Corporate Governance and Inefficient Investment in Family Businesses

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Abstract

In this paper, we examine the investment decisions of family businesses at the firm level. Specially, by extracting the value of inefficient investments from a series of OLS regressions, we test the influence of family governance factors on inefficient firm investments. We find that inefficient investments are common among family firms, and that the number and extent of underinvestments are higher than that of overinvestments. We further discover that a large percentage of family members on the board and family member CEOs reduce both overinvestments and underinvestments, whereas the performance of founders on the board exaggerates both a business' underinvestments and overinvestments. Finally, free cash flows tend to cause overinvestments, and reduce underinvestments. Our findings indicate that family-related governance factors influence a firm's investment decisions, both in terms of overinvestment and underinvestment.

Key words: Family firms, inefficient investment, corporate governance, overinvestment, underinvestment

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Table of Contents

1. Introduction

Family businesses play a significant role in the global economy. Family firms are located all over the world making up two thirds of the world's total businesses; generating 70%-90% of global GDP and 50%-80% of jobs worldwide (Family Firm Institute, 2018). Family companies are the key drivers of economic growth and wealth creation in most countries and regions (Dello Sbarba & Marelli, 2018). In The U.S alone, there are 24.2 million family businesses employing 60% of the national workforce and contributing 63% of the national GDP (Astrachan & Shanker, 2003; Family Firm Institute, 2018). Canadian family firms create over 45% of GDP. Large family-run businesses in Canada achieve CAD $280 billion turnover accounting for at least 30% of the total amount of Canada's top 100 companies (Bardsley, 2015). It is worth mentioning that there are more than 14 million family firms providing over 60 million jobs in the private sector and making up a half of GDP in the European Union, and that three quarters of European family firms operate internationally (Gardner, 2016; Quico, Fernando & Hernández-Lara, 2014). In the Mainland of China, an estimated 24.3 million companies are family-owned; they account for 85.4% of firms in the private sector, offer 65% of jobs and contribute more than 65% to GDP (Sohu Finance, 2017). The economic statistics in most countries show that family firms are an undeniably a vital part of the global economy.

What family businesses pursue is longevity rather than profit maximization, and investment is critical to this longevity of family firms (Chittoor & Das, 2007). Family businesses are often small and medium-sized enterprises, but there are also many international giants among them such as Wal-Mart, Volkswagen, Peugeot, Ford, DuPond, etc. These large family firms have survived the industrial revolutions, the World Wars, the Depressions, the economic and financial crises, the technological progresses and market competitions; and they usually have long histories of one or more centuries. People may wonder how family companies have achieved this long-term survival. Many researches who examine family businesses emphasize the importance of the survival of the firm (Chrisman, Cua & Litz, 2003), and discover that longevity seems to be the ultimate goal of family companies rather than profit maximization, since family members have inborn responsibility for the succession to their younger generations.

Longevity is an additional intangible asset of a family firm that obviously strengthens the family and its business (Tàpies & Fernández Moya, 2002). It is an inherent goal of family firms for each generation to maintain their longevity and survival (Lumpkin et al., 2008; Lenders & Waarts, 2003; Uhlaner, 2005). One study of 1,854 family firms revealed that family owners are more satisfied with family interaction, family identity and family mission than simple profit growth

(Mahto et al., 2010). Long-term survival can symbolize the credibility, trust and quality of a family firm, and brings benefits to external relations, improves the sense of honor of family members, and proves the family's commitment to social responsibilities (Tàpies & Fernández Moya, 2012). Longevity can also benefit family firms in other ways, for example, firm history and origin are usually used as highlights of promotional advertisement, and consumers usually choose products or services in their daily life from the companies that have existed in the industries for longer years. This phenomenon reflects the vital importance of longevity for family businesses.

Researchers have found that investment decisions greatly contribute to the longevity of family firms (Frankfurter, 1997; Hirigoyen & Ousseini, 2017). A lot of family firms begin with very small sizes at their starting stage; they could possibly become large companies only through continuous efficient investments. In market competition, large listed family firms also need efficient investments to sustain their longevities. Family firms give high priority to investing in assets and capabilities, such as the professionalization of management, equipment and/or real estate, R&D expenditure and training for sustaining their long-term survival (Chittoor & Das, 2007). However, it is obvious that investment decisions in family companies have received little attention, despite the fact that the issue of investment decisions is vital to family firms' longevities, and family firms contribute a large portion of investments worldwide.

Family firms might be more conservative or cautious in their investment behavior than their non-family counterparts. For the sake of longevity, family businesses may like to implement management strategies and tools to make their investment decisions reasonable. Moreover, family firms pursue long-term survival and usually have optimal investment policies, they are more rational in making investment decisions and more profitable than non-family firms in the long run (Stein, 1989). Contrarily, people may query whether investment efficiency of family firms is likely to be limited by their focus on long-term orientation (Lumpkin，G. T. et al., 2010). I also raise a query on investment efficiency of family firms, that's one of my reasons for doing this research.

Corporate governance possibly affects investment decisions and investment efficiency of family companies in many aspects, such as agent problem and information asymmetry. For example, incentive contracts and effective corporate governance may restrict overinvestment (Aggarwal & Samwick, 2006); however, the involvements of activist shareholders may decrease underinvestment by taking effective means of corporate governance (Richardson, 2006). Besides, family member shareholders have more information of their own companies than investors because of information asymmetry (Watts & Zimmerman, 1986), which may cause inefficient investments. Moreover, family member shareholders might have conflict of investment decision with non-family

member CEOs as family members pursue longevity instead of short-term profitability of their firms, contrary to this, most non-family member CEOs prefer short-term profitability for their personal interests. Generally speaking, corporate governance with family characteristics might be influential to investment behavior and investment efficiency in family firms.

There is no doubt that the measurement and cause analysis of inefficient investment are hot topics of research in this field. At present, researches on measurement and cause analysis of inefficient investment are still at the stage of exploration. Fazzari, Hubbard and Petersen (1988) examined the sensitivity of investment to cash flow using data on manufacturing firms, Richardson (2006) measured overinvestment and free cash flow using an accounting-based framework and examined whether corporate governance is influential in overinvestment of free cash flow. But the Richardson (2006) model may result in a bit of inaccuracy of overinvestment measurement and cause analysis, the methodology for measuring the extent of inefficient investment and analyzing impacts of family firms' governance on inefficient investment needs further researches.

The contribution of this thesis can be summarized as the following: We added some more accounting information to Richardson (2006) Expectation Model to better measure the residuals as the extents of firm level inefficient investment. In the process, this study is the first to estimate firm level inefficient investment using these additional accounting factors. In view of the fact that any one of measures of growth opportunities used in prior research cannot alone offer a complete picture of a firm's actual growth, in Richardson (2006) Model is queried, we used Delta SALES and Delta Total Assets as actual growth factors instead of V/P as growth opportunity factor used in Richardson (2006) to measure growth for trying to provide a more complete picture. To examine whether family featured corporate governance factors is associated with overinvestment and underinvestment, we further tested with some variables capturing the characters of corporate government of family firms. We find evidence that there is a statistically significant relation between FCF_t (free cash flow) and inefficient investment in diverse tests in my research, which shows that investment decisions are sensitive to free cash flow. We also run OLS regression models containing family featured factors: CEO_t (whether the CEO of a firm is a family member on year t), BOD_t (the portion of family members on the board of directors on year t), $Founder_t$ (whether the founder of the firm is on the board of directors on year t), and $CEO*Founder_t$ and further discovered that the number of family members on the board and family CEOs reduces underinvestments, family members on the board reduces overinvestments in particular, whereas the performance of founders on the board exaggerates both family business' underinvestments and overinvestments.

The remainder of this thesis is organized as follows: Chapter 2 highlights the literature

concerning the relationship among corporation governance, free cash flow and inefficient investment in family firms; Chapter 3 develops the hypotheses inferred from prior literature, Chapter 4 explores the methodologies measuring the extent of inefficient investments and examining the relationship among family corporation governance, free cash flow and inefficient investment, and describes the sample selection and data source used in this study; Chapter 5 discusses the results of our tests that introduced in Chapter 4, including several robustness tests; finally, in Chapter 6 we draw our conclusions.

2. Literature Review

2.1 Definitions of family firms

Regarding the definition of family firms, scholars make different judgments according to different criterion for definitions. Any definition of family firms needs to be interpreted by its social, economic, institutional and cultural context. The contents of different definitions of family firms include some or all of the following: percentage of family ownership, percentage of family members on board, family controlling interest, multi-generation, and family objectives.

According to Alfred D. Chandler (1977), the biggest characteristic of a family firm is that the founder and his/her family members control the majority of shares, have a close contact with senior managers, and have the right in making decisions about the firm's overall strategy, resource allocation and hiring senior managers. In Chandler's definition, a firm can be recognized as a family firm as long as the family members keep the majority of shares and the right in decision making. The shortcoming about this definition is that it ignores in some situations, family members may take control of little portion of shares, but the family still keeps the right in decision making, in this situation, such firms still can be defined as family firms.

Chua, Chrisman and Sherma (1999) summarized 21 methods of defining family firms through analyzing massive literature about family business. In their findings, there are a lot of standards defining family firms among different scholars, some of them only ask for family members controlling shares or decision-making rights, while in other scholars' opinion, both shareholding and decision-making rights are necessary for being a family firm.

La Porta et al. (1999) standardized the portion of shareholding of the ultimate controller of listed companies, and sorted the ultimate controllers into following categories: family or person, government and social public sectors, financial institutions, joint stock companies, etc. They used 20% of shareholding of family members as the threshold to define whether a certain listed company is family controlled. If the family holds more than 20% of a firm's total shares, then it can be defined as "the listed family firm". The structure of corporate governance and the way of operating of this firm will be influenced by family members' control, comparing with non-family listed firms.

In some other scholars' point of view, the threshold of 20% shareholding is exaggerated and appears to be unnecessary in defining family firms. Andrei and Vishny (1986), Villalonga and Amit (2006), defined family firms as those where the founder and his/her family members, by either blood or marriage, continues in maintaining a minimum 5% equity stake in the firm. Anderson and Zhao (2010) carried on this definition in his research and added that it is not necessary for a family

member to be the firm's CEO, but they will keep active roles in management or serving on the board of directors by gaining more information about their firms than other shareholders (Anderson & Reeb, 2004).

Collectively, there are many different definitions of family firms, all the definitions can reach a common ground that family firms refer to the corporations whose ownership are partially or entirely owned and controlled by family members. Ownership can be used as the only standard for people to judge whether a firm is a family business or not, in this way a firm is named as a family firm only if its stocks are owned by family members.

2.2 Inefficient investment: overinvestment and underinvestment

In a perfect and complete (frictionless) capital market, firms are expected to efficiently invest in projects with positive net present values (Modigliani & Miller, 1958), while in reality it has been long recognized that firms make inefficient decisions, this can fall into two categories: overinvestments and underinvestments.

An overinvestment problem is when management squanders its decision-making power by investing in unprofitable or overly risky projects that could damage the benefits of the shareholders and those of debtholders as well (Jensen & Meckling, 1976). When a firm holds a large amount of free cash flow, it may invest in negative NPV projects, with Tobin's Q less than 1. (Lang & Lizenberger, 1989). If overinvestments exist in a firm, this means that the firm pursues high risk and high return investment at the cost of interests of shareholders and creditors.

On the contrary, the underinvestment problems can be defined as the occasions when managers reject positive net present value projects, as a result, the firm's value would decrease (Myers 1977). If a firm cannot achieve enough free cash flow, meanwhile, it might have a higher leverage which usually makes the firm face heavy financing restraints, the firm has to give up positive NPV projects. There is also another possibility that managers could reject some positive NPV projects, because these projects may need huge amounts of investment expenditure and have a longer payback period. Underinvestment leaves firm's some recourses unused which surely is regarded as wastage to the firm.

2.3 Corporate Governance and Inefficient investment

The studies of inefficient investment have gone through many steps, and the causes of inefficient investments are mainly separated into the following three aspects: Information asymmetry, agency problem, and other problems about corporate governance.

2.3.1 Information asymmetry and inefficient investment

Corporate governance stems from the problem of information asymmetry, when a firm's insiders have more information than outsider stakeholders. The controlling shareholders can increase the degree of information asymmetry in order to protect their private interest (Richardson, 2000). According to the findings of Guadalupe and Perez-Gonzalez (2006), agency costs can be reduced through improving information asymmetry, and producing a more accurate performance evaluation.

Information asymmetry may lead to underinvestments. The mechanism of information asymmetry causing firm's underinvestment that Myers and Majluf (1984) found in their research is: Because of the existence of information asymmetry, outsider investors in the capital market cannot get enough information of the firm's investment project. To amend the potential risk caused by information asymmetry, outsider investors may request firms to provide high risk premiums. For firms which have used up their ability to issue low-risk debt, and have lower free cash flow than investment opportunities, may forgo these good investment chances rather than finance for them through issuing risky debts, eventually causing underinvestments. This will lead to the final phenomenon of adverse selection (Akerlof, 1970), that investment projects of good qualities will eventually be driven out of the market, leaving only the investment projects with poor qualities. Stiglitz and Weiss (1981) found that the underinvestments led by the financing restrictions from external debt capital market makes a positive correlation between investment expenditure and free cash flow. Later on, other researchers have reached similar results in their studies on restrictions of financing. Fazzari et al. (1988) and Hoshi et al. (1991) also found that the investment behaviors in companies that have restricted by financing (have lower dividend payout) are more sensitive to free cash flow.

Moreover, information asymmetry may also lead to overinvestments. The research paper of Meza and Webb (1987) discussed the relationship between asymmetric information and overinvestment; they found that the inability of banks in discovering the characteristics of companies' projects will result in more investment than that of socially efficient level. Narayanan (1988) concluded that when external investors and internal managers have information asymmetry about the value of a certain investment project, firms may choose the project that has a negative NPV, thus lead to overinvestments.

Furthermore, information asymmetry may cause underinvestment or overinvestment decisions to some typical managers. Kwak (2003), Anderson and Reeb (2003) suggested that because of the thorough knowledge about the companies' operation and industrial information that

family members have, they will possess better inside information comparing with typical managers and outside investors. For this reason, typical managers may make under or over investment decisions when the information they have are not abundant.

2.3.2 Agency theory and inefficient investment

Modern companies usually have a series of principal-agent relationships such as the relationship between the shareholders and the managers, the relationship between shareholders and loaners, and so on. These principal-agent relationships often have conflicts in interest between principals and agents, leading to overinvestment or underinvestment decisions.

The principal-agent relationship between shareholders and managers may bring about inefficient investments. CEOs can receive private benefits through investment; therefore, some CEOs tend to overinvest in negative NPV projects (Jensen, 1993). In addition, managerial moral hazard of CEOs can also lead to overinvestments (Lambert 1986; Hirshleifer and Suh, 1992). Although some CEOs own stocks of the firms they work for, inefficient investments would still happen. In the research of Broussard, Buchenroth & Pilotte (2004), they came to the conclusion that investment increases along with the increase of management's shareholding ratio, but when the ratio exceeds the defense effect of management, investment will then decrease as management's shareholding ratio goes up. In contrast to agency problem causing overinvestments, investment performance is a direct indicator of a manager's ability and competence, some managers care about their reputations more than gaining short-term benefits from aggressive investments. Under these conditions, some firms will experience underinvestments rather than their optimal investment plans (Campbell et al.,1989).

The principal-agent relationship between shareholders and creditors may bring about inefficient investments too. According to Jensen and Meckling (1976), in the environment of modern market, shareholders carry limited liability to their companies' operating risks. In this case, they tend to choose to invest in higher risk projects for higher returns. The returns will be shared among shareholders, rather than creditors, and once there happens to be a loss, all these losses will be shared among both shareholders and creditors, and thus managers are able to pass risks to creditors. Under this circumstance, creditors will increase the interest rate of debt to prevent potential losses, and this restriction may lead to underinvestments.

With multiple principal-agent relationships, modern firms may face the complexity of inefficient investment problems. Myers' (1977) research was the first to point out that in a high debt firm, the agency relationship between shareholders and bondholders can stimulate managers

to reject positive NPV projects. The reason is that managers act in shareholders' interest, when facing risky debts, compared to realizing bondholders' profit, shareholders are often not willing to finance for projects, and managers tend to choose not to invest in profitable projects, resulting in underinvestment problems, which therefore will hurt the firm's value. In the paper of La Rocca et al. (2007), the authors summarized that both the agency problem between shareholders and debtholders, following the hypothesis that managers act in shareholder's interest, and the agency conflict between new and old shareholders, assuming that managers act in the interests of the old shareholders, can lead to the problem of underinvestment, for the reason that managers are over conservative in choosing investment projects, thus it is possible that they reject profitable projects with positive net present values.

Principal-agent relationships commonly exist in family businesses, which inevitably lead to the problem of inefficiency investments. In the research of Kuo and Hung (2012), they classified agency problems of family firms into two types. Type I agency problem refers to the controlling family has a strong intensive to take control in management and thus reduce agency problems between shareholders and the management (Anderson & Reeb, 2003; Christman, Chua & Litz, 2004). Type II agency problem refers to the conflict between majority and minority shareholders, for the reason that family control is always related to minority shareholder expropriation problems (Faccio, Lang & Young, 2001). Most family-controlled firms are able to monitor managers on a direct basis, leading to a less severe shareholder-manager agency problem, alleviating the potential overinvestment resulting from Type I agency problems. However, family firms may have more conflict between controlling family members and minority shareholders, because family members usually tend to use their convenient controlling position to extract private benefits through over investment, thereby aggravating Type II agency problems.

2.4 Free Cash Flow, Corporate Governance and Inefficient Investment

How to measure and control the impacts of corporate governance on inefficient investment has been the key point in the research of this area. Haberler (1931) found that the most important issue in corporate governance is not to maximize profit or market value, but to sustain the firm by maximizing the probability of long-term survival; an increase in this probability can be possibly achieved only through the investment decisions at the firm level. John and Nachman (1985) researched on the mechanism of dynamic agency relationship between corporate insiders and bondholders on underinvestments. They discovered that in the management of highly centralized firms, the interests of corporate insiders and bondholders are inconsistent, and managers represent the interest of the majority controlling shareholders. When managers make investment decisions

facing the inconsistent interests of the two groups, they tend to realize the interest maximization of the corporate insiders, rather than maximizing the interest of all stakeholders. So when an investment project requires external financing, the problem of underinvestment tends to occur even if the estimated NPV is positive, because the firm's reputation is more valuable than the bondholder's wealth for the insiders. The internal retained earnings can be used for building the firm's reputation capital and thus winning a better access to external funds in the future.

If firms have principle-agent relationships in their corporate governance structures, firms possibly generate free cash flow and further problem of overinvestment. Jensen (1986) proposed the Free Cash Flow Hypothesis in his published paper "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", he made the statement that due to agency problems, information asymmetry between shareholders and managers broadly exists. Jensen then defined free cash flow as "firm's cash flow in excess of that required to invest in all projects that have positive net present values when discounted at their relevant cost of capital". The Free Cash Flow Hypothesis is originated from Agency Theory, that managers have incentives to drive their firms to grow beyond their optimal sizes, because managers' compensations are positively related to the growth in sales (Murphy, 1985). Therefore, the managers tend to keep a relatively high volume of free cash flow and aggressively invest in some projects that have negative NPVs than allocating the cash to shareholders. Jensen's main argument is that a firm's financing restructuring will effectively reduce the problem of management abusing free cash flow. Jensen suggested that shareholders should grasp the main free cash flows and rationally employ leverage (debt financing) to reduce managers' control, thus reducing the agency costs of free cash flow and bringing benefits to firms' values.

The research on measurement of free cash flow and inefficient investment is an important field in recent years. Richardson (2003) measured the extent of over investment of free cash flow and examined investing decisions in the presence of free cash flow. He analyzed the relationship between corporate governance structure and free cash flow using the data of the listed firms in the US from the year 1988 to 2002, the result of the research showed that in consistency with agency cost explanation, overinvestment is concentrated in the firms with highest free cash flow levels, and a good corporate governance structure, such as the presence of active shareholders, will efficiently mitigate potential over investment. Management in big companies with the independent director system is less likely to make over investments.

Family firms have unique characters in corporate governance structures, and there are some insights about family firms' investment decisions. Family owners have a major part of stocks of family business, and their personal wealth is mainly linked with family firm, which deeply

influences family firms' investment decisions (Breton-Miller, Miller, & Lester, 2011; Czarnitzki & Kraft, 2009). Family firms are more sensitive to financial risks (Mishra & McConaughy, 1999), they prefer internal funds rather than external financing to prevent the potential loss of equity control (Myers & Majluf, 1984), therefore family firms usually have a lower dividend payout ratio (De Cesari, 2012 ; Gugler & Yurtoglu, 2003, Gugler, 2003). It is also found that non-family member CEOs are more likely to maintain a high-level free cash-flow rather than distributing cash to family member shareholders in order to invest in low or even negative NPV projects, which will cause overinvestments in family firms (Jensen 1986; Pawlina & Renneboog, 2005; Degryse & de Jong, 2006).Some studies based on the classic agency theory argued that family companies do not encounter as many agency conflicts between owners and managers, and they are more willing invest in new projects to seek long-term survival (Czarnitzki & Kraft, 2009).

2.5 Methodologies for analyzing inefficient investments

A large finance and microeconomics literature have studied the relationship between inefficient investment behaviors and corporate governance. There are mainly three methodologies that contributed the most: FHP (1988) model, Vogt (1994) model, and Richardson (2006) model.

2.5.1 FHP (1988) model

Fazzari, Hubbard, and Petersen (1988) stated that in a perfect capital market, firms' investment decisions are irrelevant to their financial structures. However, internal and external funds are not perfect substitutes, internal funds possess a cost advantage over external funds. Under this circumstance, firm's investing and financing should be correlated.

In their work, they linked conventional models (hereinafter FHP (1988) model) of investment to capital market imperfections for individual firms. Their studies divided a sample of firms to groups according to a priori measure of financing constrains, and then compared the investment-cash flow sensitivities of different sample groups.

The results of their studies showed more severe investment-cash flow sensitivity for firms that are more likely to face a larger gap between internal and external cost of funds, and that the firms are therefore indeed constrained. Their FHP (1988) model has been broadly applied to identify firms that are more affected by financing constraints, and finance institutions that are more likely to ease constraints. However, Kaplan and Zingales (1997) criticized the FHP (1988) model that higher investment-cash flow sensitivities cannot be interpreted as evidence that firms are more financially constrained, for they have found that there are less financially constrained firms that

appear to have significantly greater sensitivities than firms that are more financially constrained.

2.5.2 Vogt (1994) model

In Vogt's (1994) article titled The Cash Flow/Investment Relationship: Evidence from U.S. Manufacturing Firms, he examined the reasons why cash flow is so important in the firm's investment decision, whether it is because firms waste free cash flow to overinvest due to agent problem, or because the cost of external financing is too high due to the problem brought by asymmetric information.

Vogt (1994) utilized equilibrium level of Tobin's Q to differentiate the liquidity constrains arising either from asymmetric information or from managerial overinvestment of free cash flow.

The results of Vogt's research showed that both Free Cash Flow hypothesis (Jensen, 1986) and Pecking Order Hypothesis (Myers & Majluf, 1984) are potential explanations for the highly correlated relationship of investment decision and free cash flow. In large, for low-dividend firms, Free Cash Flow behavior is more likely to arise when they invest in tangible assets. Pecking order behavior is often seen in smaller, low-dividend firms when they invest in less tangible projects. However, in the article of Hadlock (1998), he criticized Vogt's (1994) results on the grounds of inconsistency.

2.5.3 Richardson (2006) model

Richardson (2006) model can be used to measure the extent of overinvestment for firm level. Total investment expenditure is classified into two components: required maintain expenditure used to maintain assets in place, denoted by $I_{MAINTENANCE}$, and investment expenditure on new projects, denoted by I_{NEW}. $I_{MAINTENANCE}$ is a necessary part of total investment expenditure for a firm to maintain equipment, plant and other assets. I_{NEW} consists of two parts: the expected investment expenditure in new positive NPV projects denoted by I^{*}_{NEW} and the abnormal investment denoted by I^{ε}_{NEW}. I^{*}_{NEW} can be estimated from Richardson's Expectation Model by using some control variables as growth opportunities, firm size, leverage, firm age, the level of cash, past stock returns and firm level investment in the last year and industry indicator, and I^{ε}_{NEW} is the residual from Expectation Model as the estimate of inefficient investment. Richardson (2006) model is shown as following:

$$I_{new,t} = \alpha + \beta_1 GrowthOpportunity_{t-1} + \beta_2 I_{new,t-1} + \beta_3 Leverage_{t-1} + \beta_4 Cash_{t-1} + \beta_5 Age_{t-1} + \beta_6 Size_{t-1} + \beta_7 StockReturn_{t-1} + \Sigma\, YearIndicator + \Sigma\, IndustryIndicator + \xi$$

If $I^{\varepsilon}_{NEW}>0$, then I^{ε}_{NEW} is the estimate of overinvestment; if $I^{\varepsilon}_{NEW}<0$, then I^{ε}_{NEW} is the estimate

of underinvestment. Richardson (2006) provided a method to measure the extent of inefficient investment, and he examined the extent of overinvestment in experimental study.

2.6 Comments on literature review

Until now, the definition for "family firm" is still not unified by academia as scholars define "family firm" according to different environmental situations and their own judgments. The judgments that authors make can usually be classified into three categories: the structure of ownership, the factors of the family, and the universality of the definition.

The theory and practice study of inefficient investment have achieved many results, which mainly focus on distinguishing and measuring inefficient investments and mechanism explanations. The present literature has been discussing the causes of inefficient investments, mainly around the problems of agent theory, asymmetric information, and free cash flow. However, a comprehensive theoretical framework is not formed yet in regard of the studies of inefficient investment.

There are mainly three models to analyze the problem of inefficient investment, each of them has been approved and applied by many other scholars, and their research results have greatly contributed to the literature of inefficient investment studies. However, none of them can be perfect measurement, each of them have both advantages and disadvantages. The measurement of inefficient investment still needs to be gradually improved.

The current research of corporate governance and inefficient investment usually still remains at a general level. There are rarely research focusing on the potential characteristic reasons of family firms' inefficient investing, and there are rarely research models specially designed for discovering the influential mechanism of the family firm's special characters on their inefficient investment behaviors.

Richardson (2006) focused on measurement of overinvestment of free cash flow and the impact of corporate governance on firm level overinvestment with data from a mixed sample of different firms. But the model was not used for the measurement of the extent of underinvestment in specific family firms. In Richardson's (2006) model, *BM*, *EP* and Tobin's Q cannot give a complete picture of growth opportunities, so he used *V/P* as a measure of growth opportunities, however it still not a completive measure of growth. Moreover, there is still a possibility adding some more variables used as determinants of investment decisions or measures of growth opportunities or actual growth and financing constraints to improve the accuracy of the measurement of investment decisions of the expectation model.

The above-mentioned research gaps need to be filled by future scholars, because family firms contribute a significant part to the economy around the world, but the current literature focusing on family firms' inefficient investment is limited. These uncoordinated situations are the inspiration and necessity of this work.

3. Hypotheses

In this sector, the hypothesis about the experiment of the investment efficiency performance of family firms will be introduced, and we will fully discuss the causes of inefficient investment in family firms. I certainly develop the hypotheses inferred from prior literature.

3.1 Inefficient investment in family firms

Firms are expected to invest efficiently in every project with positive net preset values in a perfect capital market. However, in the realistic world, there are always frictions in the capital markets (Modigliani & Miller, 1958; Fazzari, Hubbard, and Petersen, 1988), and many research results have proved that there are inefficient investments that are commonly seen in most of the firms around the world.

Based on the previous discussed theoretical and empirical results, the first hypothesis that will be tested in this paper is:

H1- Family firms are subject to inefficient investments (overinvestments and underinvestments).

Family firms are sensitive to financial risks (Mishra & McConaughy, 1999). Longevity is an important intangible asset of a family firm (Tàpies & Fernández Moya, 2002). For most family firms, their ultimate goals are to always keep longevity in their firms, rather than to maximize their short-term profit. All family firms have an inherent goal for each generation, which is to maintain their longevity and survival (Lumpkin et al., 2008; Uhlaner, 2005). Researches find that family firms prefer internal funds rather than issuing new equity, when considering the prevention of the potential loss of equity control (Myers & Majluf, 1984). Family shareholders pursue long-term survival, which leads to family firms pursuing an optimal investment policy (Stein, 1989).

Sometimes family firms may be over conservative in making financing and investing decisions, they will give up good chances of investing in positive NPV projects. From the research results of Kuo and Hung (2012), they stated that most family firms can monitor managers on a more direct basis, this will reduce the shareholder-manager agency problem, and thus will reduce the overinvestment problem in family firms. In a word, family firms are more rational towards investment in order to keep their longevity, resulting in a lesser likelihood to make inefficient investments.

Based on the previous discussed theoretical and empirical results, the second and third hypotheses that will be tested in this paper are:

H2- Family firms make more underinvestments than overinvestments.

3.2 Governance factors of inefficient investment in family firms

According to Jensen's (1968) Free Cash Flow Hypothesis, he stated that due to the Agency Problem and information asymmetry, the management is more likely to keep a relatively high volume of free cash flow and can possibly invest in some projects that have negative NPVs.

The richness of a firm's free cash flow will accelerate the conflict between shareholders and managers; therefore, it will add to the motivation of the management's overinvestment. Moreover, compared with the firms having little free cash flow, rich free cash flow firms will have less financing stress, thus the underinvestment risk in rich free cash flow firms will be reduced.

Based on the previous discussed theoretical and empirical results, the third hypothesis that will be tested in this paper is:

H3- The amount of free cash flows and the extent of overinvestments in family businesses are positively related, and large free cash flows reduce the extent of underinvestments.

According to much previous literature, CEO succession is a crucial factor to a firm's success and continuity (Miller, 1993; Ocasio, 1999). Shareholders' CEO choice between a family member and an external one is a critical issue for them (Burkart et al., 2003). Much literature has discussed the respective advantages and disadvantages of having family member CEOs and non-family member CEOs in family-controlled firms.

Some studies in previous years had come to the conclusion that non-family member CEOs outperform family CEOs in gaining profits for the firms (Miller et al., 2014; Mehrotra et al., 2013; Bloom and Van Reenen, 2007). For the reason related to incentive alignment, some researches demonstrate the results that compared to family CEOs that or they need fewer compensation-based incentives to operate their firms well (McConaughy, 2000), for the reason that for most family firms, maximizing profit is not the primary task, family firm owners prefer to put 'keeping their firms' longevity' above other considerations. Therefore, it can be inferred that most family CEOs tend to make less aggressive investment decisions than non-family member CEOs in family owned firms. Besides, family member CEOs will have more knowledge and experience about their firms learned from their previous generations, many of them will see and learn how to invest from their childhoods. Thus, in general, it is more likely that family member CEOs will make less inefficient investments, when compared with non-family member CEOs.

Based on the previous discussed theoretical and empirical results, the fourth hypothesis that

will be tested in this paper is:

H4- Family firms with family member CEOs reduce both underinvestments and overinvestments, when compared to firms with non-family member CEOs.

The degree of family centralization may be another important influential element for family firms' investment behavior. This centralization can be indicated by the percentage of family members on a firm's Board of Directors.

A family firms' Board of Directors reinforces the governance of this family over the firm, the family can rely on the board for management, guidance and all kinds of decision-making. The more proportion of family members on the board, the stronger family interest will influence the firm's decision-making results. As most family firms seek long term survival and steady profitability, most family firms with larger portion of family members directors tend to avoid aggressive or risky investment projects (Zattoni, Gnan & Huse, 2015). Similarly, like the story of family member CEOs, family members on board usually know and care for their firm better than non-family members, thus they will perform their best to reduce inefficient investments.

Based on the previous discussed theoretical and empirical results, the fifth hypothesis that will be tested in this paper is:

H5- Higher percentage of family members sitting on the Board of Directors reduces both underinvestments and overinvestments in family businesses.

When the founder of a family firm is still a member on the board, such firms are usually more confident for their future prospective. On the one hand, founders who created their business worlds by their own hands, are usually full of experiences about both success and failure, and understand better about their firms' features and the nature of the industries that their firms are in. On the other hand, people who launched their own career tend to invest aggressively to seek quick expansion, and thus possibly lead to overinvestments.

Besides, for some large family business founders, they hope for a long lifetime of their own businesses, so they will tend to make conservative investment decisions, rather than aggressive ones (Cucculelli & Cucculelli, 2008; Molly et al., 2017)

Based on the previous discussed theoretical and empirical results, the sixth hypothesis that will be tested in this paper is:

H6- The preservation of founders on the Board of Directors increases both underinvestments overinvestments in family businesses.

4. Data and Methodology

4.1 Data and sample selection

4.1.1 Family firms sample

The name list of family firms in this study is initially obtained from the data sample provided by the works of Anderson, Duru, and Reeb (2009) and Anderson, Reeb, and Zhao (2012), which summarized the situation of family ownership of the top 2000 largest U.S firms based on total assets from Compustat from data-year 2001 to 2010. The sample excludes regulated public utilities (SIC codes 4812, 4813, and 4911 through 4991), financial firms (SIC codes 6020 through 6799), firms outside the U.S, firms listed as master limited partnerships, and firms with share price less than $0.25. They differentiated each of the firms in each data-year by either family owned or non-family owned, following the definition of family firm by Shleifer & Vishny (1986), Villalonga & Amit (2006), that setting 5% ownership as the threshold, which is when the family owns (or votes) a 5% or larger stake in a particular data-year, then this firm will be deemed as a family firm in that data-year.

There is almost no research on inefficient investment concerning family firms; however, this study has a focus on whether any inefficient investment exists in the sample. To widen the spectrum of the sample, firms are selected from diversified economic sectors. The Global Industry Classification Standard (GICS) covering a total of 11 economic sectors is used to measure the spectrum of the sample; it was developed jointly by Morgan Stanley Capital International (MSCI) and Standard & Poors in 1999. There are 260 family firms from 9 economic sectors in the sample, and Panel A of Table 1 shows the economic sector distributions of family firms.

Insert Panel A of Table 1 about here

4.1.2 Data selection

We collected the accounting data of each firm in the selected company list provided by Anderson, Duru, and Reeb (2009) and Anderson, Reeb, and Zhao (2012); by data-year from 2004 to 2010 from Compustat via Wrds. We further collected the individual personnel information data from BoradEx via Wrds, and complemented with the additional information of each firm's family-ownership change process obtained from the firm's official websites, annual reports and the online encyclopaedia of Wikipedia, Bloomberg, news reports, etc. A big number of family firms have complicated histories of family-ownership changes and personnel changes, which may have been

ignored in previous researches. In this study, a lot of data about family firms is collected manually that guarantees a wider spectrum of family firms of different situations is included. In this way, the results from this study are more authentic and objective than that of the previous studies.

The data of sample in this study is collected during the period from 2004 to 2010, there are 1796 initial firm-year observations. It is found that 13 firm-year observations cannot be used, so the final sample in this study consists of 1783 observations, the remaining amount from initial firm-year observations deducted by invalid observations, and Panel B of Table 1 shows firm-year observations in the sample in this study.

Insert Panel B of Table 1 about here

4.2 Methodology

4.2.1 Firm level investment decisions model (Model I)

In this process, this study is the first to examine firm level investment decisions with additional variables added to the Richardson (2006) Expectation Model. We mainly adopted the Richardson (2006) Expectation Model to estimate the expected investment for each of the firm-year observations in this sample. For more accurate measurements, we added some more variables to be determinants of investment decisions to the original model, including dividend payout, advertisement expense, operating return on assets, return on assets, short debt change, and tangibility.

Richardson (2006) selected some accounting information as the variables in his Expectation Model based on the analysis about the relation between overinvestment and free cash flow for firm level. According to Song & Zhang (2019), many accounting information directly or indirectly affects the calculation of free cash flow, the measurement of free cash flow is determined comprehensively by much accounting information. Therefore, some extra accounting information may contribute to the accuracy of the measurement besides the variables utilized by Richardson (2006), if they are added to the Expectation Model (I).

Prior research has already documented that the relation between dividend payout and free cash flow is evident in some samples of firms (De Cesari, 2012; Gugler & Yurtoglu, 2003, Gugler, 2003). Coincidentally, the investment expectation in our study is just derived from free cash flow; therefore, it is reasonable to add the variable of dividend payout to the expectation model.

It is mentioned above that any variable used in the expectation model for firm level investment does not give a complete picture for the expectation of growth opportunities. So we tried to add

some other variables, such as Advertising expenses (AD), Operating return on assets (OROA), Return on assets (ROA), Short Debt Change and Tangibility to the expectation model for firm level investment, and I hope these variables are helpful to provide a more complete picture of growth opportunities for firms in sample.

The variable representing growth opportunities in the Expectation Model, the advertising expenses (AD) can also increase investment confidence of the firm, there is a potential for firms to reduce financing constraints from external market through their advertisements. While advertisement causes selling expenses, cash flow from operations will be decreased, so investment decisions may vary with advertising expenses.

Operating return on assets (OROA) affects the amount of investment. The relations among OROA, growth opportunities and investments are examined by Freund, Prezas & Vasudevan (2003). They found that operating performance changes are negatively related to the amount of free cash flow and the buyer firms have a stronger relationship with fewer growth opportunities in announcement period, it is also found that buyer firms undergo a decline in both the return on assets and asset turnover ratios. So operating return on assets (OROA) is also selected to be an additional variable in my research.

Similarly, Return on Assets (ROA), Short Debt Change and Tangibility are usually used as indicators of a firm's profitability, debt paying ability, innovation capability and reputation relying on intangible assets. To some extent, these indicators can be used by investors to judge whether firms are worth investments, they are relative to firms' growth opportunities or financing constraints, and furthermore, they would relate to firms' investment expectation.

The firm level investment decisions model used in my study is shown as following:

$$\begin{aligned} I_{new,t} = \alpha &+ \lambda GrowthOpportunity(or\ ActualGrowth)_{t-1} + \beta_1 Ad_{t-1} + \beta_2 DividendPayout_{t-1} \\ &+ \beta_3 ROA_{t-1} + \beta_4 OROA_{t-1} + \beta_5 ShortDebtChange_{t-1} + \beta_6 Tangibility_{t-1} + \gamma_1 I_{new,t-1} \\ &+ \gamma_2 Leverage_{t-1} + \gamma_3 CashRatio_{t-1} + \gamma_4 LnAge_t + \gamma_5 Size_{t-1} + \gamma_6 StockReturn_{t-1} \\ &+ \Sigma\, YearIndicator + \Sigma\, IndustryIndicator + \xi \end{aligned}$$

Growth Opportunities (or Actual Growth) are represented by three different variables, which are V/P from the original Richardson (2006) Model, Delta SALES and Delta TA (total assets). The latter two variables are new substitutes of V/P. The variables in the bracket are the new independent variables added to the Richardson (2006) Model. The fitted value from the above regression is the estimate of the expected level of new investment, $I^{*}_{new,t}$, and then the residual is the estimate of inefficient investment, $I^{\varepsilon}_{new,t}$. The variables' definitions are described in Table 2.

Insert Panel A of Table 2 about there

In the original Richardson (2006) Expectation Model, the factor Growth Opportunities is represented by V/P, which is the substitute of Tobin's Q, book-to-market of equity (BM), and earnings-price ratios (EP) that were widely used before his research. The reason Richardson (2006) used V/P is because the author thinks that V/P gave a more complete picture of the market's expectation of growth opportunities. In this research, I employed two more factors to represent actual growth Delta SALES and Delta TA, for wider picture.

In the test process, we firstly separately tested each of the three Growth Opportunity (Actual Growth) representative factors: V/P, Delta SALES, and Delta TA to see how they fitted the regression model. Moreover, we also used both the original Richardson (2006) Expectation Model and our modified model which had six more factors added to the original Richardson (2006) Expectation Model, to check whether the new factors are contributory to estimate efficient investments of each firm-year observation. This process is used to test hypothesis 1.

To compare the overinvestment / underinvestment rate and the average overinvestment and underinvestment in family firms, we extracted the residual of each regression result, $I^{\varepsilon}_{new,t}$, which is the estimate of inefficient investment. We then compared the number of overinvestment / underinvestment over the total sample number, and calculated the average of overinvestment and underinvestment of family firms' sample. This process is used to test hypothesis 2.

4.2.2 Regression on family governance factors and inefficient investments (Model II)

To test hypotheses 3 to 6, we propose a regression model to examine the influence of family governance factors on inefficient investments for firm level after obtaining the result of error term, I^{ε}_{new}, which is the inefficient investment of each firm level sample. When $I^{\varepsilon}_{new,t} > 0$, it means in that particular firm year, this firm had made overinvestment compared to the expected level of new investment, $I^{*}_{new,t}$, and vice versa. We separated the family firm sample group into two sub-groups, the overinvestment group and the underinvestment group, judging by whether $I^{\varepsilon}_{new,t}$ of each sample is greater (goes to the overinvestment group) or less than (goes to the underinvestment group) 0. In the underinvestment group, we used the absolute value of $I^{\varepsilon}_{new,t}$ for convince. For each group, we applied the following regression:

$$I^{\varepsilon}_{new,t} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

The family governance factors are CEO_t (whether the CEO in a firm year is a family member), BOD_t (the percentage of family members on the board), $Founder_t$ (whether the founder is on the board), and $CEO*Founder_t$ (the value of CEO_t times $Founder_t$), respectively. The detailed definition

and resources are disclosed in Panel B of Table 2.

Insert Panel B of Table 2 about here

FCF_t in this regression represents Free Cash Flow, which is the amount of cash flow beyond that necessary to maintain assets in place (including current debt obligation) and finance expected new investments (Richardson, 2006). Overinvestment is one of the main uses of free cash flow, whereas the behavior of firm's underinvestment may also be significantly influenced by the volume of free cash flow. Regressions with FCF_t explores the relationship between free cash flows and inefficient investments. This process is used to test hypothesis 3.

Variables CEO_t, BOD_t, $Founder_t$, and $CEO*Founder_t$ are family corporate governance factors that may be influential to the decision of inefficient investments. Regressions (1) - (4) in Model II explore the relationship between overinvestment / underinvestment and these factors one by one, and regression (5) explored the relationship between overinvestment / underinvestment and all the variables including free cash flow. This process is used to test hypothesis 4-6.

5.Empirical Results

5.1 Full Sample Summary Statistics

Panel A of table 3 suggests descriptive statistics for the family firms' sample.

Insert Table 3 Panel A about here

For each variable, Panel A of table 3 provides the mean, median, standard deviation, maximum value and minimum value.

Panel A of Table 4 provides with the correlation matrix of all the variables in the family firm sample.

Insert Table 4 Panel A about here

Panel A Table 4 suggests that variables as $DeltaTA_{t-1}$, $DeltaSALES_{t-1}$, $DividendPayout_{t-1}$, ROA_{t-1} , $OROA_{t-1}$, $I_{new,t-1}$, $CashRatio_{t-1}$, and $Size_{t-1}$ have significant positive correlation with $I_{new,t}$ ($DividendPayout_{t-1}$ at 10% significance level, others at 1% significance level), and $Leverage_{t-1}$ has a negative correlation with $I_{new,t}$ at 1% significance level.

The correlation coefficients between most variables are less than 0.5, and all the variance inflation factors of each variable are less than 3, the risk of multicollinearity between variables is therefore excluded.

5.2 Inefficient Investments in Family Firms (Model I)

Table 5 reports the results for the tests of Model I of the family firms' sample.

Insert Table 5 about here

More specifically, Model 1 reports the results of V/P_{t-1} as the representation of Growth Opportunity with all the experimental factors newly added to the control variables in the Richardson 2006 Model. Model 3 and 5 reports the results of $DeltaTA_{t-1}$ and $DeltaSALES_{t-1}$ as actual Growth, respectively, with experimental factors and control variables. The results show that $DeltaTA_{t-1}$ has a significant negative relationship with $I_{new,\ t-1}$ at 1% significance level, which means that the larger the family firm's growth rate of total assets in year t-1 is, the less the family firm will make new investment in year t.

As for the experimental variables in models 1, 3, and 5, $OROA_{t-1}$ has a significant positive relationship with $I_{new,\ t-1}$ at 1% significance level in all the above-mentioned tree models. This is a side evidence for the findings of Freund, Prezas & Vasudevan (2003), that the larger the operating

return on asset of a family firm on year t-1 is, the more this firm is willing to make new investments in year t, thus may lead to a reduction of free cash flow in year t.

Among the control variables in models 1, 3, and 5, $I_{new,t-1}$, $CashRatio_{t-1}$, and $Size_{t-1}$ all have significant positive relationships with $I_{new,\ t}$. These results are consistent with the findings of Richardson (2006): The more a family firm invests in year t-1, the more likely that this firm will have the inertial to continue to invest more in the following year. And the more a family firm owns cash in year t-1, the more it is confident to make more investments in year t. Moreover, the larger a family firm is in year t-1, the more it is willing to expand its investments in year t.

Models 2, 4, and 6 reports V/P_{t-1}, $DeltaTA_{t-1}$ and $DeltaSALES_{t-1}$ as representations of Growth Opportunity and Actual Growth, respectively, with only the variables from the Richardson 2006 Model as control variables. Our findings about the performance of the three Growth Opportunity's representations in the above mentioned three models are similar with those in models 1, 3, and 5: $DeltaTA_{t-1}$ has a significant negative relationship with $I_{new,\ t-1}$ at 1% significance level, and the other Growth Opportunity factors are not significant, which means that $DeltaTA_{t-1}$ can be a stable factor as Actual Growth to explain family firms' new investments every year.

In models 2, 4, and 6, $I_{new,t-1}$, $CashRatio_{t-1}$, and $Size_{t-1}$ all have a significant positive relationships with $I_{new,t-1}$, which is consistent with our findings in models 1, 3, and 5 and the result from Richardson (2006). Moreover, unlike the results in models 1, 3, and 5, the performance of $Leverage_{t-1}$ in Model 4 significantly influences $I_{new,t}$ in a negative way. This result is understandable, because more investments means more risks a firm will undertake, family firms seek longevity as their first option instead of short-term profitability, therefore when a family firm has a large debit/equity ratio in year t-1, it is ore likely to invest less in the next year to avoid more financing risks.

The global financial crisis in 2008-2009 had negative impacts on family firms' investment decisions as well, for the year dummy variable for year 2009 is negatively related to $I_{new,\ t}$ in model 1 at a 1% significance level, and it is also negatively related to $I_{new,\ t}$ in model 3 at a 10% significance level. This indicates that family firms were aware of the investment risk under the crisis, and adjusted their investment plans flexibly to avoid risks in the global financial crisis.

Our Hypothesis 1 is defiantly accepted. Inefficient investments (overinvestments and underinvestments) are common among family firms, as in our regression results, there are always positive as well as negative residuals ($I^{\varepsilon}_{new,t}$) in all of our models, which means that the fitted values of family firms' new investments in our sample are always not equal to the real amount of their new investments every year.

Our Hypothesis 2 is accepted by the result as well. Take the model with the greatest adjusted R-square: Model 1, for example, the number of overinvestments is 778, accounting for 43.6% of the sample, and the number of underinvestments is 1005, accounting for 56.4% of the sample. The result from other models are similar. It is clear that more family firms prefer conservative investment plans, thus making less overinvestments than underinvestments.

5.3 Family Factors affecting Family Firms' Inefficient Investments (Model II)

After gaining the test results from Model I, we extracted the residuals from the model with the greatest adjusted R-square: Model 3 to Model I, to continue our exploration of Model II: the family governance factors and free cash flow affecting family firms' inefficient investments, to test hypotheses 3 to 6.

We separated our family firms sample into two groups according to the residuals ($I^{\varepsilon}_{new,t}$): The overinvestment group with positive residuals ($I^{\varepsilon}_{new,t}$), and the underinvestment group with negative residuals ($I^{\varepsilon}_{new,t}$). For the underinvestment group, we used the absolute values of $I^{\varepsilon}_{new,t}$ for convenience.

Panels B and C of table 3 suggest descriptive statistics for the samples in the above mentioned two groups.

Insert Table 3 Panels B and C about here

For each variable, Panels B and C of table 3 provide the mean, median, standard deviation, maximum value and minimum value of the two groups.

Panels B and C of Table 4 provide with the correlation matrix of all the variables in the above mentioned two groups.

Insert Table 4 Panels B and C about here

Panel B and C of Table 4 suggest that FCF_t have significant positive correlation with $I^{\varepsilon}_{new,t}$ at 1% significance level in both overinvestment group and underinvestment group, $Founder_t$ has significant positive correlation with $I^{\varepsilon}_{new,t}$ at 10% significance level in the overinvestment group, BOD_t has a significant negative correlation with $I^{\varepsilon}_{new,t}$ at 1% significance level in the overinvestment group, and BOD_t has a significant positive correlation with $I^{\varepsilon}_{new,t}$ at 1% significance level in the overinvestment group.

The correlation coefficients between most variables are less than 0.5, and all the variance inflation factors of each variable are less than 3 in both groups, the risk of multicollinearity between variables is therefore excluded.

Table 6 reports the results for the tests of Model II of the family firms' sample.

Insert Table 6 about here

BOD_t is positively related with both overinvestments and underinvestments in family firms at 1% significance level. The more proportion of family members on the board, the more intention of seeking long term survival and steady profitability the firm will have; thus, they will avoid risky investment projects and reduce the extent of underinvestments. Moreover, BOD_t reduces family firm's extent of overinvestments as well. Family firms often have long-term plans and steady expansion goals; it is reasonable that when more family members are on the board, they tend to make efficient investment plans together. These findings fully support our hypothesis 5.

$Founder_t$ is positively related with both family firms' overinvestments and underinvestments. Founders are pioneers of the firms, they founded their own businesses, and some of them are more likely and courageous to expand their businesses into a higher level. Moreover, if the founder is still on the board of directors, this means that their firms are not 'old age firms', and may still be in the process of growing. Therefore, it is possible that family firms with founders on board will take in more aggressive investment projects, when compared with other family firms without founders on board. On the other hand, some of the founders may become conservative when their businesses grow to a certain extent, and as they are the founders themselves, there will be no investment experiences for their reference. Therefore, they may make underinvestment plans to let their firms develop smoothly. In general, the coefficient of $Founder_t$ in the overinvestments group is 146.6987, and the coefficient of $Founder_t$ in the underinvestments group is 74.2481, which is much smaller than 146.6987, this means that the founders' effect on overinvestment is much larger than that on underinvestment. These results support our hypothesis 6.

CEO_t negatively influences both overinvestments and underinvestments, which is similar with the function of BOD_t. This result supports the theory that family member CEOs promote more efficient investments, when compared with non-family member CEOs. These results support our hypothesis 4. Besides, $CEO*Founder_t$ is positively related with family firms' overinvestments at 10% significance level. This result partially supports our explanation on why family firms with founders on board tend to overinvest more. It also conveys the message that to some extent, founders have more power over making investment decisions than CEOs.

FCF_t is positively related with both overinvestments and underinvestments at 1% significance level in all groups. This strongly supports our hypothesis 3. The richness of free cash flows always leads to situations of overinvestment, and eliminates underinvestment at the same time. This finding also agrees with the result reported in Richardson (2006) and the results tested by many

other researchers.

It is worth mentioning that $Leverage_{t-1}$ has a significant impact on exaggerating a family firm's degree of underinvestment, which means when family firms are having excessive debt in year t-1, it is likely to be cautious about its investment plans, thus end up making underinvestments in year t. On the contrary, ROA_t will add to the potential of making overinvestments, it is understandable when a family firm is having high returns on assets, it probably will look for a greater prospect and end up with overinvestments.

5.4 Robustness tests for Model II

5.4.1 Endogeneity Concerns

Table 7 reports the results for the Hausman Endogeneity Test for Model II - overinvestment group (Panel A) and underinvestment group (Panel B).

Insert Table 7 about here

We employed a two-stage instrumental variables approach to address the potential endogeneity between FCF_t and $I^{\varepsilon}_{new,t}$. We used $CashRatio_{t-1}$, $StockReturns_{t-1}$ and Year Indicator dummy variables as instruments for FCF_t, we then used the predicted values of the potentially endogenous variable obtained from the first-stage regressions in the second-stage regressions. Our null hypothesis for Hausman Tests is that there is no endogeneity for all the dependent variables. The p-values for the tests in both overinvestment group (Panel A) and underinvestment group (Panel B) are all above 0.05, implying that we cannot reject the null hypothesis.

5.4.2 Robustness Tests with different variables

Table 8 reports the results for the Robustness Test with different variables OLS regression for the effect of family corporate governance factors on inefficient investment in two groups: overinvestment group (Panel A) and underinvestment group (Panel B).

Insert Table 8 about here

In this test, we replaced $Leverage_t$ with $Tangibility_t$, as well as $OROA_t$ with ROA_t, to test the robustness of the Family Governance Factors and FCF_t for all the five models to Model II. This result indicates that the impacts of CEO_t, BOD_t, $Founder_t$ and FCF_t on overinvestments and underinvestments in the robustness models are similar to those in Model II, which supports that the results of our Model II is robust.

5.4.3 Robustness Tests with different groupings

Table 9 reports the results for the Robustness Test with different groupings OLS regression of the effect of family corporate governance factors on inefficient investment in two groups: overinvestment group (Panel A) and underinvestment group (Panel B).

Insert Table 9 about here

We sorted the two inefficient investment groups into 5 subgroups: High-Tech Firms, Low-Tech Firms, Before Crisis Period (2004-2007), Crisis Period (2008-2010), and winsorized at 5% level, to test the robustness of the Family Governance Factors.

The result shows that BOD_t is significantly negative in both panels, except for high-tech firms' overinvestment subgroup. $Founder_t$ loses power in some of the subgroups, but in general it is always positive in all the subgroups, which is consistent with our findings in the original Model II.

On the contrary, CEO_t becomes positive in high-tech firms and crisis period, indicating that family member CEOs are not always the best choices for family high-tech firms or in chaotic periods. Generally speaking, the results from those tests are mostly similar to the original test for the model 5 to Model II.

6. Conclusions

There are rarely previous researches focusing on the potential characteristic reasons of family firms' inefficient investing, nor any models specially designed for discovering the influential mechanism of the family firm's special characters on their inefficient investment behaviors. Our study is the first to examine firm level investment decisions with additional variables added to the Richardson (2006) Expectation Model. Besides, we extracted residuals (the value of inefficient investments) from the regression result of Model I, and separated them into overinvestment and underinvestment groups, and then tested the influence of family governance factors on inefficient investments for firm level.

We found that the phenomenon of inefficient investments, both overinvestment and underinvestments, are common among family firms in the sample. The number and extent of underinvestments are higher than those of overinvestments. DeltaTA can be a good and stable representation for growth, and among the new factors introduced to the Richardson (2006) Model, operating return of assets significantly influences family firms' new investments in a positive way. $I_{new,t-1}$, $CashRatio_{t-1}$, and $Size_{t-1}$ all have a significant positive relationship with $I_{new,\ t}$, which is consistent with the findings of Richardson (2006).

In the process of testing whether family governance factors influence family firms' inefficient investments, we discovered that the percentage of family members on the board (BOD_t) of directors reduces both underinvestments and overinvestments, whereas having the founder on the board ($Founder_t$) exaggerates the extent of both underinvestment and overinvestments. Family member CEOs (CEO_t) negatively influences both overinvestments and underinvestments, which is similar with the function of BOD_t. As for the richness of free cash flow, it always leads to situations of overinvestment, and reduces underinvestment. We also conducted Hausman Endogeneity test and a variety of Robustness tests to validate our results. Our results are robust to potential endogeneity of the regressors in our empirical model, and continue to hold after changing different variables and dividing into typical groups. Our study has broad implications for academics, family firms' stakeholders, policy makers, and practitioners in corporate governance.

References

Aggarwal, R. K., Samwick, A. A., 2006. Empire-builders and shirkers: Investment, firm performance, and managerial incentives. Journal of Corporate Finance, 12 (3), 489-515.

Akerlof, G., 1970. The market for "Lemons". Quarterly of Journal of Economics, 84, 88-500.

Anderson, R. C., Reeb, D. M., Zhao, W., 2012. Family-controlled firms and informed trading: Evidence from short sales. The Journal of Finance, 67(1), 351-386.

Anderson, R. C., Reeb, D. M., 2003. Founding-family ownership and firm performance: Evidence from the S&P 500, Journal of Finance, 58, 1301-1328.

Anderson, R. C., Reeb, D. M., Zhao, W., 2010. Family-Controlled Firms and Informed Trading: Evidence from Short Sales. The Journal of Finance, 67(1), 351-385.

Anderson, R. C., Ronald C., Reeb, D. M., 2004. Board composition: Balancing family influence in S&P 500 firms. Administrative Sciences Quarterly, 49, 209-237.

Anderson, R. C., Duru, A., Reeb, D. M., 2009. Founders, heirs, and corporate opacity in the United States. Journal of Financial Economics, 92, 205–222.

Shleifer, A. and Vishny, R W., 1986. Large shareholders and corporate control. Journal of Political Economy, 94, 461-488.

Astrachan, J. H., Shanker, M. C., 2003. Family businesses' contribution to the U.S. economy: A closer look. Family Business Review, 16(3), 211-219.

Bardsley, D. O Canada! Family businesses flourishing in the True North (INFOGRAPHIC) http://www.campdenfb.com/article/o-canada-family-businesses-flourishing-true-north-infographic, 30 June, 2015.

Bloom, N. and Van Reenen, J., 2007. Measuring and explaining management practices across firms and countries. Quarterly Journal of Economics, 122, 1351–1408.

Breton-Miller I. L., Miller, D., Lester, R. H., 2011. Stewardship or agency? A social embeddedness reconciliation of conduct and performance in public family businesses. Organization Science, 22, 704-721.

Broussard, J., Buchenroth, S. A. and Pilotte, E. A., 2004. CEO incentives, cash flow, and investment. Financial Management, 33(2), 51-70.

Burkart, M., Panunzi, F. and Shleifer, A., 2003. Family firms, Journal of Finance, 58, 2167–2202.

Campbell, T., Chan, Y. and Marino, A., 1989. Incentive contracts for managers who discover and manage investment projects. Journal of Economic Behavior and Organization, 12 (12), 353–

364.

Cesari, A. D., 2012. Expropriation of minority shareholders and payout policy. British Accounting Review, 44, 207-220.

Chandler, Alfred D., 1977. The visible hand: The managerial revolution in American business. Harvard University Press.

Chrisman, J., Chua, J., Litz, R., 2003. A unified systems perspective of family firm performance: An extension and integration. Journal of Business Venturing, 18, 467-472.

Chrisman, J., Chua, J., & Litz, R., 2004. Comparing the agency costs of family and non-family firms: Conceptual issues and exploratory evidence. Entrepreneurship Theory and Practice, 28, 335–354.

Chua, J. H., Chrisman, J. J. and Sharma, P., 1999. Defining the family business by behavior. Entrepreneurship Theory and Practice, 23(4): 19-39.

Credit Suisse Research Institute, 2018. Family businesses outperform other companies. The CS Family 1000 in 2018.

Cucculelli, M., Micucci, G., 2008. Family succession and firm performance: Evidence from Italian family firms. Journal of Corporate Finance, 14(1), February, 17-31.

Czarnitzki, D., Kraft, K., 2009. Capital control, debt financing and innovative activity. Journal of Economic Behavior and Organization, 71(2), 0-383.

Degryse, H., De Jong, A., 2006. Investment and internal finance: Asymmetric information or managerial discretion? International Journal of Industrial Organization, 24, 125–147.

Dello Sbarba, A., Marelli, A., 2018. Family-controlled businesses and management control: the framing of “shareholder-oriented” practices. Journal of Management Control, 28(4):417-456.

Faccio, M., Lang, L. H. P. & Young, L., 2001. Dividends and expropriation. American Economic Review, 91, 54–78.

Family Firm Institute. Global Data Points. 2018. https://my.ffi.org/page/globaldatapoints (accessed on 7 March 2019).

Fazzari, M., Hubbard, G., & Petersen, C., 1988. Financing constraints on corporate investment. Brookings Papers on Economic Activity, 19(1), 141–195.

Feltham, G. A., Ohlson, J. A., 1995. Valuation and clean surplus accounting for operating and financial activities. Contemporary Accounting Research, 11(2), 689-731.

Frankfurter, George M., 1997. Finance, investment and macroeconomics: The Neoclassical and

a post Keynesian solution. Journal of Economic Behavior & Organization, 32 (2), 326-331.

Freund, S., Prezas, A., Vasudevan, G., 2003. Operating performance and free cash flow of asset buyers. Financial Management, 32(winter):87-106.

Gardner, A., 2016. Remarks at 3d annual European family business summit, Lisbon. https://useu.usmission.gov/remarks-3d-annual-european-family-business-summit-lisbon-november-18-2016

Guadalupe, M. & Perez-Gonzalez, F., 2006. The impact of product market competition on private benefits of control. Hitotsubashi University, Hi-Stat Discussion Paper Series No. 159.

Gugler, K., 2003. Corporate governance, dividend payout policy and the interrelation between dividends, R&D and capital investment. Journal of Banking and Finance, 27, 1297-1321.

Gugler, K., Yurtoglu, B.B., 2003.Corporate governance and dividend pay-out policy in Germany. European Economic Review, 47, 731-758.

Haberler, G., 1931. Irving fisher's "theory of interest". The Quarterly Journal of Economics, 45(3).

Hadlock, C. J., 1998. Ownership, liquidity, and investment. Journal of Economics, 29(3), 487-508.

Hirigoyen, G., Ousseini, D. M., 2017. Investment decisions in unlisted family businesses. International Journal of Economics & Management Sciences, 6 (1).

Hirshleifer, D., and Suh, Y., 1992. Risk, managerial effort and project choice. Journal of Financial Intermediation, 2 (9), 308–345.

Hoshi, Takeo, Anil Kashyap and David Seharfstein., 1991. Corporate structure, liquidity and investment from Japanese industry groups. Quarterly Journal of Economics. 106, 33-60.

Jensen, M. and Meckling, M., 1976. Theory of the firm: Managerial behavior, agency costs, and capital structure. Journal of Financial Economics, 3, 305-360.

Jensen, M. C., 1986. Agency costs of free cash flow, Corporate Finance and Takeovers. American Economic Review, 76, 323-329.

Jensen, M. C., 1993. The modern industrial revolution, exit, and failure of internal control systems. Journal of Finance, 48 (7), 831–880.

John, Kose and Nachman, David C., 1985. Risky debt, investment incentives, and reputation in a sequential equilibrium. The Journal of Finance, 40(3), 863-878.

Kaplan, S. N. and Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? The Quarterly Journal of Economics, 112(1), 169-215.

Kuo, Y. and Hung, J., 2012. Family control and investment-cash flow sensitivity: Moderating effects of excess control rights and board independence. Corporate Governance: An International Review, 20(3), 253–266.

Kwak, M., 2003. The advantages of family ownership. MIT Sloan Manage. Review, 44(2).

La Porta, R., Florencio, L. D. S. and Andrei, S., 1999. Corporate ownership around the world. Journal of Finance, (2):471-516.

Lambert, R. A., 1986. Executive effort and selection of risky projects. Rand Journal of Economics, 17 (Spring), 77–88.

Lang, L., and Lizenberger, L., 1989. Dividend announcement: Cash flow signaling vs. free cash flow hypothesis. Journal of Financial Economics, (24), 181-191.

Leenders, M. & Waarts, E., 2003. Competitiveness and evolution of family businesses: The role of family and business orientation. European Management Journal, 21(6), 686–697.

Lumpkin, G. T., Martin, W. & Vaughn, M. (2008). Family orientation: Individual-level influences on family firm outcomes. Family Business Review, 21(2), 127–138.

Lumpkin，G. T.，Brigham, K. H., Moss, T. W., 2010. Long term orientation: Implications for the Entrepreneurial orientation and performance of family businesses，Entrepreneurship and Regional Development，22 (3-4): 241-264.

Mahto, R. V., Davis, P. S., Pearce, J. A. & Robinson, R. B., 2010. Satisfaction with firm performance in family businesses. Entrepreneurship Theory and Practice, 34, 985-1001.

McConaughy, Daniel L., 2000. Family CEOs vs. nonfamily CEOs in the family-controlled firm: An examination of the level and sensitivity of pay to performance. Family Business Review, vol. XIII, no. 2, June, 121-132.

Mehrotra, V., Morck, R., Jungwook, S. and Wiwattanakantang, Y., 2013. Adoptive expectations: Rising sons in Japanese family firms. Journal of Financial Economics, 108, 840–854.

Meza, D. D. and Webb, D. C., 1987. Too Much Investment: A problem of asymmetric information. The Quarterly Journal of Economics, Vol. 102, No. 2, 281-292.

Miller, D., 1993. Some organizational consequences of CEO succession. Academy of Management Journal, 36, 644–659.

Miller, D., Le Breton-Miller, I., Minichilli, A. et al, 2014. When do non-family CEOs outperform in family firms? Agency and behavioral agency perspectives. Journal of Management Studies, 51(4), 547-572.

Mishra, C. S., McConaughy, D. L., 1999. Founding family control and capital structure: The risk

of loss of control and the aversion to debt. Entrepreneurship theory and practice, summer, 53-64.

Modigliani, F. and Miller, M. H., 1958. The cost of capital, corporation finance and the theory of investment. The American Economic Review, Vol. 48, No. 3. 261-297.

Molly. V., Laveren, E., Deloof, M., 2017. Family business succession and its impact on financial structure and performance. Family Business Review. 23(2), 131-147.

Murphy, Kevin J., 1985. Corporate performance and managerial remuneration: An empirical analysis. Journal of Accounting and Economics, 7(1–3), 11-42.

Myers S., 1977. Determinants of corporate borrowing. Journal of Financial Economics, 5, 146-175.

Myers, S., Majluf, N., 1984. Corporate financing and investment decisions when firms have investors do not have. Journal of Financial Economics, 13,187-221.

Narayanan M. P., 1988. Debt versus equity under asymmetric information. Journal of Financial and Quantitative Analysis, 23(1), 39-51.

Ocasio, W., 1999. Institutionalized action and corporate governance: The reliance on rules of CEO succession. Administrative Science Quarterly, 44, 384–416.

Pawlina, G., Renneboog, L., 2005. Is investment-cash flow sensitivity caused by agency costs or asymmetric information? Evidence from the UK. European Financial Management, 11, 483-513.

Pimentel, D., Scholten, M. and Couto, J., 2018. Fast or slow? Decision-making styles in small family and nonfamily firms, Journal of Family Business Management, 8(2), 113-125.

Quico, M., Fernando, C. P., Hernández-Lara A. B., 2014. Uncertainty in the family business facing the process of internationalization: Literature review and future research agenda. Intangible Capital, 10(4), 836-853.

Richardson, S., 2006. Over investment of Free Cash Flow. Review of Accounting Studies, 11(2-3), 159－189.

Richardson, S., 2003. Corporate Governance and the over-investment of surplus cash. Dissertation, Michigan University.

Richardson, V., 2000. Information asymmetry and earnings management: Some evidence. Review of Quantitative Finance and Accounting, 15, 325-347.

Shleifer, A. and Vishny, R. W., 1986. Larger shareholders and corporate control. Journal of Political Economy, 94, 461-488.

Sohu finance, 2017. Global family business survey 2016: How family businesses in the Mainland of China and Hong Kong move forward under the current situation. May 24, 2017. https://www.sohu.com/a/143238841_680864.

Song W.，Zhang X., 2019. Internal control，free cash flow and cash dividend．Journal of Chongqing University of Technology (Social Science), 33 (3), 54-62.

Stein, J., 1989. Efficient capital markets, inefficient firms: A model of myopic corporate behavior. Quarterly Journal of Economics, November, 655-669.

Stiglitz, J. and Weiss, A., 1981. Credit rationing in markets with imperfect information. American Economic Review, 71, 393-410.

Tàpies J, Fernández Moya M., 2012. Values and longevity in family business: Evidence from a cross-cultural analysis. Journal of Family Business Management, 2, 130-146.

Uhlaner, L. M., 2005. The use of Guttman scale in development of a family orientation index for small-to-medium sized firms. Family Business Review, 18(1), 41–56.

Villalonga B., Amit R., 2006. How do family ownership, control and management affect firm value? Journal of Financial Economics 80, 341–385.

Vogt, Stephen C., 1994. The cash flow/investment relationship: Evidence from U.S. manufacturing firms. Financial Management, 23(2), Summer, 3-20.

Watts R. L., Zimmerman J., 1986. Positive accounting theory. Prentice-Hall. Englewood Cliffs.

Zattoni, A., Gnan, L., Huse, M., 2015. Does family involvement influence firm performance? Exploring the mediating effects of board processes and tasks. Journal of Management, 41(4), 1214-1243.

Appendices

Table 1: Sample and Data

Panel A: Firms Classified by Economic Sectors

GICS Codes	Economic Sector	Family firms
10	Energy	12
15	Materials	11
20	Industrial	54
25	Consumer discretionary	103
30	Consumer staples	24
35	Health care	14
40	Financials	0
45	Information technology	35
50	Communication service	2
55	Utilities	0
60	Real estate	1
Σ		256

Note: The Global Industry Classification Standard (GICS) is a standardized classification system for equities, developed jointly by Morgan Stanley Capital International (MSCI) and Standard & Poors in 1999.

Panel B: Observations by firm-years from 2001 to 2010.

	Number of Observations	Invalid Observations	Valid Observations
2004	257	3	254
2005	256	3	253
2006	258	3	255
2007	258	3	255
2008	256	0	256
2009	255	0	255
2010	256	1	255
Σ	1796	13	1783

Note: This table reports the observations for constructing sample. Besides Compustat via Wrds and BoradEx via Wrds, for the family firms, the individual personnel information obtained from the firm's official websites, annual reports and the online encyclopedia of Wikipedia, Bloomberg, news reports, etc.

Table 2: Variable definitions and data sources

This table presents a brief description of the variables used in my study and the sources/calculating methods that used to obtain each of the variables.

Panel A: Variables for Model I

Variable	Description	Source
$I_{new,t}$	$I_{new,t}$ represents the **new investment expenditure** for every year, which is calculated as the difference between $I_{total,t}$ and $I_{maintenance,t}$. $I_{new,t}=I_{total,t}-I_{maintenance,t}$. $I_{total,t}$ is the total investment expenditure. $I_{total,t}=XRD_t$ *(Research & development expenditure)* $+CAPX_t$ *(Capital Expenditure)* $+AQC_t$ *(Acquisition Expenditure)-SPPE (Cash Receipts from Sale of Property, Plant & Equipment).* $I_{maintenance,t}$ is the necessary investment expenditure to maintain assets in place. $I_{maintenance,t}=DP_t$ *(Depreciation & Amortization).*	Compustat: XRD, CAPX, AQC, SPPE, DP.
V/P_{t-1}	A measure of **growth opportunities**. Calculated as: V/P = Value of the firm (V_{AIP}) / Market Value of Equity *(MV)*; $V_{AIP}=(1-\alpha r)\,BV+\alpha(1-r)\,X-\alpha rd$, $\alpha=(\omega/(1-r+\omega))$, where r=12% and ω=0.62. ω is the abnormal earnings persistence parameter from the Feltham and Ohlson (1995) * framework; *BV* is the book value of equity; *d* is the annual dividends; and *X* is the firm's operating income after depreciation.	Compustat: *BV*=CEQ; *d*= DVT; *X*= OIADP; *MV*=CSHO*PRCC-F.
$DeltaSALES_{t-1}$	A measure of **growth opportunities**. Calculated as: $DeltaSALES_t = (SALES_t - SALES_{t-1}) / SALES_{t-1}$.	Compustat: SALE.
$DeltaTA_{t-1}$	A measure of **growth opportunities**. Calculated as: $DeltaTA_t = (AT_t-AT_{t-1})/AT_{t-1}$.	Compustat: AT.
$LnAge_t$	The log of the number of years since the firm had been founded.	Annual reports, firms' official websites.
$CashRatio_{t-1}$	The balance of cash and short-term investments, deflated by total assets by the start of the year. Calculated as: $CashRatio_t = CAE_t/AT_t$	Compustat: CAE, AT.
$Size_{t-1}$	The log of total assets measured at the start of the year.	Compustat:

		AT.
$Leverage_{t-1}$	The sum of book value of short-term and long-term debt, divided by the sum of the book value of total debt and total equity. Calculated as: $Leverage_t=DT_t/(DT_t+SEQ_t)$	Compustat: DT, SEQ.
$StockReturns_{t-1}$	The stock returns for the year prior to the investment year. Calculated as: $StockReturns_t= (MKVALT_t-MKVALT_{t-1})/MKVALT_{t-1}$	Compustat: MKVALT.
Year Indicator	Dummy variables. It is a vector of indicator variables to capture annual fixed effects. Y_{2004}=1 when the data is from the year 2004, Y_{2004}=1 when the data is not from the year 2004; and so forth.	Compustat: Data Year - Fiscal
Industry Indicator	Dummy variables. It is a vector of indicator variables to capture industry fixed effects. $I_{GIC\ Sectors\ Code}$=1 when the firm is classified in a particular industry according to Global Industry Classification Standard (GICS), $I_{GIC\ Sectors\ Code}$=0 when the firm is not classified in the particular industry according to Global Industry Classification Standard (GICS).	Compustat: GSECTOR
Ad_{t-1}	The advertising expenses of the year.	Compustat: XAD
Dividend $Payout_{t-1}$	The ratio of the total amount of dividends paid out to the shareholders relative to the net income of the company of the year. Calculated as: Dividend $Payout_t=Dividend_t/Sales_t$	Compustat: DVT=Total dividend; SALES
$OROA_{t-1}$	Operating return on assets, a profitability ratio. Calculated as: $OROA_t$= Earnings Before Taxes and $Interest_t$/Total $Assets_t$	Compustat: EBIT=Earnings Before Taxes and Interest; TA
ROA_{t-1}	Return on assets, a profitability ratio. Calculated as: ROA_t= Net $Income_t$/Total $Assets_t$	Compustat: NI=Net Income; TA
Short Debt $Change_{t-1}$	The ratio of the amount of Short-term Debt Changed from the beginning to the end of the year over total asset. Calculated as:	Compustat: DLTT = Long term

	(Short-term $Debt_t$ -Short-term $Debt_{t-1}$)/AT_t	debt; DBTE - Total debt; AT
$Tangibility_{t-1}$	The ratio of tangible assets over total assets of the year. Calculated as: $Tangibility_t$=Tangible $Assets_t$/Total $Assets_t$	Compustat: INTAN = Intangible Assets; AT

[*] Feltham G A, Ohlson J A, 1995. Valuation and Clean Surplus Accounting for Operating and Financial Activities. Contemporary Accounting Research, 11(2):689-731.

Panel B: Governance factors in Model II.

Variable	Description	Source
$I^{\varepsilon}_{new,t}$	The residual from **regression Model I**. It is an estimate of the amount of **inefficient investment**.	
FCF_t	Free Cash Flow. The cash flow beyond that necessary to maintain assets in place (including current debt obligation) and finance expected new investments. Calucated as: $FCF_t=CF_{AIP,t} - I^*_{new,t}$; $CF_{AIP,t}$ =Cash from $Operation_t$ - $Maintenance\ Expenditure_t$ + $R\&D_t$; $I^*_{new,t}$ is the fitted value of Model I, $I^*_{new,t} = I_{new,t} - I^{\varepsilon}_{new,t}$	Compustat: OANCF = Cash from Operation; DP = Maintenance Expenditure; XRD
CEO_t	A Dummy variable. CEO_t=1 when the CEO of the firm is a family member in the current year, CEO_t=0 when the CEO of the firm is a non-family member in the current year. To make sure whether an individual belongs to the family or not.	BoardEx: Individual name & Individual role. Then, search this person on companies' official webpage/Bloomberg/ Google /Wikipedia/etc...
BOD_t	The percentage of family members sitting on the board of directors at the current year. To make sure whether an individual belongs to the family or not.	BoardEx: Individual name & Individual role. Then, search this person on companies' official webpage/Bloomberg/ Google

		/Wikipedia/etc...
$Founder_t$	A Dummy variable. $Founder_t$=1 when the firm's founder is still a member in the board of directors, $Founder_t$=0 when the firm's founder is no longer a member in the board of directors.	BoardEx: Individual name & Individual role. Then, search this person' name on companies' official webpage/ Bloomberg/ Google /Wikipedia/ etc... To make sure whether the founder of the firm is still in the name list of BOD_t.
$CEO*Founder_t$	A Dummy variable. $CEO*Founder_t$=1 when the CEO_t of the firm is a family member, and the firm's founder is still a member in the board of directors. Otherwise, $CEO*Founder_t$=0.	

Table 3: Full Sample Summary Statistics

Panel A: Family Firms Full Sample

Variable	N	Mean	Median	Std.Dev.	Min	Max
$I_{new,t}$	1,783	223.5686	19.7890	1,000.9540	-6,320.0000	17,527.0000
V/P_{t-1}	1,783	0.4402	0.5014	6.8572	-285. 8872	18.6936
$DeltaTA_{t-1}$	1,783	0.0648	0.0430	0.2165	-0.7281	2.8604
$DeltaSales_{t-1}$	1,783	0.0722	0.0632	0.2274	-1.0000	3.1136
$Advertisment_{t-1}$	1,783	0.0160	0.0010	0.0333	0.0000	0.2861
$DividendPayout_{t-1}$	1,783	0.0175	0.0036	0.0693	0.0000	2.1783
$OROA_{t-1}$	1,783	0.0886	0.0863	0.0867	-0.4128	0.5471
ROA_{t-1}	1,783	0.0356	0.0489	0.1066	-0.8256	0.6823
$ShortDebtChange_{t-1}$	1,783	0.0000	0.0000	0.0538	-0.8233	0.6325
$Tangibility_{t-1}$	1,783	0.8066	0.8731	0.2065	0.1204	1.0000
$I_{new,t-1}$	1,783	212.8367	20.3820	962.9861	-6,320.0000	17,527.0000
$LnAge_t$	1,783	3.7204	3.7136	0.7441	1.7918	5.4116
$CashRatio_{t-1}$	1,783	0.1487	0.0874	0.1645	0.0000	0.9720
$Size_{t-1}$	1,783	3.1122	3.0078	0.5909	1.6879	5.4837
$Leverage_{t-1}$	1,783	0.2947	0.2609	0.3105	0.0000	2.6512
$StockReturns_{t-1}$	1,783	0.2806	0.0797	2.9755	-0.9838	120.0071

Panel B: Family Firms Overinvestment Group

Variable	N	Mean	Median	Std.Dev.	Min	Max
$I^e_{new,t}$	778	272.8166	97.8100	766.0332	0.4300	10,359.0400
CEO_t	778	0.5925	1.0000	0.4917	0.0000	1.0000
BOD_t	778	0.1797	0.1538	0.1073	0.0000	0.5000
$Founder_t$	778	0.4100	0.0000	0.4922	0.0000	1.0000
$Ceo*Founder_t$	778	0.2931	0.0000	0.4555	0.0000	1.0000
FCF_t	778	396.1383	108.8110	1,900.7500	-2,514.1100	22,012.7400
$Leverage_t$	778	0.3326	0.2954	0.3483	0.0000	2.6512
$LnAge_t$	778	3.7974	3.8712	0.7965	1.7918	10.7630
ROA_t	778	0.0229	0.0420	0.1080	-0.8256	0.2429

Panel C: Family Firms Underinvestment Group

Variable	N	Mean	Median	Std.Dev.	Min	Max
$I^{e}_{new,t}$	1,005	211.1954	111.8800	438.2291	0.0800	7076.1400
CEO_t	1,005	0.5882	1.0000	0.4923	0.0000	1.0000
BOD_t	1,005	0.1816	0.1429	0.1032	0.0000	0.5000
$Founder_t$	1,005	0.5652	1.0000	0.4959	0.0000	1.0000
$Ceo*Founder_t$	1,005	0.3970	0.0000	0.4895	0.0000	1.0000
FCF_t	1,005	54.7914	-26.0880	944.7558	-13,964.1400	15,472.1100
$Leverage_t$	1,005	0.2656	0.2112	0.2946	-0.5404	1.9351
$LnAge_t$	1,005	3.6927	3.6376	0.9349	1.7918	19.9740
ROA_t	1,005	0.0476	0.0593	0.1026	-0.7802	0.6823

Table 4: Pearson Correlation Coefficients

Panel A: Model I- Family Firms of full sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
$I_{new,t}$	(1) 1.000															
V/P_{t-1}	(2) 0.002	1.000														
$DeltaTA_{t-1}$	(3) 0.105***	-0.002	1.000													
$DeltaSales_{t-1}$	(4) 0.098***	-0.015	0.511***	1.000												
$Advertisment_{t-1}$	(5) 0.007	-0.016	0.000	-0.025	1.000											
$DividendPayout_{t-1}$	(6) 0.080***	-0.001	-0.059**	-0.050**	0.007	1.000										
$OROA_{t-1}$	(7) 0.137***	-0.017	0.259***	0.235***	0.044*	0.101***	1.000									
ROA_{t-1t-1}	(8) 0.127***	0.029	0.409***	0.262***	0.055**	0.081***	0.664***	1.000								
$ShortDebtChange_{t-1}$	(9) -0.001	-0.008	0.076***	0.031	-0.008	0.002	-0.004	-0.037	1.000							
$Tangibility_{t-1}$	(10) -0.008	0.048**	0.032	0.036	-0.059**	0.025	-0.011	0.128***	-0.020	1.000						
$I_{new,\ t-1}$	(11) 0.741***	0.005	0.195***	0.123***	0.005	0.068***	0.133***	0.118***	0.008	-0.049**	1.000					
$LnAge$	(12) -0.060**	0.038	-0.002	-0.135***	0.047**	-0.011	0.148***	0.106***	-0.020	-0.030	-0.050**	1.000				
$CashRatio_{t-1}$	(13) 0.094***	0.001	-0.003	0.030	0.044*	0.035	-0.089***	0.040*	0.003	0.297***	0.058**	-0.320***	1.000			
$Size_{t-1}$	(14) 0.390***	-0.060**	0.130***	0.050**	0.131***	0.044*	0.157***	0.123***	0.023	-0.176***	0.402***	0.216***	-0.178***	1.000		
$Leverage_{t-1}$	(15) -0.051**	-0.149***	-0.086***	-0.055**	-0.043*	0.031	-0.169***	-0.349***	0.081***	-0.282***	-0.045*	0.005	-0.347***	0.253***	1.000	
$StockReturns_{t-1}$	(16) -0.011	0.005	0.057**	0.028	0.002	-0.021	0.014	0.170***	-0.002	-0.021	-0.014	0.035	-0.013	0.023	0.048**	1.000

Panel B: Model II- Family Firms Overinvestment Group

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I^{E}_{new,t}$	(1)	1.000								
CEO_t	(2)	-0.047	1.000							
BOD_t	(3)	-0.129***	0.487***	1.000						
$Founder_t$	(4)	0.117***	0.207***	0.123***	1.000					
$Ceo*Founder_t$	(5)	0.058	0.534***	0.225***	0.772***	1.000				
FCF_t	(6)	0.506***	-0.098***	-0.098***	0.050	-0.061*	1.000			
$Leverage_t$	(7)	0.021	0.039	0.081**	-0.032	0.041	0.012	1.000		
$LnAge_t$	(8)	-0.035	-0.258***	-0.054	-0.570***	-0.517***	0.017	-0.053	1.000	
ROA_t	(9)	0.124***	0.010	0.041	-0.017	-0.024	0.121***	-0.341***	0.182***	1.000

Panel C: Model II- Family Firms Underinvestment Group

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Residual_t$	(1)	1.000								
CEO_t	(2)	-0.067**	1.000							
BOD_t	(3)	-0.114***	0.402***	1.000						
$Founder_t$	(4)	0.031	0.265***	0.164***	1.000					
$Ceo*Founder_t$	(5)	-0.005	0.679***	0.274***	0.712***	1.000				
FCF_t	(6)	-0.214***	-0.059*	-0.057*	0.023	-0.045	1.000			
$Leverage_t$	(7)	0.127***	-0.034	0.019	-0.129***	-0.067**	-0.106***	1.000		
$Lnage_t$	(8)	0.013	-0.253***	-0.099***	-0.512***	-0.417***	0.034	0.006	1.000	
ROA_t	(9)	-0.025	-0.038	0.020	-0.014	-0.049	0.138***	-0.321***	0.042	1.000

Note: We report the Pearson correlation coefficients between all pairs of variables for the sample. ***, ** and * denote statistical significance at the 1%, 5 % and 10% level, respectively.

Table 5 The effect of growth opportunity or actual growth and other accounting on the investment expectation (Model I, full sample)

$$I_{new,t} = \alpha + \lambda GrowthOpportunity(or\ ActualGrowth)_{t-1} + \beta_1 Ad_{t-1} + \beta_2 DividendPayout_{t-1} + \beta_3 ROA_{t-1} + \beta_4 OROA_{t-1} + \beta_5 ShortDebtChange_{t-1} + \beta_6 Tangibility_{t-1} + \gamma_1 I_{new,t-1} + \gamma_2 Leverage_{t-1} + \gamma_3 CashRatio_{t-1} + \gamma_4 LnAge_t + \gamma_5 Size_{t-1} + \gamma_6 StockReturn_{t-1} + \Sigma\, YearIndicator + \Sigma\, IndustryIndicator + \xi$$

Variables	V/P_{t-1}		$deltaTA_{t-1}$		$deltaSALES_{t-1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-703.1497**	-658.0371**	-722.6562**	-698.7597***	-701.6819**	-659.5738**
	(0.0173)	(0.0235)	(0.0139)	(0.0157)	(0.0174)	(0.0231)
Growth Opportunities / Actual Growth						
V/P_{t-1}	0.3994	0.2490				
	(0.8628)	(0.9141)				
$deltaTA_{t-1}$			-367.3312***	-309.1076***		
			(<.0001)	(<.0001)		
$deltaSALES_{t-1}$					-97.3555	-68.0205
					(0.2204)	(0.3756)
Other Explanatory Variables						
Ad_{t-1}	-158.2817		-164.7484		-159.8628	
	(0.7523)		(0.7411)		(0.7497)	
$Dividend\ Payout_{t-1}$	278.7108		162.8489		253.2134	
	(0.2281)		(0.4817)		(0.2753)	
$OROA_{t-1}$	486.6009*		465.6343*		519.4943**	
	(0.0549)		(0.0645)		(0.0414)	
ROA_{t-1}	-143.9220		152.5991		-113.8469	
	(0.5204)		(0.5117)		(0.6131)	
$ShortDebt\ Change_{t-1}$	-118.8708		4.4588		-109.1241	
	(0.6836)		(0.9878)		(0.7082)	

Tangibility$_{t-1}$	92.2354		94.9413		94.6382	
	(0.2846)		(0.2680)		(0.2721)	
Control Variables						
$I_{new,t-1}$	0.6861***	0.6897***	0.6978***	0.7003***	0.6876***	0.6909***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
LnAge	-41.5046*	-39.6139	-44.7523*	-41.1920*	-45.2335*	-42.0014*
	(0.0895)	(0.1047)	(0.0656)	(0.0899)	(0.0662)	(0.0871)
CashRatio$_{t-1}$	253.5926**	284.7495**	243.4510**	279.0861**	250.4900**	282.6376**
	(0.0402)	(0.0156)	(0.0474)	(0.0172)	(0.0424)	(0.0163)
Size$_{t-1}$	238.8849***	242.1853***	242.2507***	253.9855***	239.2085***	243.7682***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Leverage$_{t-1}$	-68.8264	-89.8456	-54.1384	-110.2544*	-66.0888	-92.5961
	(0.2869)	(0.1244)	(0.3958)	(0.0567)	(0.3024)	(0.1099)
Stock Returns$_{t-1}$	-1.6327	-2.3147	-2.1094	-1.0342	-1.4823	-2.0420
	(0.7660)	(0.6632)	(0.6990)	(0.8453)	(0.7869)	(0.7012)
Year Indicator	No	No	Yes 2009 negative*	No	No	No
Industry Indicator	No	No	No	No	No	No
Observations	1783	1783	1783	1783	1783	1783
Adj. R^2	0.5679	0.5675	0.5726	0.5714	0.5682	0.5677

Note: The OLS regression results of family firms' expected investments are presented for our whole sample over the period from January 2004 to December 2010. Our sample includes 1,783 firm-year observations from 256 family companies. Detailed descriptions of each variable are provided in Table 2. Summary statistics results are provided in Panel A of Table 3, and the correlation matrix between each variable is provided in Panel A of Table 4. For each regressor, we present both the coefficient estimate and p-value in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Table 6 The effect of family corporate governance on inefficient investment in family firms (Model II)

Panel A Overinvestment group

$$I^{\varepsilon}_{new,t} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Models	(1)	(2)	(3)	(4)	(5)
Intercept	389.3788***	491.1119***	95.0613	164.1049	173.9051
	(0.0036)	(0.0001)	(0.5484)	(0.2639)	(0.2957)
Family Governance Factors					
CEO_t	-26.3621				15.75467
	(0.5996)				(0.8197)
BOD_t		-662.8694***			-825.7112***
		(0.0029)			(0.0013)
$Founder_t$			146.6987**		103.3498
			(0.0127)		(0.2422)
$CEO*Founder_t$				136.0857**	102.6106
				(0.0257)	(0.3207)
Control Variables					
FCF_t	0.1992***	0.1958***	0.1980***	0.2020***	0.1954***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Leverage_t$	95.8988	117.1027	102.0318	85.4792	121.1270*
	(0.1857)	(0.1058)	(0.1573)	(0.2366)	(0.0953)
$LnAge_t$	-59.6349*	-61.0161**	-2.1414	-13.9051	8.7665
	(0.0572)	(0.0428)	(0.9536)	(0.6939)	(0.8149)
ROA_t	641.7509***	699.8475***	583.9503**	575.2279**	635.3219***
	(0.0075)	(0.0034)	(0.0145)	(0.0163)	(0.0078)
Observations	778	778	778	778	778
Adj. R^2	0.2606	0.2688	0.2663	0.2651	0.2757

Panel B Underinvestment group

$$I^{\varepsilon}_{new,t} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Models	(1)	(2)	(3)	(4)	(5)
Intercept	204.2296***	250.4163***	9.3693	125.9973*	125.8076
	(0.0016)	(<.0001)	(0.9030)	(0.0648)	(0.1250)
Family Governance Factors					
CEO_t	-66.4896**				-35.4585
	(0.0188)				(0.4121)
BOD_t		-549.3419***			-543.7884***
		(<.0001)			(0.0001)
$Founder_t$			74.2481**		98.1164**
			(0.0201)		(0.0325)
$CEO*Founder_t$				3.7662	1.8382
				(0.9014)	(0.9740)
Control Variables					
FCF_t	-0.0981***	-0.0998***	-0.0977***	-0.0963***	-0.1023***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Leverage_t$	170.1731***	180.9699***	192.6799***	176.2918***	200.5657***
	(0.0004)	(0.0002)	(<.0001)	(0.0003)	(<.0001)
$LnAge_t$	-0.4208	2.3034	28.4256*	9.1380	24.6621
	(0.9774)	(0.8725)	(0.0903)	(0.5640)	(0.1422)
ROA_t	164.1574	198.3360	190.6313	176.9203	211.7391
	(0.2383)	(0.1518)	(0.1711)	(0.2055)	(0.1257)
Observations	1005	1005	1005	1005	1005
Adj. R^2	0.0592	0.0706	0.0591	0.0540	0.0772

Note: The OLS regression results of the effect of corporate governance factors on inefficient investment in family firms are presented in two groups: overinvestment group (Panel A) and underinvestment group (Panel B) over the period from January 2004 to December 2010. Detailed descriptions of each variable are provided in Table 2. Summary statistics results are provided in Panel B & C of Table 3, and the correlation matrixes between each variable is provided in Panel B & C of Table 4. For each regressor, we present both the coefficient estimate and p-value in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Table 7 Hausman Endogeneity Test for Model Ⅱ

Panel A Overinvestment group

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	iv	ols	Difference	S.E.
FCF_t	0.23541	0.19538	0.0400	0.0491
CEO_t	11.5174	15.7547	-4.2373	5.1985
BOD_t	-754.5487	-825.7112	71.1626	87.3061
$Founder_t$	62.8526	103.3498	-40.4971	49.6841
$Ceo*Fd_t$	143.6073	102.6106	40.9967	50.2970
$Leverage_t$	101.5712	121.1270	-19.5558	23.9921
$LnAge_t$	6.99804	8.76651	-1.7757	2.1785
ROA_t	529.1963	635.3219	-106.1256	130.2008
	χ^2=0.66			
	Prob>χ^2=0.4150			

b = consistent under Ho and Ha; obtained from ivregress

B = inconsistent under Ha, efficient under Ho; obtained from regress

Test: Ho: difference in coefficients not systematic

Panel B Underinvestment group

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	iv	ols	Difference	S.E.
FCF_t	-0.01648	-0.10228	0.0858	0.1347
CEO_t	-38.2244	-35.4585	-2.7659	4.3417
BOD_t	-504.1769	-543.7885	39.6115	62.1774
$Founder_t$	78.2356	98.1164	-19.8808	31.2065
$Ceo*Fd_t$	19.6916	1.8382	17.8534	28.0242
$Leverage_t$	217.0224	200.5657	16.4567	25.8318
$LnAge_t$	20.6225	24.6621	-4.0396	6.3409
ROA_t	121.2691	211.7391	-90.4700	142.009
	χ^2=0.41			
	Prob>χ^2=0.5241			

b = consistent under Ho and Ha; obtained from ivregress

B = inconsistent under Ha, efficient under Ho; obtained from regress

Test: Ho: difference in coefficients not systematic

Note: This table presents the results for the Hausman Endogeneity Test for Model II - overinvestment group (Panel A) and underinvestment group (Panel B). We employed a two-stage instrumental variables approach to address the potential endogeneity between FCF_t and $I^{\varepsilon}_{new,t}$. We used $Cash_{t-1}$, $StockReturns_{t-1}$ and Year Indicator dummy variables as instruments for FCF_t, we then used the predicted values of the potentially endogenous variable obtained from the first-stage regressions in the second-stage regressions. Our null hypothesis for Hausman Tests is that there is no endogeneity for all the dependent variables. The *p*-values for the tests in both overinvestment group (Panel A) and underinvestment group (Panel B) are all above 0.05, implying that we cannot reject the null hypothesis.

Table 8 Robustness Test with different variables-The effect of family corporate government on ineffective investment in family firms (Model II)

Panel A Overinvestment group

$$I_{new,t}^{\varepsilon} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Models	(1)	(2)	(3)	(4)	(5)
Intercept	542.1290***	659.4993***	289.9652*	339.6734**	356.0198**
	(0.0003)	(<.0001)	(0.0942)	(0.0395)	(0.0457)
Family Governance Factors					
CEO_t	-11.1069				38.0438
	(0.8258)				(0.5868)
BOD_t		-638.7294***			-831.2948***
		(0.0040)			(0.0011)
$Founder_t$			136.9778**		98.9294**
			(0.0200)		(0.2606)
$CEO*Founder_t$				131.5945**	89.3414
				(0.0309)	(0.3875)
Control Variables					
FCF_t	0.2015***	0.1977***	0.2002***	0.2039***	0.1979***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Tangibility_t$	-263.7030**	-262.8107**	-260.8637**	-257.9229**	-261.3516**
	(0.0151)	(0.0142)	(0.0152)	(0.0165)	(0.0161)
$LnAge_t$	-48.2283	-52.0732*	3.1705	-6.5522	15.4698
	(0.1226)	(0.0818)	(0.9311)	(0.8519)	(0.6788)
$OROA_t$	606.9279**	686.9722**	510.5807*	524.2722*	572.5907*
	(0.0467)	(0.0235)	(0.0936)	(0.0849)	(0.0602)
Observations	778	778	778	778	778
Adj. R^2	0.2645	0.2723	0.2695	0.2688	0.2784

Panel B Underinvestment group

$$I^{\varepsilon}_{new,t} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Models	(1)	(2)	(3)	(4)	(5)
Intercept	413.2055*** (<.0001)	442.0626*** (<.0001)	267.4928*** (0.0041)	357.5305*** (<.0001)	349.1179*** (0.0003)
Family Governance Factors					
CEO_t	-62.5089** (0.0288)				-35.2331 (0.4187)
BOD_t		-499.2991*** (0.0002)			-483.40896*** (0.0007)
$Founder_t$			63.5852** (0.0452)		83.1332* (0.0700)
$CEO*Founder_t$				0.6592 (0.9828)	2.3360 (0.9672)
Control Variables					
FCF_t	-0.1036*** (<.0001)	-0.1056*** (<.0001)	-0.1042*** (<.0001)	-0.1026*** (<.0001)	-0.1081*** (<.0001)
$Tangibility_t$	-195.5139*** (0.0055)	-183.1331*** (0.0089)	-223.9111*** (0.0014)	-212.9153*** (0.0025)	-189.2061*** (0.0072)
$LnAge_t$	-0.5852 (0.9686)	2.1159 (0.8835)	24.5430 (0.1441)	7.5062 (0.6362)	20.7583 (0.2181)
$OROA_t$	28.3400 (0.8520)	79.0599 (0.5997)	63.7677 (0.6735)	58.2876 (0.7020)	70.3797 (0.6423)
Observations	1005	1005	1005	1005	1005
Adj. R^2	0.0548	0.0638	0.0541	0.0503	0.0682

Note: The Robustness Test with different variables OLS regression results of the effect of corporate governance factors on inefficient investment in family firms are presented in two groups: overinvestment group (Panel A) and underinvestment group (Panel B) over the period from January 2004 to December 2010. We replaced $Leverage_t$ with $Tangibility_t$, and $OROA_t$ with ROA_t, to test the robustness of the Family Governance Factors. For each regressor, we present both the coefficient estimate and p-value in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Table 9 Robustness Test with different groupings -The effect of family corporate government on ineffective investment in family firms (Model II)

Panel A Overinvestment group

$$I_{new,t}^{\varepsilon} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Groups	(1) High-Tech Firms	(2) Low-Tech Firms	(3) Firm year 2004-2007	(4) Firm year 2008-2010	(5) Winsorized at 5% level.
Intercept	-207.4004	103.8974	209.6619	77.7206	3.5161
	(0.8760)	(0.4335)	(0.4437)	(0.6897)	(0.9697)
Family Governance Factors					
CEO_t	1069.7634	-29.8575	-22.3582	67.0563	-3.0889
	(0.1807)	(0.5432)	(0.8350)	(0.4328)	(0.9304)
BOD_t	-6744.3014	-464.4398**	-1136.6762***	-596.3190*	-276.6757**
	(0.1920)	(0.0114)	(0.0039)	(0.0637)	(0.0374)
$Founder_t$	706.6184	74.3550	99.0259	116.4545	102.3154**
	(0.5184)	(0.2584)	(0.4780)	(0.2807)	(0.0241)
$CEO*Founder_t$	0	51.7985	145.1204	22.6633	-16.5171
		(0.5014)	(0.3592)	(0.8614)	(0.7542)
Control Variables					
FCF_t	0.1870**	0.1389***	0.1408***	0.2541***	0.5407***
	(0.0116)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Leverage_t$	2053.6523	156.5523***	260.1015*	95.2351	193.0279***
	(0.4778)	(0.0027)	(0.0775)	(0.2136)	(<.0001)
$LnAge_t$	146.6213	19.2311	5.0154	11.1985	11.6531
	(0.6074)	(0.5215)	(0.9354)	(0.7993)	(0.5836)
ROA_t	1892.7536	403.1852**	1635.9643**	269.4691	397.0748**
	(0.6716)	(0.0191)	(0.0102)	(0.2529)	(0.0113)
Observations	43	735	394	384	778
Adj. R^2	0.2674	0.1456	0.1742	0.4257	0.4004

Note: the parameter $CEO*Founder_t$ in model (1) has been set to 0, since it equals to CEO_t.

Panel B Underinvestment group

$$I^{\varepsilon}_{new,t} = \alpha + \beta_1 FamilyGovernanceFactor_t + \beta_2 \Sigma\, Control + \xi$$

Groups	(1) High-Tech Firms	(2) Low-Tech Firms	(3) Firm year 2004-2007	(4) Firm year 2008-2010	(5) Winsorized at 5% level
Intercept	293.5716*	-185.0858*	122.7127	140.7089	109.1911*
	(0.0821)	(0.0686)	(0.2397)	(0.3125)	(0.0529)
Family Governance Factors					
CEO_t	34.3302	-55.7426	-52.1651	0.0516	-12.0683
	(0.8145)	(0.1446)	(0.2365)	(0.9995)	(0.5864)
BOD_t	-1365.7433***	-305.7340**	-381.4534***	-869.3373***	-332.8329***
	(0.0007)	(0.0178)	(0.0078)	(0.0033)	(<.0001)
$Founder_t$	92.3602	102.6703**	45.1717	172.6855**	74.5342***
	(0.4705)	(0.0202)	(0.3735)	(0.0442)	(0.0024)
$CEO*Founder_t$	135.9739	6.2369	22.9714	4.1378	-11.0880
	(0.4154)	(0.9048)	(0.6927)	(0.9714)	(0.7015)
Control Variables					
FCF_t	0.0425*	-0.3282***	-0.0916***	-0.1141***	-0.0160
	(0.0533)	(<.0001)	(<.0001)	(<.0001)	(0.4719)
$Leverage_t$	387.6393**	172.5146***	130.8642**	300.7605***	113.4878***
	(0.0181)	(0.0001)	(0.0128)	(0.0011)	(0.0001)
$LnAge_t$	-1.5001	95.8580***	27.0334	20.1958	18.0934
	(0.9529)	(<.0001)	(0.2424)	(0.4437)	(0.1515)
ROA_t	747.1583**	185.8101	101.5908	381.0757	117.9620
	(0.0267)	(0.1612)	(0.5381)	(0.1110)	(0.1798)
Observations	196	809	623	382	1005
Adj. R^2	0.1025	0.3149	0.0581	0.0881	0.0403

Note: The Robustness Test with different groupings OLS regression results of the effect of corporate governance factors on inefficient investment in family firms are presented in two groups: overinvestment group (Panel A) and underinvestment group (Panel B) over the period from January 2004 to December 2010. We sorted the two inefficient investment groups into 5 groups: High-Tech Firms, Low-Tech Firms, Before Crisis Period (2004-2007), and Crisis Period (2008-2010), to test the robustness of the Family Governance Factors. For each regressor, we present both the coefficient estimate and p-value in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10 % level, respectively.