

家族企業、經理人過度自信與創新活動關係之研究

A Study of the Relationship among Family Business, CEO Overconfidence and Corporate Innovation

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摘要：本研究旨在探討家族企業、經理人過度自信與創新活動間之關係，並針對 2001 年至 2007 年 692 家上市上櫃之電子產業進行分析。研究結果發現，家族企業較少創新活動，顯示家族企業由於風險考量、資源不足以因應龐大研發投入，因此較少進行創新研發活動；其次，具過度自信傾向之經理人創

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新行為較高，顯示過度自信經理人會高估報酬與低估風險的態度，會使其偏好高風險的投資計畫（如創新活動），以滿足其對未來樂觀的預期；最後，在經理人態度作為家族所有權與創新活動間調節變項方面，本研究進一步發現，一旦過度自信的經理人加入家族企業後，會弱化家族特性（保守等）對創新活動的負面影響，而提高創新活動，產生正向調節效果，尤其當企業之控制權與所有權偏離程度較低時，經理人過度自信傾向之影響更為明顯。此外，當家族企業之經理人為家族成員，更會強化經理人過度自信對創新活動之正向調節效果。

關鍵詞：家族企業；經理人過度自信；創新活動；調節效果

Abstract : This study examines the relationship among family business, CEO overconfidence and corporate innovation based on analysis of a sample (4,504) of listed electronic firms (692) in Taiwan from 2001 to 2007. The results show that family businesses are less likely than non-family businesses to engage in corporate innovation. The risk aversion and lack of resources that characterize family businesses can lead to weak corporate innovation. In addition, we find that overconfident CEOs prefer innovation activities. It is suggested that overestimation of returns and underestimation of risk due to CEO overconfidence leads to investment in risky innovation activities in order to meet optimistic expectations. Finally, investigation shows that when an overconfident CEO is employed in a family business, his/her overconfidence will have a positive moderating effect that enhances corporate innovation, especially in the firms with relatively little deviations from control rights and ownership. Furthermore, a family member serving as CEO with overconfidence in a family business will strengthen the positive moderating effect of managerial overconfidence on innovation activities.

Keywords : Family business; CEO overconfidence; Corporate innovation,
Moderating effect

1. Introduction

Innovation, which results in changes in corporate strategy and competitive advantages, directly influences the strategy and the core competence of a firm. However, previous related studies have focused on organizational and environmental features, rather than the individual properties of top managers. Lin *et al.* (2005, 2008) found that the manager's properties, such as optimism², can affect financing and investment decisions. The managers' background and attitudes have an influence on organizational innovation, structure, culture and procedure (Lewin and Stephens, 1994), suggesting that the individual characteristics of top managers play an important role in corporate innovation strategy.

Previous research results have provided support for the effect of ownership heterogeneity on corporate innovation strategies. Those in charge of public pension funds tend to focus on internal innovation while those in charge of professional investment funds prefer external innovation (Hoskisson *et al.*, 2002). In addition, the ownership type, family or non-family, plays a vital role in corporate management around the world. Shanker and Astrachan (1996) have found that about 20 million firms are family-controlled. About one-third of S&P 500 corporations are controlled by founding families holding 18% ownership. 67% of firms in Australia and 68% in Italy are family-controlled (Anderson and Reeb, 2003). In East Asian countries over 50% of the firms are controlled and managed by families (Tan and Fock, 2001).

Family business is often characterized as being controlled by family management. In other words, one of the family members is appointed to be the CEO and will become the dominant information provider (Ahlstrom *et al.*, 2004; Lien *et al.*, 2005; Chen, 2001). The individual characteristics of family CEOs influence corporate investment decision more than do those of non-family CEOs,

² Following Heaton (2002) and Malmendier and Tate (2005), we infer the CEOs' beliefs about the future performance of their company from their personal portfolio transactions. The term "overconfidence" is used in this paper regardless of whether the biased beliefs derive from optimism or overconfidence.

especially when managerial biases exist, such as CEO overconfidence (Malmendier and Tate, 2008). Recent studies have focused on personal characteristics such as the education background (Forbes, 2005) or institutional logic provided by family (Bhappu, 2000)³. Yet, because they have not examined the effect of CEO overconfidence on the decision making process in family and non-family corporations, the effect of CEO overconfidence has not been ascertained in these studies.

Innovation represents the future growth opportunity and survival of a firm (Ayadi *et al.*, 1996; Hill and Snell, 1988). However, innovation is risky and costly, and leads to longer investment horizons without certain revenue, which induces the managers' personality to affect the corporate innovation strategy. Managerial optimism is significantly related to corporate financing decisions (Lin *et al.*, 2005, 2008). Optimistic managers are more likely to accept negative NPV projects, which damages firm value. In family firms, the classic owner-manager conflict (type I agency problem) is not present; family CEOs act as stewards, managing their company based on their own expectations and vision (Davis *et al.*, 1997). Therefore, family CEOs may demonstrate different corporate decision making than non-family CEOs in relation to risky investment, because they feel responsible for the family's reputation and the need to maintain a long-term presence (Amihud and Lev, 1999; Fox and Hamilton, 1994). On the other hand, previous studies indicate that people are more optimistic about outcomes that they believe they can control (Weinstein, 1980). Consistent with Weinstein (1980), evidence reveals that managers underestimate the level of uncertainty, believing that they have great control over the firm performance than they actually do (March and Shapira, 1987). Managers are more optimistic about outcomes when they are highly committed to a firm's success (Gilson, 1989). Consequently, this study examines the effects of family ownership, and managerial behavior and attitudes on investment decisions for risky projects-corporate innovation activities.

³ Bhappu (2000) have found that the Japanese family provides the institutional logic for Japanese corporate networks and Japanese management practices. Furthermore, the historical actions of individuals in Japanese corporations are indicative of a strategy to sustain and nurture their social capital.

In addition, the moderating effect of managerial overconfidence on family ownership and innovation activities is further tested. The results should fill a gap in the related literature.

Our study makes the following contributions. First, previous studies have emphasized the influence of family ownership on firm performance, rather than on corporate innovation. Firm value mainly results from innovation activities which enhance competitive advantages and operating performance. However, the uncertainty and substantial capital expenditure required for innovation are inconsistent with other characteristics of family firms such as conservatism and lack of resources. Therefore, it is meaningful to investigate the relation between family ownership and corporate innovation. Furthermore, most firms in Taiwan, an area famous for its technological orientation, are family-controlled. Our findings should be helpful to assist government authorities and management to obtain a better understanding of corporate innovation.

Second, research related to behavioral finance has focused on the investors' expectation, instead of the managers' considerations. However, recent studies indicate the impact of managers' attitudes on corporate decision. Heaton (2002) have explored the relation between managerial optimism and corporate decision making in efficient capital markets. Based on Heaton (2002), Lin *et al.* (2005) have found that, in more financing constrained firms, optimistic managers exhibit higher investment-cash flow sensitivity than do non-optimistic managers. Managerial optimism can also lead to pecking order preference in financing decisions (Lin *et al.*, 2008). In addition, Goel and Thakor (2008) have examined the effect of CEO overconfidence on corporate governance, suggesting that the board will lay off CEOs who demonstrate excessive diffidence and excessive overconfidence. We attempt to examine the impact of CEO overconfidence on corporate innovation, since the individual characteristics of CEOs play an important role in corporate decision making. To the best of our knowledge, we are the first in Taiwan to explore whether CEO overconfidence is one of the dominant factors affecting corporate innovation activities.

Third, we mainly focus on the moderating effect of CEO overconfidence on the relation between family business and corporate innovation. Regarding innovation

activities, the goals of family business, family mission and inheritance of family descendants, may be different from the traditional goal: maximization of stockholder wealth. The related evidence is scarce, and therefore we attempt to explore how CEO overconfidence affects innovation activities in family firms.

The sample includes 692 listed and OTC electronic firms from 2001-2007. The final sample consists of 4,504 observations. The results show that family businesses are less likely than non-family businesses to engage in corporate innovation, indicating that this risk aversion and lack of resources of family businesses lead to weak corporate innovation. In addition, we find that an overconfident CEO prefers more innovation activities, especially when there is relatively low divergence between control right and ownership, which is consistent with Papadakis and Bourantas (1998). It is suggested that CEO overconfidence causes investment in risky projects (e.g., innovation) in order to meet optimistic expectations. Finally, consistent with the arguments of Zahra (2005), CEO overconfidence will have a positive moderating effect that enhances corporate innovation when they are employed in a family business, especially when there is no or relatively low deviation from control rights and ownership. Furthermore, a family member serving as CEO that is overconfident would strengthen his/her positive moderating effect on innovation activities in family firms. We infer that family members have strong incentives to engage in innovation activities in order to create and sustain family wealth (Zahra, 2005). Moreover, since family CEOs pay much attention to the family's reputation and performance, they are likely to be optimistic (Miller and Le Breton-Miller, 2005). The evidence also shows that non-family CEOs in family business do not have a positive moderating effect on innovation, because they may feel monitored by family members, although family input does mitigate the problem of owner-manager conflict in family business. This is consistent with the arguments of Solomon *et al.* (2003)⁴.

⁴ Solomon *et al.* (2003) argue that it is likely that many company directors in Taiwan are uncomfortable with high levels of family control. Although they themselves are often selected by family members, they may not be related. They may therefore feel that their position and decision-making ability is hindered by family interference.

The rest of the paper is organized as follows. In Section 2 we review the literature and develop our hypotheses. In Section 3 we describe our data and methodology. The main results and an analysis of the robustness are presented in Section 4 while some conclusions are offered In Section 5.

2. Literature Review and Hypothesis Development

Innovation activities require long-term investment horizons (Bange and De Bondt, 1998) and have a high degree of uncertainty (Pisano, 1989). Also, the outcomes are difficult to value. Previous Studies found the return on R&D investment to be about 33%, and that it takes at least five years to gradually gain the profits. Furthermore, expenditure is substantial during the period of R&D development. This ambiguity involved in innovation enhances the managers' power of decision making in R&D, and increases the degree of information asymmetry between owners and managers, resulting in agency problems (Ryan and Wiggins, 2002). In addition, R&D expenditure also worsens information asymmetry and reduces corporate profits, which act as a negative signal to the market to decrease the firm value. It is also possible that the benefits of R&D will not be recognized if firms encounter the financial distress or if they have relatively high financial leverage, even though, as suggested by Bhagat and Welch (1995), R&D activities result in the future benefits. Thus, uncertainty is one of the dominant factors in R&D decision making.

Family-controlled firms are prevalent in Asia. Claessens *et al.* (2000) find that about 50% of the firms are controlled by families. Concentration of family ownership induces different agency problem (Yeh, 2005). Compared to western family firms, in Chinese society, management in family firms is heavily influenced by Confucianism (Yen, 1994). Chinese are highly committed to their family and the corporation is like an extension of the family system (Zapalska and Edwards, 2001). The relationships between relatives are quite important in Chinese family firms (Chen, 2001). Consequently, the usage of corporate resources is influence by personal familial relationships, loyalty and altruism, and these three elements create value in family firms (James, 1999a). Therefore,

families are in an uncommonly powerful position to exert influence and control over the firm, leading to potential innovation differences from nonfamily firms.

2.1. The Effect of Family Ownership on Corporate Innovation

We examine the innovation activities in family firms from the perspectives of type II agency problem arising from the conflict between majority and minority shareholders, altruism and resource-based theory.

Ali *et al.* (2007)⁵ suggest that ownership concentration would mitigate type I agency problems but worsen type II agency problems. Yeh (2005) indicates that when families not only own but also operate the company, it alleviates type I agency problems. Zahra (2005) also reports the same evidence, that when the large shareholder is present in the family firm as management, type I problems will be mitigated. The alignment of interests between management and shareholders reduces agency costs, which allows for the input of more resources into innovation activities. In this scenario, family firms' ownership structure also leads to continuity, encouraging investment in long-term development, rather than short-term returns (Zahra *et al.*, 2008). However, it has been argued in several studies that the concentration of ownership in family firms induces a tradeoff between type I and type II agency problems (Anderson and Reeb, 2003; Tsai *et al.*, 2006; Villalonga and Amit, 2006). The large shareholder may use their controlling position in the firm to extract private benefits at the expense of the small shareholders, especially from short-term and risky investments. Therefore, family firms are less likely to engage in long-term R&D activities when ownership is concentrated and there is divergence between control rights and ownership.

As for altruism⁶, founding families view their firms as assets to pass on

⁵ Ali *et al.* (2007) suggested that the non-family firms have more serious type I agency problems but less serious type II agency problems than family firms do. Specifically, the difference in agency costs between family and non-family firms due to Type I agency problems dominated the difference in agency costs across family and non-family firms due to Type II agency problems.

⁶ Schulze *et al.* (2002) defined altruism as a moral value that motivates individuals to undertake actions that benefit others without any expectation of external reward. Altruism thus compels parents to transfer resources to their children, since to refrain from doing so would harm the altruist's welfare.

down to their descendants, instead of wealth to consume. The survival of the firm is thus an important concern for families (Zahra *et al.*, 2000; Anderson and Reeb, 2003), giving them the potential to advocate long term value maximization. Altruism induces common beliefs among family members and strengthens the link between the children's welfare and the family's. This belief encourages family members to align managerial attitudes toward long-term investment with growth opportunities, instead of short-term benefit (Bruton *et al.*, 2003). However, family firms might well reduce investment in R&D to avoid the loss of family wealth under inheritance considerations (Sharma *et al.*, 1997). Yeh *et al.* (2001) also argue that family-controlled Taiwanese companies tend to be conservative and therefore less likely to invest when risk is high, which might harm the firm value. Furthermore, family members are highly committed to their corporate mission, employees and shareholders (Miller and Le Breton-Miller, 2005). In short, the goal of the chairman and management is organizational and maximization of family wealth. Family firms tend to evaluate investment projects prudently in order to achieve the common vision among family members, thereby reducing R&D investment (Donaldson and Davis, 1991; Davis *et al.*, 1997; Fox and Hamilton, 1994).

From the resource-based perspective, substantial human and financial resources are needed for innovation, but this does not guarantee the achievement of a competitive advantage. It is also necessary to create corporate core competence and promote investment efficiency. Family firms suffer weak innovation as a result of the lack of human and financial resources. Semkow's (1994) findings show that when non-family employees are interfered with by the family or when family members serve in management, this has a negative impact on firm value. Family management seeks to avoid external finance in order to maintain their positions and control rights (Górriz and Fumás, 2005; Sirmon and Hitt, 2003), thereby decreasing their capital resources. James (1999b) has suggested that family companies rely on internal resources, instead of external market resources, for investment. Therefore, family firms tend to utilize their funds more prudently when involved in risky investment-innovation.

To sum up, according to resource-based theory, family firms suffer weak innovation due to the lack of human and financial resources. On the other hand, from the perspectives of agency theory and altruism, family firms experience both positive and negative incentives to be involved in innovation. However, the regulatory and cultural environments also have an influence on corporate investment decisions. Weak investor protection exists in Taiwan because multiple share classes with pyramids and crossholdings are prevalent in Taiwanese family firms (Yeh *et al.*, 2001; Lee and Ma, 2006), and the corporate governance mechanism is immature (Hung, Chen and Ke, 2005). In this type of situation, agency conflicts between controlling and minority shareholders worsen (Wei and Zhang, 2008), which facilitates the expropriation of minority shareholders. Thus, family firms are less likely to engage in long-term and risky innovation activities.

H1: Family businesses are less likely than non-family businesses to engage in corporate innovation.

2.2. The Effect of CEO Overconfidence on Corporate Innovation

Behavioral approaches are now common in asset pricing, but little work has been done in the area of corporate finance (Heaton, 2002). Several recent studies have applied behavioral approaches to the process of making corporate financial decisions. According to Heaton (2002) and Lin *et al.* (2005, 2008) with managerial optimism, there is a tradeoff effect between underinvestment and overinvestment related to free cash flow without invoking asymmetric information or rational agency costs.

The degree of managerial overconfidence depends on a self-serving bias, including biased inferences or assumptions. The link between managers' decisions and firm benefits induces a self-serving bias for entrepreneurs starting their own business. Therefore, overconfidence is embodied not only in the way a business is started but also the way corporate decisions are made. There are three features of overconfidence. First, managers are more optimistic about the outcomes that they believe they can control (Weinstein, 1980), and when they have greater control over firm performance (March and Sharpia, 1987). Second, managers are

generally highly committed to the firm's success due to their wealth, professional reputation, and employability (Gilson, 1989; Weinstein, 1980). Third, managers are prone to overconfidence and exaggerate their skills when sources of private information are too abstract or too ambiguous to be confirmed (Alicke *et al.*, 1995; Larwood and Whittaker, 1977). Jensen and Meckling (1976) and Roll (1986) have suggested that managers tend to be overconfident due to self-hubris.

According to Heaton (2002), free cash flow results in overinvestment because optimistic managers think that this type of cash flow is flexible, and they believe that the capital market underestimates firm value, which however is overestimated by optimistic managers. In other words, managerial overconfidence leads to investment in negative NPV projects when free cash flow is sufficient.

Innovation motivates corporate growth, but the process is complex and success is difficult to achieve (Avermaete *et al.*, 2003). However, overconfident managers believe that they can control this high degree of uncertainty (Weinstein, 1980) so are willing to engage in innovation. In addition, optimistic managers are confident of positive outcomes (Weinstein, 1980). Their professional reputation relies on the firm's success. Hence, overconfident managers prefer innovation because they would like to maintain and create individual wealth and reputation, and they believe they can control the outcome of innovation.

H2: An overconfident CEO prefers more innovation activities.

2.3. The Relationship among Family Ownership, CEO Overconfidence and Corporate Innovation

Family CEOs evaluate long-term investment projects prudently based on altruism, and therefore will not pursue short-term projects with high returns but high risk. Moreover, family firms emphasize good strategy development for firm survival and ensured inheritance. They may suffer from financial constraints because they are reluctant to raise funds externally in order to maintain their controlling positions. Consequently, family firms are less likely to engage in innovation.

However, overconfident CEOs believe that the outcomes are actually under their control and are therefore willing to be involved in innovation activities (Weinstein, 1980). The employment of overconfident CEOs has an impact on the family firm's strategy and management style and enhances innovation investment. We thus hypothesize that CEO overconfidence positively moderates the influence of family business on corporate innovation.

H3: CEO overconfidence positively moderates the influence of family business on corporate innovation.

3. Research Method

3.1 Data Sampling and Modeling

The firm-year sample in this study is comprised of listed electronics industry firms in Taiwan from 2001 to 2007. The financial information is acquired from the Taiwan Economic Journal (TEJ) database; patent information is from the Intellectual Property Office of the R.O.C.

R&D and innovation have widely been recognized as the driving factors for creating value and sustaining competitiveness in the electronics industry, as well as important input for management and business performance. Therefore, the intension of R&D in the electronics industry in Taiwan is higher than 3.5% (Lee and Su, 2009).

Liu *et al.* (2005) study the R&D performance of listed companies in Taiwan. They find the number of accumulated patents in the electronics industry to be 14,847 but there are only 2,757 in the other industries. This indicates that the innovation input in the electronics industry is seven times higher than in other industries. Therefore, we select the electronics industry as our sample to examine the relationship among family business, CEO overconfidence and corporate innovation.

Previous literature suggests that most family electronics firms are not innovation-oriented (Upton *et al.*, 2001; Morck and Yeung, 2003). On the other hand, Zahra (2005) finds that family firms are more likely to involve in

innovation. These inconsistent results are induced by industry differences. Therefore, in this study we test family innovation only in the electronics industry to avoid cross-industry interference.

This study examines the relationships among family business, CEO overconfidence and corporate innovation, following the work carried out by Tidd (2001), Liu *et al.* (2005) and Wang *et al.* (2008). The fixed year effect is also controlled (Galasso and Simcoe, 2011). Our model can be specified as follows:

$$INNO_{it} = B_0 + B_1FB_{it} + B_2OC_{it} + B_3FB*OC + B_4GR_{it} + B_5ROE_{it} + B_6PT_{it} + B_7Tobin's Q_{it} + B_8DEBT_{it} + B_9Year_i + \varepsilon_{it} \quad (1)$$

$$INNO_{it} = C_0 + C_1FBCEO_{it} + C_2OC_{it} + C_3FBCEO_{it} \times OC_{it} + C_4GR_{it} + C_5ROE_{it} + C_6PT_{it} + C_7Tobin's Q_{it} + C_8DEBT_{it} + C_9Year_i + \pi_{it} \quad (2)$$

where *i* and *t* represent firm and year, respectively; ε_{it} and π_{it} are the residuals of the model; while ε_{it} and $\pi_{it} \sim N(0,1)$.

Model (1) is used to test hypothesis 1, which examines the effect of family business and non-family business on innovation. We expect a negative coefficient for B_1 and a positive one for B_2 . The positive moderating effect (B_3) is predicted.

Model (2) is used to verify the effect of overconfident family CEOs on innovation. According to the degree of ownership divergence, we test whether the deviation of control from cash flow rights will affect innovation in family firms. First, the sample is divided into two groups according to zero or non-zero deviation. Furthermore, in the non-zero deviation group, the sample is divided into high and low deviation subgroups based on the median.

3.2 Dependent and Independent Variables

(1) Innovation (INNO)

We use the research and development expenditures divided by net total sales as a measure of innovation, followed by Tidd (2001); Liu *et al.* (2005); Wang *et al.* (2008).

(2) Family business (FB)

The family business dummy equals 1 if the number of seats on the board of

directors occupied by family members exceeds 50%⁷ and the sum of the voting power held by family members exceeds 20%⁸. The criteria for judging who has “ultimate control” are derived from those used by La Porta et al. (1999) and Yeh (1999).

(3) CEO overconfidence (OC)

Following Malmendier and Tate (2005), our measures of CEO overconfidence are built on CEOs' personal investment decisions to construct a proxy for overconfidence, or systematic over-estimation of the returns to holding stock in their own firm. Specifically, we consider the subsample of CEOs who keep their position for at least 3 years. CEOs are identified as overconfident if they are net buyers of company equity during these years, that is, if they are net buyers of stocks in more years than they sell during this time period. CEO overconfidence (OC) is indicated by the dummy variable "1"; "0" otherwise.

(4) Family CEO (FBCEO)

If a family member serves as CEO in the family firm, then we set FBCEO to be 1; "0" otherwise.

3.3 Control Variables

We include a variety of control variables obtained from the literature review in our model, including growth (GR), firm profitability (ROE), patents (PT), firm value (Tobin's Q), debt ratio (DEBT), the ratio of deviations of control from cash flow rights (DEV).

(1) Growth (GR)

Anthony and Ramesh (1992) show that capital expenditure is a function of firm life cycle. Growth (GR) controls for the effect of firm life cycle on innovation. The variable is defined as the growth rate of the realized gross profit margin (Anthony and Ramesh, 1992; Porter, 1980).

(2) Firm profitability (ROE)

⁷ Following Lee and Ma (2006), most of the spouses involves in the management or the boards of directors in Taiwanese family groups.

⁸ Following La Porta *et al.* (1999), we use the summation of direct and indirect ownerships to measure this voting power. The indirect ownership represents the ownership in the end of the controlling chain.

Branch (1974) find that profits may influence subsequent R&D, and R&D may influence subsequent profits. Profitability is measured as net income after taxes divided by total equity (Young *et al.*, 2008).

(3) Patents (PT)

Lev (2001) argues that patents may prevent other firms from copying and are needed in order to maximize profits of R&D. Therefore, patents are the middle product derived from R&D and will push businesses to engage in more corporate R&D and innovation. However, Liu *et al.* (2005) indicate that the output of R&D can feedback to the original factor, then be revised and improve management factor which are helpful for increasing performance.

(4) Firm value (Tobin's Q)

Firms with better growth opportunities should exhibit higher expenditures for R&D. We use Tobin's Q to measure firm value, which represents the firm's market value of equity plus its book value of debt less its book value of current asset divided by the book value of total assets (Lang and Stulz, 1994; Yermack, 1996; Tu *et al.*, 2002; Wang *et al.*, 2008).

(5) Debt ratio (BEBT)

Zantout (1997) has pointed out that there is a positive relation between debt ratio and R&D expenditure, and supports the hypotheses of debt as a monitor. We control for the effect of debt on innovation using total debt divided by total asset (Wang *et al.*, 2008; Young *et al.*, 2008; Zantout, 1997).

(6) Deviations of control from cash flow rights (DEV)

Following La Porta *et al.* (1999), Yeh and Woidtke (2005), we estimate the deviation of control from cash flow rights captured as control rights less cash flow rights.

3.4 The moderating Effect

A moderator is a quantitative or qualitative variable which impacts the direction and/or strength of the relation between an independent variable and a dependent variable. Moreover, a moderator is a variable which alters the direction of the relation between a predictor and an outcome (Baron and Kenny, 1986).

The study investigates the impact of the type of ownership on innovation activities. The interaction term, $FB*OC$, is used as a moderator to predict the effect of managerial overconfidence on innovation activities. Weinstein (1980) argues that overconfident managers tend to believe that future outcomes are under their control and so are likely to engage in innovation activities. If an overconfident manager is employed in a family business, this can change strategy and management and affect innovation activities. Managerial overconfidence can moderate the effects of ownership style on innovation. Therefore, we expect a positive coefficient for the interaction term $FB*OC$ and B_3 to be positive.

In addition, we want to test the specific effect of CEO overconfidence in family firms. When family members serve as CEO, the $FBCEO$ is set to be 1; 0 otherwise. In family businesses, most non-family CEOs are employed by family directors and therefore they are often monitored by family members, which hinders their attitudes and personality. On the other hand, family CEOs operate family business for firm survival, thus they will emphasize firm reputation and performance. Therefore, they will tend to be overconfident about their decisions (Miller and Le Breton-Miller, 2005). We expect the family CEOs with overconfidence to have a positive effect on innovation, that is, C_3 is positive.

4. Empirical Results

4.1 Descriptive Statistics

Our sample includes data on 692 electronics firms listed in Taiwan from 2001 to 2007. Excluding firms with missing data, we have a total of 4,504 observations. It can be seen in Table 1 that the mean of family firm (FB) is 26% meaning presents that 26% of the firms in the electronics industry are family firms. The mean of the CEO's overconfidence (OC) is 34%, indicating that 34% of CEOs in the electronic industry are overconfident. The mean (median) ratio of innovation activities (INNO) is 5% (3%) meaning that electronics firms rely on innovation to enhance competitive advantage. The mean of deviation level (DEV) between control rights and cash flow rights is 6.67%. Also, the minimum ratio is 0 (no deviation), while the maximum one is 95.59%. Moreover, 19.40% (874/4,504)

of firms in our sample have a zero deviation level meaning that around 80% of electronics firms have a deviation from control and cash flow rights. The mean of growth (GR) is 15%. The mean of profitability (ROE) is 6% which is similar to the innovation ratio. The mean (median) of the number of patents (PT) per year is 51.91 (2.00). This indicates that electronics firms focus on applying patents. The mean (median) of firm value and debt ratio is 0.71 (0.73) and 0.39 (0.38), respectively.

Table 1
Descriptive Statistics

Variable	Mean	Med.	Min.	Max.	Std.
Family Businesses (FB)	0.26	0.00	0	1.00	0.44
Overconfidence (OC)	0.34	0.00	0	1.00	0.47
Innovation (INNO)	0.05	0.03	0	7.00	0.14
Deviation (DEV)	6.67	2.18	0	95.59	11.23
Growth (GR)	0.15	0.18	-1.82	0.99	0.29
Firm Profitability (ROE)	0.06	0.11	-9.04	1.90	0.41
Patents (PT)	51.91	2.00	0.00	15374	501.55
Firm Value (Tobin's Q)	0.71	0.73	0.04	1.00	0.15
Debt Ratio (DEBT)	0.39	0.38	0.00	1.89	0.17

Note: Innovation represents the ratio of R&D to Net Sales; Patent's measurement unit is number; deviation's measurement unit is %.

In addition, the sample is classified into two groups based on median of control-ownership deviation. The mean value of deviation in family firms is 28.24% with high deviation and 2.11% in family firms with low deviation. This indicates that the deviation of control from cash flow rights exists in family firms in the electronics industry. Furthermore, according to previous studies, family firms are usually associated with type II agency problems (La Porta *et al.*, 1999; Tan and Fock, 2001). Kao *et al.*, (2006) find that the deviation of control from cash flow rights is large in the electronics industry and families acquire controlling positions through complex ownership structure and pyramid structure. To sum up, although only 26% of firms in the electronics industry are family firms, the deviation of control from cash flow rights can be attributed to family businesses in the electronics industry.

Table 2
Pearson's Correlation

	OC	FB	INNO	DEV	GR	ROE	PT	Tobin's Q	DEBT
OC	1								
FB	-0.04*	1							
INNO	0.07**	-0.06**	1						
DEV	0.01	0.10**	0.38*	1					
GR	0.02	-0.04**	0.02	0.04**	1				
ROE	0.00	0.02	-0.06**	-0.02	0.06**	1			
PT	0.06**	0.05**	-0.00	0.05**	0.00	-0.01	1		
Tobin's Q	0.06**	-0.01	0.17**	0.01	-0.01	0.19**	0.04*	1	
DEBT	-0.08**	0.02	-0.17**	-0.02	-0.01	-0.26**	-0.03	-0.83**	1

Note: ***, **, and * indicate the significance level at the 1%, 5%, and 10%, respectively.

Table 2 shows that overconfidence (OC) is significantly and positively correlated with innovation (INNO). There is a significantly negative relation between family business (FB) and innovation (INNO) at the 5% level, consistent with our hypothesis. In addition, the deviation level (DEV) is significantly and positively linked to family business (FB), providing an important relation between deviation and family businesses. Most correlation coefficients of control variables (except the DEBT and Tobin's Q) are low, showing there are lesser multi-collinearity problems. Moreover, the study examines the Variance Inflation Factors (VIF) of variables; the results reveal that all values are less than 10, indicating negligible multi-collinearity problems.

4.2 Univariate Test

It can be seen in Table 3 that the mean difference in innovation activity (CEO overconfidence) between family and non-family business is 0.35 (0.31), significant at the 5% level. Family businesses have less enhanced innovation and hire less overconfident CEOs than nonfamily businesses. These results are consistent with previous findings in Goel and Thakor (2008). Furthermore, family businesses prefer to employ family members to be their CEOs, which do not consider their ability and performance (Schulze *et al.*, 2003). In contrast, non-family businesses tend to employ CEOs from the professional labor market

Table 3
Univariate Analysis - Variable Comparison

Variable	Family business	Non-family business	Mean difference (<i>t</i> -value)
OC	0.31	0.35	-0.04 ** (-2.57)
INNO	0.03	0.05	-0.01 *** (-4.83)
DEV	8.52	6.02	2.50 *** (5.24)
GR	-5.55	21.42	-26.96 *** (-3.58)
ROE	0.06	0.05	-0.01 (1.29)
PT	93.69	40.96	52.73 *** (2.99)
Tobin's Q	0.70	0.71	-0.01 (-0.28)
DEBT	0.38	0.37	0.07 (1.41)

Note: *t*-values are presented in parentheses; ***, **, and * indicate the significance level at the 1%, 5%, and 10%, respectively.

based on ability and expert knowledge. Therefore, there are more overconfident CEOs in non-family businesses than in family businesses.

In addition, the results from the effect of ownership style on innovation show that the innovation ratio in family businesses is 0.03, which is significantly lower than the 0.05 of non-family businesses at the 1% level. These results support our hypothesis. This suggests that family businesses engaged in less R&D, because of an aversion to risk and scarce resources. The control variable results indicate that there is a significant difference in growth (GR), patents (PT) and deviation (DEV) between family and non-family samples. This means that differences in ownership structure will affect management, especially, family and nonfamily businesses⁹. More importantly, the deviation level (DEV) of control and cash flow rights is larger in family than nonfamily businesses. This suggests a significant difference in the deviation between family and nonfamily businesses. Thus, we go a further step to examine the deviation level.

⁹ We are grateful for the anonymous reviewer's suggestions.

4.3 Tests of the Hypotheses

An OLS regression is used with a time fixed effects approach to estimate the effect of CEO overconfidence on the relation between family ownership and innovation.

Table 4
Family Ownership, CEO Overconfidence and Innovation (model 1)
- Full Sample

Variables	I	II	III	IV
C	0.07** (2.20)	0.06 (1.59)	0.06* (5.39)	0.04** (2.33)
FB	-0.02*** (-3.58)		-0.02*** (-3.11)	-0.01*** (-4.39)
OC		0.02*** (2.98)	0.02*** (2.87)	0.00 (0.59)
FB×OC				0.01** (2.04)
GR	0.00 (1.20)	0.00 (1.14)	0.00 (1.02)	0.00*** (18.93)
ROE	-0.04*** (-6.41)	-0.04*** (-5.78)	-0.04*** (-5.71)	-0.05*** (-14.82)
PT	0.00 (0.79)	0.00 (0.49)	0.00 (0.60)	0.00* (1.89)
Tobin's Q	0.06** (2.08)	0.06* (1.86)	0.06** (1.92)	0.02* (1.71)
DEBT	-0.13*** (-4.72)	-0.13*** (-4.14)	-0.13*** (-4.06)	-0.06*** (-4.79)
YEAR	Yes	Yes	Yes	Yes
Adj.R²	0.05	0.05	0.05	0.27
F-value	13.97	11.12	11.04	64.47
Obs.	3081	2481	2481	2481

Note: This table presents the regression results for family firm and CEO overconfidence on innovation for 692 TSE electronics firms over the period 2001-2007. The dependent variable is innovation, measured as R&D expenditure divided by net total sales. The independent variable is FB, which equals 1 if the number of seats on the board of directors occupied by the family members exceeds 50% and the sum of the voting power held by family members exceeds 20%; OC, equals 1 if CEOs were net buyers of company equity for three years; FB*OC, represents the moderating effect of CEO overconfidence between family business and innovation; GR is the growth rate or realized gross profit margin; ROE, net-income after taxes divided by total equity; PT indicates the number of patents; the Tobin's Q is measured by the market value of equity plus the book value of debt less the book value of current assets divided by the book value of total assets; DEBT is total debt divided by total assets; YEAR indicates the year fixed effect; t-values are presented in parentheses; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 shows the results for model 1. In column I, we can see that there is a significantly negative relationship between family business (FB) and innovation (INNO). The coefficient of FB is -0.02 and significant at the 1% level, suggesting that family businesses engage in less innovation. This results support Hypothesis 1. Our evidence shows that family businesses cannot afford to make huge expenditures on innovation because of their lack of human and financial resources. On the other hand, they prefer to have family members serve in management. This can result in management with the lack of professional knowledge and skills. Moreover, innovation ambiguity and uncertainty mean that in pursuit of firm survival family firms hesitate to invest in long-term innovation activities.

Column II of table 4 shows that the relation between overconfidence (OC) and innovation (INNO). OC (0.02) is positively significant at the 1% level, suggesting CEO overconfidence. This result supports Hypothesis 2, which posits that overconfident CEOs are more likely to engage in innovation activities because they are confident that their decision will lead to the making of huge profits for the firm. As shown in column III of Table 4, FB is negatively related to INNO at the 1% significance level, and the relation between OC and INNO is significantly positive at the 1% level. These results are similar to those in column II and confirm the robustness. Finally, we test the moderate effect of overconfidence (OC) on the relation between family business (FB) and innovation (INNO). The coefficient of FB*OC is 0.01 and is significant at the 5% level, which supports Hypothesis 3. The evidence shows that CEO overconfidence enhances the degree of innovation in family business.

We also control for firm characteristics. In column IV, it can be seen that firm growth (GR) is positive and significant at the 1% level. This suggests that growing firms need more innovation in order to reach their goals and to create core value as well as to obtain competitive advantages in the electronics industry. Firm profitability (ROE) is negatively related to firm innovation at the 1% significance level. Branch (1974) shows that profits may influence R&D and vice versa. Sougiannis (1994) also suggests that R&D has a leading effect on subsequent net income and stock prices for the next 7 years. Therefore, the effect of R&D on profit will appear in the future and that periods of R&D are periods of

high expenditure and periods of low profit. Thus, innovation had a negative effect on profits in the current year. Lev (2001) argues that patent protection is useful for encouraging innovation and can help to avoid being copied by other firms. However, the performance of innovation, namely patents, can feed back to revise and improve the original impact factor, leading to better performance. That is, patents have a negative effect on innovation (Liu *et al.*, 2005). The results show a positive relation between patents (PT) and innovation (INNO), indicating that patents can increase innovation. Firm value (Tobin's Q) is positively associated with innovation, suggesting that a higher level of firm value will lead to a higher level of innovation in the electronics industry. The coefficient of DEBT is negative and significant at 1%, indicating that a higher debt ratio represents a higher probability of bankruptcy which constrains business resources needed for innovation.

Table 5 shows the relation among family ownership, overconfidence and innovation in family business. Based on the degree of deviation, we also divide the sample into 3 subsamples (no deviation, low deviation and high deviation). Each subsample has 441, 1,078 and 952 firm-year observations, respectively.

In table 5, we find that family firms (FB) with no deviation, high deviation and low deviation all have significantly negative effects on innovation (INNO) at the 5% level. In addition, the coefficients on FB*OC are 0.02 and 0.02 in column I (no deviation) and column II (low deviation), significant at the 10% and 5% levels, respectively. The results indicate that CEO overconfidence moderates the relation between family business and innovation, especially when there is no deviation or low deviation in family firms. In family firms, owner-manager agency problems are slight, and Type II agency problems between majority and minority shareholders are slight when there is no deviation and low deviation. This better ownership structure leads to the alignment of interests between managers and shareholders, which reduces agency costs and increases family willingness to invest more resources in innovation. These results are consistent with the arguments of Zahra (2005)¹⁰.

¹⁰ Zahra (2005) found that family members have stronger incentives to engage in innovation activities in order to create and sustain family wealth.

Table 5
Family Ownership, CEO Overconfidence and Innovation (Model 1)
- Full Sample for Different Deviation Levels

Variables	I	II	III	IV
	No deviation	Low deviation	High deviation	High deviation
C	0.06* (1.92)	0.04* (1.67)	0.05** (2.52)	0.09*** (4.54)
FB	-0.02*** (-2.84)	-0.01** (-2.37)	-0.01** (-2.61)	
FBCEO				-0.03*** (-4.89)
OC	-0.01 (-1.42)	0.01 (0.48)	0.01 (0.94)	-0.01 (-1.27)
FB×OC	0.02* (1.83)	0.02** (1.97)	-0.01 (-0.96)	
FBCEO×OC				0.02*** (2.90)
GR	0.00*** (5.35)	0.00*** (9.60)	0.00*** (20.64)	0.00*** (3.70)
ROE	-0.04*** (-5.89)	-0.04*** (-7.61)	-0.16*** (-17.56)	-0.09*** (-10.78)
PT	0.00 (0.19)	0.00 (0.07)	0.00 (0.06)	0.00 (0.06)
Tobin's Q	0.02 (0.65)	0.01* (0.59)	-0.01 (-0.46)	0.04** (2.29)
DEBT	-0.08*** (-2.89)	-0.07*** (-3.28)	-0.07*** (-3.49)	-0.15*** (-8.55)
YEAR	Yes	Yes	Yes	Yes
Adj.R ²	0.21	0.19	0.47	0.22
F-value	9.60	19.12	60.25	32.11
Number of Obs.	441	1078	952	952

Note: This table represents the regression results for family firm and CEO overconfidence on innovation. No deviation indicates that control rights are equal to cash flow rights; the subsamples for lower deviation and higher deviation are classified as the median. The dependent variable is innovation, measured as R&D expenditure divided by total net sales. The independent variable is FB, which equals 1 if the number of seats on the board of directors occupied by the family members exceeds 50% and the sum of the voting power held by family members exceeds 20%; OC equals 1 if CEOs were net buyers of company equity during the previous three years; FB*OC shows the moderating effect of CEO overconfidence between family business and innovation; GR is the growth rate of realized gross profit margin; ROE indicates net-income after taxes divided by total equity; PT is the number of patents; Tobin's Q is measured by taking the market value of equity plus the book value of debt less its book value of current asset divided by the book value of total assets; DEBT indicates total debt divided by total assets; YEAR is the year fixed effect; t-values are presented in parentheses; ***, **, and * indicate significance at the levels of 1%, 5%, and 10%, respectively.

Table 6
Identity of Family CEO, CEO Overconfidence and Innovation
(Model 2) -Full Sample with Different Deviation levels

Variables	I	II	III	IV
		No-deviation	Low deviation	High deviation
C	0.05* (1.77)	0.09** (2.17)	0.05 (1.07)	0.07** (2.09)
FBCEO	-0.01 (-0.17)	0.01 (1.27)	0.02** (1.99)	-0.01 (-1.11)
OC	-0.02*** (-2.62)	-0.01 (-1.26)	-0.01 (-0.64)	-0.02** (-2.18)
FBCEO×OC	0.05*** (4.74)	0.03** (2.10)	0.04** (2.33)	0.03*** (2.86)
GR	0.01*** (9.89)	0.01*** (5.98)	0.01*** (6.10)	0.01*** (9.67)
ROE	-0.04*** (-6.18)	-0.07*** (-3.65)	-0.03*** (-3.74)	-0.14*** (-8.33)
PT	0.01 (1.41)	-0.01 (-0.84)	-0.01 (-0.69)	0.01 (1.16)
Tobin's Q	0.01 (0.11)	-0.02 (-0.72)	-0.04 (-0.87)	-0.03 (-0.86)
DEBT	-0.09*** (-4.16)	-0.10*** (-2.67)	-0.15*** (-3.46)	-0.07** (-2.48)
YEAR	Yes	Yes	Yes	Yes
Adj. R²	0.26	0.29	0.30	0.41
F-value	22.85	8.33	10.88	14.84
Number of Obs.	858	247	329	282

Note: This table represents regression of family firms and CEO overconfidence in relation to innovation for 692 TSE electronics firms over the period 2001-2007. No deviation means that control rights are equal to cash flow rights; the subsamples with lower deviation and high deviation are classified as median. The dependent variable is innovation, measured as R&D expenditure divided by total net sales. The independent variable is FBCEO, and is equal to 1 if a family member serves as CEO in a family business; OC equals 1 if CEOs were net buyers of company equity for a period of three years in our sample; FB*OC represents the moderating effect of CEO overconfidence between family business and innovation; GR is the growth rate of realized gross profit margin; ROE indicates net-income after taxes divided by total equity; PT is the number of patents; Tobin's Q is measured as the market value of equity plus the book value of debt less the book value of current assets divided by the book value of total assets; DEBT is total debt divided by total assets; YEAR is the yearly fixed effect; t-values are presented in parentheses; ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

In column III of table 5, the coefficient on FB*OC is negative but insignificant. That is, there is no evidence to show the moderating effect of OC on the relation between innovation (INNO) and family (FB) with high deviation. We

try to take the identity of the family CEO (FBCEO) into consideration. The results are shown in column IV. The coefficient on FBCEO*OC is 0.02 and statistically significant at the 1% level. This suggests that overconfident family CEOs will engage in more innovation. Non-family CEOs may therefore feel their position and decision-making ability to be hindered by family interference (Solomon *et al.*, 2003), especially when there is higher level of deviation in family firms.

In column I and column IV of table 6, the coefficients on OC are -0.02 and -0.02, and are significant at the 1% and 5% levels, respectively suggesting that overconfident CEOs engage in less innovation especially in high control-ownership deviated family businesses. This result is consistent with Solomon *et al.*'s arguments (2003). In column III, the coefficient for FBCEO is 0.02 and significant at the 5% level. That is, when deviation is low, family CEOs will more likely to engage in innovation. Low deviation leads to interest alignment in family businesses, which supports family CEOs being involved in more innovation (Astrachan, 2003).

According to the results in table 6, the coefficients of FBCEO*OC are all positive and significant at the 5% level. It is suggested that an overconfident family CEO is a vital factor of influence for innovation and plays a positive moderating role between family business and innovation. We infer that the family tends to support the decisions of family CEOs. In order to maintain family reputation and long run operation, family CEOs remain optimistic when making decisions (Miller and Le Breton-Miller, 2005).

4.4 Robustness Testing

In this section, we discuss a number of robustness tests undertaken to provide additional evidence in support of our Hypotheses¹¹.

Instead of R&D expenditure divided by net income, we use R&D expenditure divided by the number of employees as the proxy for innovation (INNO). The results are similar to our main results. That is, CEO overconfidence has a positive effect on innovation. This proxy represents the average R&D

¹¹ Data can be provided upon request.

expenditure per employee, which helps measure the impact of CEOs' attitude-overconfidence, on innovation.

As in Malmendier and Tate (2005), CEOs who keep their position for at least 5 years are used to measure CEO overconfidence (OC) in our sample. In models (1) and (2), family business (FB) is found to have a negative effect on innovation and is significant at the 5% level; CEO overconfidence has an insignificantly positive effect on innovation; the FBCEO results are consistent with our main results.

As for the measure of CEO overconfidence, we also use outsider perceptions, cash dividends and earnings forecasting. Following Malmendier and Tate (2008)¹², we hand-collected data on how the press portrays CEOs during the sample period. We searched for articles referring to the CEOs in the KMW and udndata.com news banks. For each CEO and sample year, we recorded and analyzed a number of articles as containing specific words classified CEO as overconfident or non-overconfident. We analyzed 1,702 articles and constructed three indicators: "Press 1", "Press 2" and "Press 3". "Press 1" is constructed from both KMW and udndata.com news banks; "Press 2" and "Press 3" are constructed from KMW and udndata.com, respectively. Consistent with our main results, the results for model (1) show that family business (FB) has a negative effect on innovation. The results for model (2) are similar to our main results. However, the coefficients on FB*OC and FBCEO*OC are all positive but insignificant.

Finally, the change in cash dividend payout ratio is used as a measure of CEO overconfidence. DeAngelo *et al.* (1996) found that managers tend to overestimate future firm performance and therefore may distribute more cash dividends, as the result of CEO overconfidence. Furthermore, as in Lin *et al.* (2005), we use managers' earning forecasts as a proxy for CEO overconfidence. After re-estimation we find that the results for models (1) and (2) are consistent with our main results. The coefficients of FB are negative and significant at the 1% level. OC, FB*OC and FBCEO*OC are positive but insignificant.

¹² Following Malmendier and Tate (2008), we record the number of articles containing the words "confident", "confidence", "optimistic", "optimism" or containing the words "reliable", "cautious", "conservative", "practical", "frugal", or "steady".

5. Conclusion and Management Implications

5.1 Conclusion and Discussion

This purpose of this study is to examine the relationships among family business, CEO overconfidence and corporate innovation. CEOs of family business are separated into two types: family and non-family CEOs. We investigate (1) how family ownership affects corporate innovation, (2) how CEO overconfidence impacts innovation activities, and (3) how CEO overconfidence moderates the relationship between family ownership and corporate innovation. The results show that innovation activities are less in family business than those in nonfamily businesses, which is consistent with our expectations. The attitude of risk aversion and a lack of resources can lead to weak corporate innovation in family business. Secondly, the evidence reveals that CEO overconfidence prefers more innovation activities, especially in firms with relatively low deviation from control rights and ownership; these results are consistent with our hypothesis and the findings of Papadakis and Bourantas (1998). The implication is that (1) high risk of corporate innovation satisfies the individual properties of an overconfident CEO; (2) the huge investment from innovation processes causes CEO to be free rider to reach personal interests; and (3) the high risk of innovation will not directly affect an overconfident CEO's own benefits. Lastly, CEO overconfidence has a positively moderating effect on family ownership on innovation activity, which is consistent with our hypothesis. This shows that CEO overconfidence will enhance corporate innovation, when the overconfident CEO is employed in a conservative family business. This evidence mainly comes from family businesses with no or relatively low deviations from control rights and ownership. This agrees with the results obtained from Zahra (2005). This is because an overconfident CEO tends to make multidimensional and creative decisions (innovation), which is different from conservative family businesses; the perspective agrees with Englmaier's results (2007). This implies that when a company is faced with a high degree of competition or changeable environment, family businesses may hire an overconfident CEO to provide more faith and trust to fight for competitors.

In addition, the results reveal that an overconfident family CEO promotes corporate innovation. CEO overconfidence has a positive moderating effect on innovation activity. However, non-family CEOs are still controlled by family businesses (Solomon *et al.*, 2003). The special ownership structure of the family business reduces traditional agency problems. Therefore, an overconfident non-family CEO does not increase innovation activity. Overall, family CEOs in the family income focus on reputation and performance, and then they will have more confidence to make an aggressive decision. Therefore, an overconfident family CEO will positively moderate relation between a family firm and innovation activity.

5.2 Management Implications

This paper applies agency theory to family businesses. Our results can be applied to the practice of employment and monitoring systems. They suggest that it is a good policy for the family business to hire an overconfident CEO to overcome big challenges and strong competition. However, this action will worsen agency problems between controlling family shareholders and minority stockholders. If the family business does not have a sound monitoring system, hiring an overconfident CEO will increase risks. In addition, our evidence shows that CEO overconfidence is the key factor affecting corporate innovation strategy. When investors find targets, they should not only examine their financial condition, but also the CEO's individual character, such as, overconfidence.

5.3 Limitations and Suggestions

This paper is limited to data for the electronics industry. It is difficult to obtain detailed information about the number of patents in other industries. In future research the database could be extended to other industries. In addition, this study adopts the proportion of CEO's shares as a proxy of overconfidence. However, the CEO's share holdings are affected by other factors. Also, the family maintains a controlling position. Even though the number of CEO held shares are few, the CEO still has controlling power because of the entrenchment effect.

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