outside the firm (outsider CEO) (Zhang & Rajagopalan, 2010). This distinction would have important implications for non-family CEOs' sense of ownership and stewardship

motivations, which would then impact their propensity to invest in R&D. Because insiders have long tenures and have been socialized to the culture of the family firm (Le Breton-Miller et al., 2011), they may develop a sense of ownership over the firm. Stronger stewardship motivations might prompt insider non-family CEOs to think and act like family CEOs, resulting in similar levels of R&D spending. Insider non-family CEOs might also come to revere the family and engage in strategies that are aligned with the family's interests.

Lastly, it would be insightful to examine how family and non-family CEOs' different levels of R&D spending impact innovation outcomes. R&D investments are inputs to the innovation process and thus do not necessarily guarantee innovation (Ahuja, Lampert & Tandon, 2008). Would non-family CEOs be more efficient at converting R&D investments to innovation outcomes? Perhaps their knowledge and experience in related fields equip them with the knowledge to efficiently allocate resources, yielding higher conversion rates. However, it is also possible that family CEOs are more efficient at converting R&D inputs into innovation outputs. Family CEOs have high levels of control, which might allow more efficient decision making and resource allocation (Duran, Kammerlander, Essen & Zellweger, 2016). Thus, future studies could shed light on the innovation process of family firms by examining how CEO type affects the relationship between innovation inputs and outputs.

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국문초록

# 가족기업의 전문경영인이 R&D 투자에 미치는 영향

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본 연구는 대리인 이론 (agency theory)과 청지기 이론 (stewardship theory) 을 통해 전문 경영인 (Non-Family CEO)과 가족 경영인 (Family CEO)이 가족기업의 R&D 투자에 미치는 영향을 살펴보고 있다. 또한 최고경영진(top management team)내에 승계가 유력한 가족 구성원의 유무와 지배구조의 특성(사외이사의 비율과 기관 소유권의 비율)에 따라 R&D 투자가 어떻게 달라지는지를 살펴보고 있다. 마지막으로 최고경영자의 은퇴 시기 (career horizon)에 따라 R&D 투자가 어떻게 달라지는지를 살펴보았다. 이를 위해 2009년에서 2018년까지 유가증권 시장에 상장된 12월 결산 제조 기업을 대상으로 고정 효과 패널 분석을 시행하였다. 그 결과 전문경영인이 경영하는 가족 기업은 가족경영인이 경영하는 가족 기업에 비하여 연구개발투자 집중도가 유의하게 낮게 나타났다. 이 관계는 최고경영진 내의 승계가 유력한 가족 구성원이 있을 경우 그리고 최고경영자의 은퇴시기가 길어질수록 약해지는 것으로 나타났다.

**주요어:** R&D 투자; 가족기업; 전문경영인; 지배구조; 대리인 이론; 가족 승계; 최고경영자 은퇴시기

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