Soochow Journal of Accounting
會計學報，第 9 卷第 2 期，2023 年 11 月
第 82-123 頁

家族企業的公司風險及成長機會、控制權與現金流量權偏離程度的角色：利益收斂假說的風險效果觀點

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摘要

本文以 2010 年至 2017 年台灣家族企業為樣本，並基於利益收斂假說的風險效果觀點來探討台灣家族企業的公司風險是否比非家族企業低，並接續研究成長機會及控制權與現金流量權偏離程度的調節效果。本研究實證結果顯示家族企業的公司風險低於非家族企業。除此之外，成長機會及控制權與現金流量權偏離程度都會弱化公司風險與家族企業間的負向關聯性。然而，當本研究以全球金融危機期間(2008 年至 2009 年)為樣本期間，發現家族企業的公司風險高於非家族企業，顯示全球金融危機期間的實證結果和一般期間恰相反。本研究結果可以補充過去關於家族企業公司風險文獻的不足。

關鍵詞：家族企業、公司風險、成長機會、控制權與現金流量權偏離程度、利益收斂假說

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SOOCHOW JOURNAL OF ACCOUNTING
Volume 9 Number 2, Nov. 2023
PP. 82-123

The Firm Risk for a Family Firm and the Role of Growth Opportunity and Control-Cash Flow Right Deviation: The Viewpoint of the Risk Effect of the Convergence of Interest Hypothesis

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Abstract

This research utilizes data on family firms in Taiwan from 2010 to 2017 to investigate whether the level of firm risk for them is lower than that for non-family firms and further examines the moderating effects of growth opportunities and control-cash flow right deviation under the viewpoint of the risk effect of the convergence of interest hypothesis. First, the results show that the level of firm risk for family firms is lower than that for their counterparts. Second, growth opportunities and control-cash flow right deviation mitigate the negative correlation between the level of firm risk and family firms. Third, when applying the research period from 2008 to 2009 (the global financial crisis), the level of firm risk for family firms is higher than that for non-family firms, presenting results during this crisis that run opposite to those during a stable period. The findings herein fill gaps in the empirical literature with regard to firm risk of family firms.

Keywords：*Family firm, Firm risk, Growth opportunity, Control-cash flow right deviation, convergence of interest hypothesis*

1. Introduction

The literature has concretely shown that family firms are an important organizational form of business in East Asia, particularly in Taiwan. For instance, La Porta *et al.* (2000) found that if 20% of voting rights are set as the threshold in developed countries, then 30% of large companies there are designated as family controlled, and this number rises to 45% when encompassing medium-sized companies. Claessens *et al.* (2000) examined nine East Asian countries and noted that over half of the main controlling shareholders of firms are families, and that if the threshold drops to 10% of voting rights, then the proportion of such firms in Taiwan runs as high as 66%. Kuo and Wang (2017) also asserted that from 1996 to 2010 around 67% of listed companies in Taiwan were family firms.

Uncertainty exists in all economic environments, and thus the evaluation of firm risk is a prime focus of both academia and investors. The level of firm risk is typically hidden within various company activities that are affected by internal and external factors, which also impact company profits. Since greater firm risk influences decision making, it is critical to understand the various factors that make up this risk (Wright *et al.*, 1996). While many studies have examined family firms (e.g., Wang, 2006; Ali *et al.*, 2007; Evert *et al.*, 2018; Ray *et al.*, 2018; Pucci *et al.*, 2020; Basco *et al.*, 2021), most have targeted the association between family firm characteristics and company performance (e.g., Berle and Means, 1932; Demsetz, 1983; Anderson and Reeb, 2003; Dyer and Whetten, 2006; Maury, 2006; Lin *et al.*, 2011; Dal Maso *et al.*, 2020), while some have explored the firm risk of a family firm (e.g., McGrath, 1997; Miller and Folta, 2002; Chen *et al.*, 2012; Bianco *et al.*, 2013; Miralles-Marcelo *et al.*, 2015; Duran *et al.*, 2016). In addition, higher risk might endanger the goal of business succession and family firm survivability (Hiebl, 2012), implying that increasing firm risk may raise the cost of capital, reduce available funds, and decrease the likelihood of firm survival. Family members also generally invest large parts of their private wealth in their family firm, meaning that family firm risk is indeed a crucial issue to them (Bianco *et al.*, 2013). Therefore, exploring the firm risk of these firms is interesting, and findings help fill gaps in related literature. According to related literature, like Ahmed *et al.* (2002), Hutchinson (2003), Hsueh (2008), Lee *et al.* (2011), and Miralles-Marcelo *et al.* (2015), I

use three measures to proxy firm risk: standard deviation of return on equity, standard deviation of return on assets, and standard deviation of stock return.

The theoretical basis of my study is the risk effect of the convergence of interest hypothesis. This hypothesis states that the higher the shareholdings of managers are, the more consistent the interests of them and the principal (like family members) will be and thus a lower agency cost (Jensen and Meckling, 1976). There are two opposing effects of the convergence of interest hypothesis. First, the reward effect captures the increase in family members' wealth associated with greater risk when their equity ownership can be viewed as an option on the levered firm with the value of equity ownership increasing with stock risk. Second, the risk effect captures the decline in utility for risk-averse family members associated with greater risk when their human capital and wealth are highly concentrated in the same firm and are exposed to that risk (e.g., Guay, 1999; Armstrong *et al.*, 2013). In other words, the reward effect suggests that equity ownership provides incentives for family firms to increase risk if this increases stock price; on the other hand, the risk effect suggests that concentrated ownership discourages risk-taking for family firms, because it exposes risk-averse family members to increased equity risk. Therefore, from the viewpoint of the risk effect of the convergence of interest hypothesis, the relationship between family firms and risk-taking is negative. My study's empirical results are consistent with the viewpoint of the risk effect of the convergence of interest hypothesis.

This research uses data on family firms in Taiwan from 2010 to 2017 to explore whether the level of firm risk for family firms is lower than that for non-family firms and further examines the moderating effects of growth opportunities and control-cash flow right deviation. I find that the level of firm risk for family firms is lower than that for non-family firms. In addition, growth opportunities and control-cash flow right deviation mitigate the negative correlation between the level of firm risk and family firms. However, when I define my research period from 2008 to 2009 (during the global financial crisis), the level of firm risk for family firms is higher than that for non-family firms. In other words, the results during the global financial crisis run opposite to those during a stable period. This means the global financial crisis impacted a company's growth rate, and that a decreasing growth rate will raise the level of

firm risk. As a result, the study suggests that readers cannot hold an overly optimistic view on the risk level of family firms.

There are four reasons why this study examines the moderating effects of growth opportunities and control-cash flow right deviation. First, Hiebl (2012) reviewed 29 papers related to risk aversion in family firms, and among them some documented that growth opportunities and control-cash flow right deviation do influence the level of firm risk; i.e., Casillas *et al.* (2010, 2011), Bianco *et al.* (2013), and Nguyen (2011). However, these studies all used developed markets as samples; i.e., Nguyen (2011) took family firms in Japan for research data. Therefore, my research fills the gap in the literature related to the risk aversion of family firms for emerging markets.

Second, Casillas *et al.* (2010, 2011) used a configurational approach, Bianco *et al.* (2013) analytically applied a mathematical derivation, and Nguyen (2011) adopted the agency theory to develop the risk-performance relation. Therefore, there is no research yet that employs the risk effect of the convergence of interest hypothesis as a theoretical ground to develop its own hypothesis and to further explore the moderating effects of growth opportunities and control-cash flow right deviation.

Third, investors care about both return and risk simultaneously. This implies investments with higher growth opportunities are not better than investments with lower growth opportunities, because investors also have to consider the level of risk related to this growth opportunity. Thus, whether the growth opportunities have an impact on the level of firm risk for family firms is critical.

Fourth, many corporate governance studies in Taiwan have explored the variable of control-cash flow right deviation and found that the mean of this variable is not low, and that its estimated coefficients are usually statistically significant (Tang, 2010; Chen *et al.*, 2010). As a result, control-cash flow right deviation is a variable worth exploring when using Taiwanese family firms as data samples. Furthermore, according to the viewpoint of the risk effect of the convergence of interest hypothesis, I expect both growth opportunities and control-cash flow right deviation to mitigate the negative correlation between the level of firm risk and family firms.

There are two articles related to this present study: Miralles-Marcelo *et al.* (2015) and Chen *et al.* (2012). First, Miralles-Marcelo *et al.* (2015) explored the level of firm risk, as well as the moderating effects of shareholdings and growth opportunities. However, Miralles-Marcelo *et al.* (2015) did not study the moderating effects of control-cash flow right deviation. Second, Chen *et al.* (2012) employed listed family firms from Taiwan as samples for the period 2001 to 2008 (before the global financial crisis erupted) and explored the correlations among family ownership, corporate governance, and risk-taking. Chen *et al.* (2012) also tested the moderating effects of four items: family members serving as CEOs, board size, the proportion of outside directors, and CEO duality. As a result, my study's research period and intermediary variables are different from those of Miralles-Marcelo *et al.* (2015) and Chen *et al.* (2012), thus offering additional implications for both practitioners and academics.

The theoretical basis of my hypotheses is the risk effect of the convergence of interest hypothesis, and so the first contribution of this study is to provide some implications to this hypothesis. Reviewing related studies, like Lennox (2005), Elston *et al.* (2011), Sulong *et al.* (2013), and Lin and Liu (2013), there is no research using the risk effect of the convergence of interest hypothesis as a theoretical basis to examine whether the level of firm risk for family firms is lower than that for non-family firms. As a result, providing some empirical findings related to the risk effect of the convergence of interest hypothesis is this paper's first contribution.

A firm's return rate and risk are the focal concerns of investors. However, Fahlenbrach (2009) and Miralles-Marcelo *et al.* (2015) explored the stock prices of family firms and reported that their stock prices are better than those of non-family firms. Therefore, this research focuses on the issue of risk and compares the level of firm risk between family and non-family firms so as to provide some implications to the literature, which is my second contribution.

The effects of corporate governance mechanisms can be influenced by the specific characteristics of a company (Coles *et al.*, 2008; Linck *et al.*, 2008; Chen and Nowland, 2010; Tai and Hwang, 2020; Frankenreiter *et al.*, 2021). This present study further explores the moderating effects of growth opportunities and control-cash flow right deviation. As a result, the third contribution of this study is that the empirical results of the moderating effects

can be used as a reference for investors when they target family firms' investments.

Fourth, this study reviews a broad range of the literature and employs three different variables to proxy firm risk, making the empirical results turn out to be consistent. All findings indicate that the level of firm risk for family firms is lower than that for non-family firms. Hence, the results of this study are robust and provide more valid evidence to academics. For additional analysis, this research also employs data during the financial crisis period (2008-2009) to examine my hypothesis. The findings are consistent with Johnson *et al.* (2000), Chen (2009), Chen *et al.* (2012), and Wang (2013), showing that the level of firm risk for family firms is higher than that for non-family firms during the financial crisis period.

Fifth, Hiebl (2012) indicated that existing research might also be biased due to different omitted cultural or environmental factors. That study further mentioned that more investigations on the risk aversion of family firms in emerging countries are needed, because research findings about emerging countries might show different behaviors for family firms compared to developed markets (Entwisle *et al.*, 1995; Herath *et al.*, 2006; Miller *et al*., 2009). Therefore, my results fill the gap in the literature for emerging economies.

Finally, some studies documented concepts that are in agreement with the hypotheses of this study; i.e., Sirmon and Hitt (2003) and Dow and McGuire (2016) mentioned that growth opportunities have positive impacts on the level of firm risk. Fama and Jensen (1983), James (1999), Hermalin and Weisbach (2001), and Chen and Nowland (2010) also indicated that control-cash flow right deviation increases the level of firm risk. However, the above-mentioned studies do not examine the moderating effects of the two items of growth opportunities and control-cash flow right deviation on the association between the level of firm risk and family firms. Therefore, the findings of this paper fill the gap in the literature for these issues.

The rest of this paper runs as follows. Section 2 presents a literature review and the development of the research hypotheses. Section 3 discusses the data and methodology. Section 4 is the empirical results. Finally, Section 5 provides

conclusions and some related recommendations.

2. Literature Review and Hypotheses' Development

2.1 Literature Review

There are two articles related to this present study: Miralles-Marcelo *et al.* (2015) and Chen *et al.* (2012). Miralles-Marcelo *et al.* (2015) examined the level of firm risk, which is defined as the standard deviation of 12 monthly returns for family firms, as well as the moderating effects of shareholdings and growth opportunities. However, Miralles-Marcelo *et al.* (2015) did not study the moderating effects of control-cash flow right deviation. Other studies, like Johnson *et al.* (2000), Claessens *et al.* (2002), and Fan and Wang (2002), show when the control-cash flow right deviation is larger, family members have a motivation to expand their own interests by harming the interests of their family firm. In addition, according to the convergence of interest hypothesis, when the control-cash flow right deviation is larger, the tunneling incentive between family members and managers in the family firm increases. In short, based on that hypothesis, the moderating effects of control-cash flow right deviation is worth exploring when testing the risk level of family firms. From my findings, the control-cash flow right deviation mitigates the negative correlation between the level of firm risk and family firms. Thus, compared to Miralles-Marcelo *et al.* (2015), my findings fill the gap in the literature for the relation between control-cash flow right deviation and firm risk of family firms.

Second, Chen *et al.* (2012) employed listed family firms from Taiwan as samples for the period 2001 to 2008 (before the global financial crisis erupted) and explored the correlations among family ownership, corporate governance, and risk-taking. However, my research employs listed family firms from Taiwan as samples after the global financial crisis (from 2010 to 2017). Chen *et al.* (2012) also investigated the moderating effects of four items: family members serving as CEOs, board size, the proportion of outside directors, and CEO duality. In other words, they did not examine the moderating effects of growth opportunities and control-cash flow right deviation, which this present study targets. Based on the empirical results, both growth opportunities and control-cash flow right deviation mitigate the negative correlation between the

level of firm risk and family firms. In addition, according to the findings of Chen *et al.* (2012) and those herein, the level of firm risk for family firms is lower (higher) than that for non-family firms after (before) the global financial crisis erupted. As a result, this study's research period and intermediary variables are different from those of Chen *et al.* (2012), thus offering additional findings for both practitioners and academics.

To summarize the above discussions, my paper uses data on family firms in Taiwan from 2010 to 2017 to explore whether the level of firm risk for family firms is lower than that for non-family firms and further examines the moderating effects of growth opportunities and control-cash flow right deviation. My findings can complement the shortcomings of related research.

2.2 Hypotheses' Development

Jensen and Meckling (1976) offered the convergence of interest hypothesis, which states when the firm is owned by its own managers that it possesses a lower degree of agency cost. In other words, if the firm is largely owned by individuals who do not have a role in its day-to-day management, then there is a higher cost of monitoring its management. In short, when ownership and management are in the same hands, then owner-manager interests converge. The risk effect of the convergence of interest hypothesis states that the decline in utility for risk-averse family members associated with risk increases when their human capital and wealth are highly concentrated in the same firm and are exposed to that risk. This risk effect suggests that concentrated ownership discourages risk-taking for family firms, because it exposes risk-averse family members to increased equity risk. Therefore, from the viewpoint of this effect, the relationship between family firms and risk-taking is negative. In summary, according to the convergence of interest hypothesis, the higher the shareholdings of managers are, the more consistent the interests of them and the principal (like family members) will be, and the lower is the agency cost. In addition, from the view of the risk effect, the wealth concentration of family firms implies specific attitudes toward risk and uncertainty, such as lowering the amount of financial resources dedicated to innovation projects, which are a priori uncertain, in order to further reduce uncertainty (Duran *et al.*, 2016).

To sum up, according to the risk effect of the convergence of interest hypothesis, the higher the shareholdings of managers (including family members and non-family members) are, the more consistent their interests and those of family members will be. Therefore, for risk-averse family members related to risk increases when their wealth is highly concentrated in their family firm. In other words, the risk effect of the convergence of interest hypothesis suggests that concentrated ownership discourages risk-taking behaviors for family firms, because it exposes risk-averse family members to greater equity risk. Hence, firm risk is expected to be lower in family firms. Based on the above discussion, this paper proposes Hypothesis 1.

H1: According to the risk effect of the convergence of interest hypothesis, the level of firm risk for family firms is lower than that for non-family firms.

The study further examines the moderating effects of two items, growth opportunities and control-cash flow right deviation, on the association between the level of firm risk and family firms.

High-growth opportunity projects typically bring high return rates, but they are more likely to have a high level of firm risk. Because the wealth of family members depends deeply on the performance of their firms, to increase the interests of theirs, family members will accept new growth investment opportunities in order to have a higher probability of producing better financial performance. To sum up, because of the close ties between family members' wealth and firm value (Gomes, 2000; Anderson and Reeb, 2003, 2004; Weber *et al.*, 2003; Miller *et al.*, 2008; Suess, 2014), family members tend to adopt a growth investment target to enhance their firm's performance and their interests. This behavior more likely increases the risk level of the family firm.

Following the risk effect of the convergence of interest hypothesis, the interests of family members and managers (including family members and non-family members) in the family firm notably converge. Hence, in order to increase interests of both family firms and family members, managers in the family firm and family members will accept a new growth investment opportunity that is more likely to have a high level of firm risk in order to gain better financial performance. Hence, growth opportunities can mitigate the negative correlation between the level of firm risk and family firms. This leads

to Hypothesis 2.

H2: Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, growth opportunities mitigate the negative correlation between the level of firm risk and family firms.

As the shareholdings of family members are generally greater, family members are concerned over their firm's long-term profitability and will thus work to reduce behaviors that can harm firm value. However, controlling shareholders (like family members) generally have more control rights than cash flow rights[1] (La Porta *et al.*, 2000; Claessens *et al.*, 2000; Faccio and Lang, 2002), and these excess control rights can induce agency problems (Johnson *et al.*, 2000; Claessens *et al.*, 2002; Fan and Wang, 2002; Conyon and He, 2011). The tunneling incentive of controlling shareholders (like family members) is also strengthened with excess control rights (Zhang *et al.*, 2014; Tai, 2017). In short, when the control-cash flow right deviation is greater, such encroachment turns more serious (Schulze *et al.*, 2002, 2003; Du and Dai, 2005). Hence, if family members have more control rights than cash flow rights, then family members will be more concerned with their own interests and are then more likely to choose investments with potentially greater risk, but not necessarily with higher return rates. Consequently, the level of firm risk for family firms turns higher.

Based on the convergence of interest hypothesis, the higher the shareholdings of managers (family members and non-family members) are, the more consistent their interests and those of family members will be. Therefore, the behaviors of managers in the family firm are in alliance with family members, and thus when the control-cash flow right deviation is larger, the family members have incentives to collude with managers in the family firm to expand their interests and are more likely to choose investments with potentially higher risk, but not necessarily with higher return rates. Hence, the control-cash flow right deviation has a positive impact on the association between the level of firm risk and family firms, meaning control-cash flow right

[1] Control rights are the sum of the minimum ownership in each "control chain" of the ownership structure in order to determine the lowest voting rights of the controlling shareholders; cash flow rights are the ratio of shares owned by the ultimate shareholders to total shares (La Porta *et al.*, 2000; Claessens *et al.*, 1999; Tsai *et al.*, 2003).

deviation can mitigate the negative correlation between the level of firm risk and family firms. Hypothesis 3 thus goes as follows.

H3: Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, control-cash flow right deviation mitigates the negative correlation between the level of firm risk and family firms.

3. Research Method

3.1 Sample

This study uses a sample of Taiwanese listed firms for the period 2010 to 2017.[2] The source of the data for the variables examined herein is the Taiwan Economic Journal (TEJ) database, supplemented by relevant information disclosed in the financial statements of the sample companies.

Table 1 shows the sample collection process. This work first selects TWSE-/ TPEx-listed companies' data from the end of 2010, 2011, 2012, 2013, 2014, 2015, 2016, and 2017. Next, according to the definition of the TEJ database, if the sample company meets one of four criteria, then this study defines the sample company as a family firm: (1) the chairman and CEO roles are served by one specific family member; (2) the ratio of family board members is more than 50% (not including affiliated directors), and the ratio of affiliated directors and outside directors is less than 33%; (3) the ratio of family board members is larger than 33%, and at least three members of the ultimate controlling family are directors and managers; and (4) the family shareholding ratio exceeds the critical proportion of shares. This study defines the critical proportion of shares using the model based on Cubbin and Leech (1983). After deleting samples with missing data and those for which it could not be determined whether they are a family firm or not due to missing data of one of the four criteria, this paper obtains a total of 9,651 observations, accounting for about 77% of the original sample.

[2] The global financial crisis from 2007 to 2008 is also known as the 2008 financial crisis or the U.S. sub-mortgage crisis. During this period, investors began to lose confidence in the value of mortgage-backed securities, and even though the central banks of many countries injected huge amounts of capital into their financial markets, they were unable to prevent this event. The bankruptcy of Lehman Brothers occurred in September 2008, after which a number of large financial institutions collapsed or were taken over by governments. Referring to other Taiwanese studies, such as Chen (2009) and Wang (2013), the global financial crisis impacted companies' growth rate. As a decreasing growth rate will raise the level of firm risk, the study therefore chooses its period of research from the start of 2010 in order to avoid the impact of this global financial crisis on firm risk for Taiwanese listed firms. This paper was written from the beginning of 2019. During that period 2018 annual reports had not yet been announced, and so the sample period ends in 2017.

Table 1 Sample collection process

	2010	2011	2012	2013	2014	2015	2016	2017	Total
Initial firm-year observations (number of TWSE-/TPEx-listed companies at the end of 2010, 2011, 2012, 2013, 2014, 2015, 2016, and 2017)	1,507	1,528	1,520	1,522	1,540	1,582	1,620	1,667	12,486
Step 1: Less companies with missing data	(220)	(215)	(209)	(205)	(227)	(220)	(231)	(228)	(1,755)
Step 2: Less companies that cannot be determined to be a family firm or not									
- missing data of criteria 1	(18)	(21)	(20)	(36)	(28)	(29)	(28)	(29)	(209)
- missing data of criteria 2	(43)	(38)	(51)	(47)	(55)	(54)	(56)	(58)	(402)
- missing data of criteria 3	(23)	(25)	(30)	(33)	(41)	(42)	(42)	(43)	(279)
- missing data of criteria 4	(31)	(21)	(24)	(28)	(22)	(20)	(22)	(22)	(190)
Firm-year samples used in the study	1,172	1,208	1,186	1,173	1,167	1,217	1,241	1,287	9,651
Proportion of final observations (%)	78%	79%	78%	77%	76%	77%	77%	77%	77%

3.2 Variables

3.2.1 Dependent variables

The dependent variable in this study is firm risk, which refers to volatility in a firm's return stream and is identified as a source of agency conflict (Bathala and Rao, 1995; Hutchinson, 2003). Core *et al.* (1999) asserted that firm risk, as a measure of both the firm's information environment and the risk of its operating environment, is also an important determinant of the level of managers' incentive to operation decisions. In short, firm risk refers to variability in organizational returns and the increased chance of corporate ruin (Bloom and Milkovich, 1998; Hutchinson, 2003). According to related literature, such as Ahmed *et al.* (2002), Hutchinson (2003), Hsueh (2008), Lee *et al.* (2011), and Miralles-Marcelo *et al.* (2015), the factor of firm risk adopted in this study refers to volatility in a firm's return stream, including three measures: standard deviation of return on equity (ROESD), standard deviation of return on assets (ROASD), and standard deviation of stock return (RETSD). ROESD and ROASD are calculated from the past 8 quarterly returns from the end of the sample year, and RETSD is calculated from the past 24

monthly returns starting from the end of the sample year.[3]

3.2.2 Independent variables

This study has three independent variables: a dummy variable for family firm (FAMILY), the growth opportunity for a family firm (GROWTH), and control-cash flow right deviation for family members (SEP).

3.2.2.1 Family firm (FAMILY)

The source of this study's variable data is from the TEJ database, which uses the four criteria (mentioned on the Section of 3.1 Sample) to define a "single family controlling" firm, and so I define a "single family controlling" firm as a "family firm". In other words, as long as a company meets one of the four criteria, the TEJ database defines the sample company as a "single family controlling" firm, and I define it as a "family firm". The four criteria follow other studies, such as Lee and Liao (2004), Claessens *et al.* (2000), Faccio and Lang (2002), Villalonga and Amit (2006), Chen and Ho (2009), Lin and Chang (2009), and Tang (2010).

3.2.2.2 Growth opportunities for the family firm (GROWTH)

This research references the literature, such as Rosen (1982), Smith and Watts (1992), Core *et al.* (1999), Brick *et al.* (2006), and Miralles-Marcelo *et al.* (2015), and takes the ratio of market value to book value (GROWTH) as a proxy for growth opportunities.

3.2.2.3 Control-cash flow right deviation for family members (SEP)

Control-cash flow right deviation for family members (SEP) is defined as the ratio of control rights to cash flow rights, where the former is computed as the sum of the minimum ownership in each control chain of the ownership structure, in order to determine the lowest voting rights of the controlling shareholders. In contrast, cash flow rights are measured as the ratio of shares owned by the ultimate shareholders to the total number of shares (La Porta *et*

[3] According to regulations starting from 2008, the quarterly reports of listed companies must be completed and provided to investors. Therefore, if the standard deviation of the three measures is calculated for the past 12 quarters or 36 months beginning from the end of the sample year, then there are no quarterly reports provided in 2007. As a result, this study decides to calculate the standard deviation of the three measures for the past 8 quarterly returns or 24 monthly returns starting from the end of the sample year.

al., 2000; Claessens *et al.*, 1999; Tsai *et al.*, 2003).

3.2.3 Control variables

Referring to the related literature, such as Jo and Na (2012) and Miralles-Marcelo *et al.* (2015), this study adds five control variables to the model: natural logarithm of total assets (SIZE), ratio of total debt to total assets (DEBT), return on assets (ROA), ratio of capital expenditure to sales revenue (CAPEX), and growth rate of sales revenue (SG). In addition, consistent with other studies, I also add D, YEAR, and INDUSTRY to control for trading type, firm-year, and industry influence, respectively.

3.3 Regression model

I use Model 1 to test H1, H2, and H3. H1 asserts that according to the risk effect of the convergence of interest hypothesis, the level of firm risk for family firms is lower than that for non-family firms. H1 is supported if β_1 is significantly negative. H2 states that, ceteris paribus, according to the risk effect of the convergence of interest hypothesis, growth opportunities mitigate the negative correlation between the level of firm risk and family firms. H2 is supported if β_4 is significantly positive. H3 notes that, ceteris paribus, according to the risk effect of the convergence of interest hypothesis, control-cash flow right deviation mitigates the negative correlation between the level of firm risk and family firms. H3 is supported if β_5 is significantly positive.

The study presents Model 1 as follows:

$$\begin{aligned} RISK_{i,t} = {} & \beta_0+\beta_1 FAMILY_{i,t}+\beta_2 GROWTH_{i,t}+\beta_3 SEP_{i,t}+\beta_4 FAMILY_{i,t}*GROWTH_{i,t} \\ & +\beta_5 FAMILY_{i,t}*SEP_{i,t}+\beta_6 SIZE_{i,t}+\beta_7 DEBT_{i,t}+\beta_8 ROA_{i,t}+\beta_9 CAPEX_{i,t}+\beta_{10} SG_{i,t} \\ & +\beta_{11} D_{i,t}+\beta_{12} INDUSTRY_{i,t}+\sum_{2010}^{2017}\beta_{13} YEAR_{i,t}+\varepsilon_{i,t} \qquad (1) \end{aligned}$$

RISK:	The measure of firm risk adopted herein includes three measures: standard deviation of return on equity (ROESD), standard deviation of return on assets (ROASD), and standard deviation of stock return (RETSD). ROESD and ROASD are calculated from the past 8 quarterly returns from the end of the sample year; RETSD is calculated from the past 24 monthly returns starting from the end of the sample year.
FAMILY:	Dummy variable for a family firm; if a company meets one of the following four criteria, then "FAMILY" is equal to 1 and 0 otherwise: (1) the chairman and CEO roles are served by one specific family member; (2) the ratio of family board members is more than 50% (not including affiliated directors), and the ratio of affiliated directors and outside directors is less than 33%; (3) the ratio of family board members is larger than 33%, and at least three members of the ultimate controlling family are directors and managers; and (4) the family shareholding ratio exceeds the critical proportion of shares.
GROWTH:	Growth opportunities - the ratio of market value to book value.
SEP:	Control-cash flow right deviation, measured as the ratio of control rights to cash flow rights.
SIZE:	Natural logarithm of total assets.
DEBT:	Ratio of total debt to total assets.
ROA:	Return on assets, defined as net income divided by total assets.
CAPEX:	Ratio of capital expenditure to sales revenue.
SG:	Growth rate of sales revenue.
D:	Dummy variable equal to 1 if a TWSE-listed firm and 0 otherwise.
YEAR:	Dummy variable coded as 1 for firm i in year t and 0 otherwise.

INDUSTRY:	An indicator set to each industry category according to the codes of the TEJ database.
t:	t^{th} year; the research period is from 2010 to 2017.
i:	i^{th} firm.
$E_{i,t}$:	Residuals.

4. Empirical Results

4.1 Descriptive statistics and correlation analyses

Table 2 reports the descriptive statistics of the variables. It can be seen that the mean (median) values of ROESD, ROASD, and RETSD for family firms are respectively 6.116 (5.019), 4.607 (3.780), and 14.417 (13.385); on the other hand, the mean (median) values of ROESD, ROASD, and RETSD for non-family firms are respectively 6.697 (5.693), 5.005 (4.244), and 14.880 (13.875). In addition, the difference in the mean value of ROASD and RETSD between family firms and non-family firms is significant at the 1% level in a two-tailed test. The mean value of ROESD for family firms is significantly lower than that for non-family firms at the 10% level in a one-tailed test. In short, with regard to the descriptive statistics of ROESD, ROASD, and RETSD, the mean variables for family firms are significantly lower than those for non-family firms; therefore, H1 is supported.

The mean values for the other two independent variables, GROWTH and SEP, are 1.645 and 1.701 for family firms (1.857 and 3.873 for non-family firms), respectively, and the difference in the mean value of GROWTH and SEP between family firms and non-family firms is significant at the 1% level in a two-tailed test. The market value of family firms (non-family firms) is 1.645 (1.857) times the book value, and the control rights of family firms (non-family firms) are 1.701 (3.873) times the cash flow rights. In addition, the mean values for the five control variables, SIZE, DEBT, ROA, CAPEX, and SG, are 9.636, 0.416, 0.086, 0.686, and 0.154 (9.579, 0.401, 0.096, 0.495, and 0.198) for family firms (non-family firms), respectively. Finally, the mean value for D is 0.588 (0.504) for family firms (non-family firms), as the number of TWSE-

listed firms in the two sub-samples is a bit higher than the number of TPEx-listed firms. To summarize, except for the variables of ROESD and SG, the significance for the difference in the mean value of all other variables between family firms and non-family firms is at the 1% level in a two-tailed test.

Table 3 shows the Pearson correlation and Spearman correlation of Model 1. The results note that RISK (ROESD, ROASD, RETSD) and FAMILY do not significantly correlate based on Pearson correlation; however, RISK (ROESD, ROASD, RETSD) and FAMILY do significantly negatively correlate based on Spearman correlation. FAMILY and GROWTH have significantly negative correlations under two types of definition; however, GROWTH and RISK (ROESD, ROASD, RETSD) have significantly positive correlations under two types of correlation. On the other hand, FAMILY and SEP have significantly positive (no significant) correlations based on Pearson correlation (Spearman correlation), but SEP and RISK (ROESD, ROASD, RETSD) have no significant correlations under two types of definition. By simply looking at the significance of the correlation coefficients between the two variables it is not possible to decide accurately whether this paper's hypotheses can be supported, because the correlation coefficients between the two variables do not control the effect of other variables. Therefore, I use regression analysis to explore the hypotheses in greater detail.

Table 2 Descriptive statistics of Model 1

FAMILY=1

Variable	N	Mean	Med	Std. Dev.	Max	Min
ROESD	6,109	6.116	5.019	28.009	1,111.400	0.199
ROASD	6,109	4.607***	3.780	5.223	211.756	0.120
RETSD	6,109	14.417***	13.385	5.847	50.919	2.798
GROWTH	6,109	1.645***	1.244	1.689	55.386	0.067
SEP	6,109	1.701***	1.051	2.630	78.125	1
SIZE	6,109	9.636***	9.556	0.643	12.391	7.254
DEBT	6,109	0.416***	0.415	0.179	0.987	0.006
ROA	6,109	0.086***	0.079	0.098	0.965	-0.717
CAPEX	6,109	0.686***	0.356	4.394	254.151	0
SG	6,109	0.154	0.042	62.390	4,174.655	-1
D	6,109	0.588***	1	0.492	1	0

FAMILY=0

Variable	N	Mean	Med	Std. Dev.	Max	Min
ROESD	3,542	6.697	5.693	11.633	176.717	0.084
ROASD	3,542	5.055	4.244	3.361	37.247	0.121
RETSD	3,542	14.880	13.875	6.340	98.466	2.944
GROWTH	3,542	1.857	1.352	4.091	192.868	0.041
SEP	3,542	3.873	1.166	17.790	416.667	1
SIZE	3,542	9.579	9.486	0.644	12.175	6.110
DEBT	3,542	0.401	0.394	0.203	4.854	0.008
ROA	3,542	0.096	0.093	0.114	0.811	-0.696
CAPEX	3,542	0.495	0.235	1.552	31.681	0
SG	3,542	0.198	0.058	2.308	111.453	-0.979
D	3,542	0.504	1	0.500	1	0

1. Variable definitions: ROESD: A proxy for firm risk, defined as the standard deviation of return on equity. ROASD: A proxy for firm risk, defined as the standard deviation of return on assets. RETSD: A proxy for firm risk, defined as the standard deviation of stock return. FAMILY: Dummy variable for a family firm. If a company meets one of the following four criteria, then it is equal to 1 and 0 otherwise: (1) the chairman and CEO roles are served by one specific family member; (2) the ratio of family board members is more than 50% (not including affiliated directors), and the ratio of affiliated directors and outside directors is less than 33%; (3) the ratio of family board members is larger than 33%, and at least three members of the ultimate controlling family are directors and managers; and (4) the family shareholding ratio exceeds the critical proportion of shares. GROWTH: Growth opportunities, defined as the ratio of market value to book value. SEP: Control-cash flow right deviation, measured as the ratio of control rights to cash flow rights. SIZE: Natural logarithm of total assets. DEBT: Ratio of total debt to total assets. ROA: Return on assets, defined as net income divided by total assets. CAPEX: Ratio of capital expenditure to sales revenue. SG: Growth rate of sales revenue. D: Dummy variable equal to 1 if the company is a TWSE-listed firm and 0 otherwise.
2. *** indicates significance for the difference in the mean value of variables between family firms and non-family firms at the 1% level in a two-tailed test.

Table 3 Correlation matrix of Model 1 (N=9,651)

Variable	ROESD	ROASD	RETSD	FAMILY	GROWTH	SEP	SIZE	DEBT	ROA	CAPEX	SG	D
ROESD	1	0.804**	0.219**	-0.078**	0.167**	0.032	-0.098**	0.196**	0.037	-0.004	-0.077**	-0.122**
ROASD	0.541**	1	0.206**	-0.096**	0.199**	0.053**	-0.244**	-0.226	0.196**	0.075	-0.044	-0.170**
RETSD	0.313 **	0.322 **	1	-0.043*	0.233**	0.021**	-0.177*	-0.007**	-0.122**	0.000*	-0.035	-0.175**
FAMILY	-0.009	-0.008	-0.008	1	-0.059**	-0.211	0.040	0.063**	-0.065**	0.047**	-0.021*	0.102**
GROWTH	0.046**	0.041**	0.030**	-0.031**	1	0.045*	0.023	-0.114**	0.297**	-0.091	0.044**	0.017
SEP	0.012	0.015	0.011	0.096**	0.023	1	0.108**	-0.073**	0.120**	0.037	0.086**	0.022
SIZE	-0.057**	-0.052**	-0.050**	0.041**	-0.111**	0.064*	1	0.342**	0.089**	0.145**	0.078**	0.580**
DEBT	-0.009	-0.002	-0.001	0.045**	0.020*	-0.014	0.303**	1	0.258**	-0.035	0.004	0.098**
ROA	-0.119**	-0.126**	-0.112**	-0.044**	0.063**	0.031**	0.164**	-0.168**	1	-0.003	0.418**	0.078**
CAPEX	0.103**	0.102**	0.106**	0.023*	-0.015	0.004	-0.006	-0.017	-0.065**	1	0.111**	0.027
SG	0.000	0.000	0.000	0.014	0.000	-0.003	-0.007	-0.014	0.013	-0.002	1	0.028
D	-0.031**	-0.035**	-0.036**	0.082**	-0.075**	0.014	0.523**	0.086**	0.065**	-0.003	0.012	1

1. All variables are as defined in Table 2.
2. ** and * indicate significance at the 1% and 5% levels, respectively.
3. The lower left part is the number of Pearson correlation, and the upper right part is the number of Spearman correlation.

4.2 Regression analyses

Winsorizing is the transformation of statistics by limiting extreme values in the statistical data to reduce the effect of outliers. This research refers to Garvey and Milbourn (2003) and sets the top and bottom 1% of the sample of all variables to the numbers of 1% and 99%, respectively. My study uses panel datasets that consist of a number of observations over time on a number of cross-sectional units. If serial correlation exists, then the estimated variances of the regression coefficients are biased, leading to unreliable hypothesis testing (Hanushek and Jackson, 1977).

To avoid the above-mentioned problem, the standard errors in the regression model are all corrected by clustered robust standard errors (Peterson, 2009; Gow *et al.*, 2010). The empirical results of Model 1 are in Table 4, showing that the estimated coefficients of FAMILY are all significantly negative no matter whether I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively -1.92, -2.93, and -2.03. Therefore, the results support H1: According to the risk effect of the convergence of interest hypothesis, the level of firm risk for family firms is lower than that for non-family firms. This means that the higher the shareholdings of managers are, the more consistent the interests of them and family members will be. Therefore, the behaviors of managers in the family firm are in alliance with family members, and thus both family members and managers in the family firm will reduce behaviors that can harm their firm value and seek to manage such firm risk (Erbetta *et al.*, 2013). Family members and managers in the family firm are thus expected to aggressively manage the risk of the firms in order to lower it.

The estimated coefficients of GROWTH are 0.009, 0.009, and 0.032 and are significant at the 10% level (t=1.89, 1.81, and 1.85), which agree with studies such as Smith and Watts (1992) and Gaver and Gaver (1993) and indicate that the level of firm risk is higher for firms with greater growth opportunities. Furthermore, the estimated coefficients of SEP are significantly positive (t=1.78, 1.81, and 2.01) and also consistent with studies such as Du and Dai (2005) and Zhang *et al.* (2014). The estimated coefficients of the interaction term (FAMILY*GROWTH) are 0.683, 0.224, and 0.125, and the t values are 2.69, 4.36, and 2.18. Thus, the results support Hypothesis 2:

Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, growth opportunities mitigate the negative correlation between the level of firm risk and family firms. This is in agreement with the concepts mentioned in the literature, such as Granovetter (1973), Sirmon and Hitt (2003), and Dow and McGuire (2016), who indicated that growth opportunities positively impact the level of firm risk. Moreover, the estimated coefficients of the interaction term (FAMILY*SEP) are 0.175, 0.024, and 0.136, and the t values are 1.88, 1.89, and 3.70. Therefore, the results support Hypothesis 3: Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, control-cash flow right deviation mitigates the negative correlation between the level of firm risk and family firms. The results are in accordance with the assertions of the literature, such as Fama and Jensen (1983), James (1999), Hermalin and Weisbach (2001), and Chen and Nowland (2010), meaning that control-cash flow right deviation increases the level of firm risk.

To summarize up, the empirical results herein support all the hypotheses set out in this study. As for the control variables in Model 1, the results are consistent with those in other research, and thus details will not be provided here. Except for CAPEX and SG, all other control variables are statistically significant. The setting of control variables in this study is thus suitable.

Table 4 Regression statistics of Model 1 (N=9,651)

$RISK_{i,t}$

$=\beta_0+\beta_1 FAMILY_{i,t}+\beta_2 GROWTH_{i,t}+\beta_3 SEP_{i,t}+\beta_4 FAMILY_{i,t}*GROWTH_{i,t}+\beta_5 FAMILY_{i,t}*SEP_{i,t}+\beta_6 SIZE_{i,t}$

$+\beta_7 DEBT_{i,t}+\beta_8 ROA_{i,t}+\beta_9 CAPEX_{i,t}+\beta_{10} SG_{i,t}+\beta_{11} D_{i,t}+\beta_{12} INDUSTRY_{i,t}+\sum_{2010}^{2017}\beta_{13} YEAR_{i,t}+\varepsilon_t$

	RISK=ROESD		RISK=ROASD		RISK=RETSD	
Variable	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate
Intercept	35.302 (6.28)***	34.114 (6.15)***	11.335 (10.35)***	11.021 (9.01)***	31.215 (14.22)***	30.511 (13.88)***
FAMILY	-0.110 (-1.69)*	-0.413 (-1.92)*	-0.123 (-2.03)**	-0.447 (-2.93)***	-0.195 (-1.71)*	-0.348 (-2.03)**
GROWTH	0.129 (1.66)*	0.009 (1.89)*	0.050 (1.73)**	0.009 (1.81)*	0.067 (1.74)*	0.032 (1.85)*
SEP	0.003 (1.73)*	0.002 (1.78)*	0.001 (1.71)*	0.005 (1.81)*	0.009 (1.73)*	0.004 (2.01)**
FAMILY*GROWTH	-	0.683 (2.69)***	-	0.224 (4.36)***	-	0.125 (2.18)**
FAMILY*SEP	-	0.175 (1.88)*	-	0.024 (1.89)*	-	0.136 (3.70)***

SIZE	-3.759	-3.678	-3.732	-3.677	-1.642	-1.670
	(-6.00)***	(-5.85)***	(-5.97)***	(-5.40)***	(-11.42)***	(-11.05)***
DEBT	11.655	11.324	10.078	10.031	2.821	2.772
	(6.08)***	(5.89)***	(1.21)	(1.08)	(6.51)***	(6.45)***
ROA	-14.875	-13.789	-4.934	-4.521	-8.586	-8.709
	(-4.04)***	(-3.75)***	(-6.84)***	(-6.25)***	(-10.52)***	(-10.58)***
CAPEX	-0.001	-0.004	-0.008	-0.007	0.027	0.022
	(-0.02)	(-0.06)	(-0.50)	(-0.49)	(1.51)	(1.23)
SG	-0.001	-0.005	-0.001	-0.005	0.003	0.003
	(-0.10)	(-0.14)	(-0.51)	(-0.52)	(1.11)	(1.13)
D	-2.191	-2.214	-2.332	-2.330	-1.155	-1.134
	(-2.91)***	(-2.95)***	(-2.25)**	(-2.29)**	(-6.84)***	(-6.76)***
INDUSTRY	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
$AdjR^2$	0.024	0.028	0.037	0.049	0.159	0.199
F Value	8.18	8.55	20.92	22.09	106.2	97.52
Pr > F	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

1. All variables are as defined in Table 2. 2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
3. The VIF of all variables is less than 2.

4.3 Additional analysis

The paper proceed with three additional analyses: (1) investigate the impact of the global financial crisis on the issue at hand; (2) address the problem of firm clustering by adjusting the standard errors and related t-statistics in estimating Equations; and (3) does this paper's findings hold after matching with control firms?

First, the global financial crisis started around the end of 2007. According to Chen (2009) and Wang (2013), this crisis impacted company growth rates, and any decreasing growth rate will likely raise the level of firm risk. Therefore, this study chooses the research period from the start of 2010 in order to avoid the impact of this global financial crisis on firm risk for Taiwanese listed firms. However, taking Tatung Inc. in 2008 as a one family controlling firm example, the controlling family members misused and stole firm assets for family use, resulting in a great scandal and depreciation in its stock price and profits. Johnson *et al.* (2000) argued that a family controlling firm may increase the likelihood of tunneling and also documented that tunneling is more likely to happen during a financial crisis in emerging economies. In other words, H1 will likely not be supported by the data, if the study employs data during the

financial crisis period (2008-2009). Therefore, excluding data during a financial crisis and concluding that family firms have lower levels of risk is incomplete. Thus, this research employs data during the financial crisis period (2008-2009) to examine H1 again. The empirical results are in Table 5, showing that the estimated coefficients of FAMILY are all significantly positive no matter whether I define RISK as ROESD, ROASD, or RETSD, and t values are respectively 1.77, 1.80, and 1.68. Therefore, the results do not support H1. On the contrary, the results show that the level of firm risk for family firms is higher than that for non-family firms. The findings employing data after the financial crisis erupted are in accordance with the literature, such as Johnson *et al.* (2000) and Chen *et al.* (2012). Furthermore, the results are consistent with Taiwanese studies, such as Chen (2009) and Wang (2013), implying the global financial crisis impacted a company's growth rate, and that a decreasing growth rate will raise the level of firm risk. As a result, when my paper chooses its period of research from 2008 to 2009 (during the global financial crisis), the study results will include the impact of this crisis on firm risk. In other words, choosing the research period from 2010 to 2017 has an incremental research contribution for this paper, because this time period avoids the influence of the global financial crisis.

Second, following Rogers (1993) and Ettredge et al. (2014), I address the problem of firm clustering by adjusting the standard errors and related t-statistics in estimating Model 1. The untabulated results of Model 1 show that the estimated coefficients of FAMILY are all significantly negative as I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively -1.95, -2.97, and -2.06. Therefore, the results support H1: According to the risk effect of the convergence of interest hypothesis, the level of firm risk for family firms is lower than that for non-family firms. In addition, the estimated coefficients of the interaction term (FAMILY*GROWTH) are all significantly positive as I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively 2.70, 4.29, and 2.11. Thus, the results support Hypothesis 2: Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, growth opportunities mitigate the negative correlation between the level of firm risk and family firms. Finally, the estimated coefficients of the interaction term (FAMILY*SEP) are all significantly positive as I define RISK

as ROESD, ROASD, or RETSD, and their t values are respectively 1.89, 1.87, and 3.66. Therefore, the results support Hypothesis 3: Ceteris paribus, according to the risk effect of the convergence of interest hypothesis, control-cash flow right deviation mitigates the negative correlation between the level of firm risk and family firms. To sum up, as I address the problem of firm clustering by adjusting the standard errors and related t-statistics in estimating Model 1, the results are in accordance with the assertions of prior findings of 4.2 Regression analyses.

Third, to further confirm the findings reported in Section 4.2, I use control firms to discern the effect of different industry on firm risk. This procedure allows me to determine the effect of the core events - that is, the level of firm risk between a family firm and non-family. According to another study, like Tai and Hwang (2020), I select control firms according to the same industry and the most similar assets size, measured by the natural logarithm of total assets at the end of each year. Based on the untabulated results, the estimated coefficients of FAMILY are all significantly negative as I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively -1.99, -3.01, and -2.19. Therefore, the results support H1. In addition, the estimated coefficients of the interaction term (FAMILY*GROWTH) are all significantly positive as I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively 2.88, 4.32, and 2.14. Thus, the results support Hypothesis 2. Furthermore, the estimated coefficients of the interaction term (FAMILY*SEP) are all significantly positive as I define RISK as ROESD, ROASD, or RETSD, and their t values are respectively 1.95, 1.96, and 3.71. Therefore, the results support Hypothesis 3. In short, when I use control firms to discern the effect of different industry on firm risk, the results are consistent with those of the main tests.

Table 5 Regression statistics of Model 1 during the financial crisis period (N=2,894)

$RISK_{i,t}$

$=\beta_0+\beta_1 FAMILY_{i,t}+\beta_2 GROWTH_{i,t}+\beta_3 SEP_{i,t}+\beta_4 FAMILY_{i,t}*GROWTH_{i,t}+\beta_5 FAMILY_{i,t}*SEP_{i,t}+\beta_6 SIZE_{i,t}$

$+\beta_7 DEBT_{i,t}+\beta_8 ROA_{i,t}+\beta_9 CAPEX_{i,t}+\beta_{10} SG_{i,t}+\beta_{11} D_{i,t}+\beta_{12} INDUSTRY_{i,t}+\sum_{2008}^{2009}\beta_{13} YEAR_{i,t}+\varepsilon_t$

	RISK=ROESD		RISK=ROASD		RISK=RETSD	
Variable	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate
Intercept	-15.534	-24.685	35.219	29.062	24.89	17.05
	(-0.85)	(2.06)**	(1.36)	(1.12)	(0.84)	(1.47)
FAMILY	1.781	1.696	0.545	0.527	0.248	0.257
	(1.78)*	(1.77)*	(1.82)*	(1.80)*	(1.70)*	(1.68)*
GROWTH	1.692	1.865	0.172	0.215	0.308	0.264
	(15.59)***	(15.99)***	(5.76)***	(6.14)***	(5.28)***	(4.25)***
SEP	0.014	0.015	0.005	0.005	0.009	0.007
	(1.74)*	(1.76)*	(1.85)*	(1.78)*	(1.75)*	(1.82)*
FAMILY*GROWTH	-	0.796	-	0.142	-	0.214
		(3.99)***		(2.37)***		(2.01)**
FAMILY*SEP	-	0.067	-	0.004	-	0.107
		(1.88)*		(1.98)***		(2.15)**
SIZE	-3.115	-3.58	-2.558	-2.577	-2.529	-2.351
	(-1.39)	(-1.6)	(-3.64)***	(-3.66)***	(-2.12)**	(-1.97)***
DEBT	18.216	16.264	18.486	28.848	3.589	8.184
	(1.33)	(2.65)***	(0.95)	(1.32)	(0.05)	(0.71)
ROA	-0.964	-0.98	-0.701	-0.703	-0.572	-0.557
	(-5.26)***	(-5.36)***	(-12.06)***	(-12.11)***	(-3.13)***	(-3.05)***
CAPEX	-0.379	-0.384	-0.421	-0.421	-0.006	-0.005
	(-0.34)	(-0.34)	(-1.13)	(-1.13)	(-3.13)**-	(-3.05)***
SG	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(-0.11)	(-0.13)	(-0.43)	(-0.43)	(-0.16)	(-0.13)
D	-1.179	-1.232	-0.79	-0.798	-1.881	-1.865
	(-2.36)***	(-2.47)***	(-4.92)***	(-4.98) ***	(-6.70)***	(-6.65)***
INDUSTRY	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
$AdjR^2$	0.134	0.139	0.090	0.092	0.083	0.089
F Value	41.12	36.21	26.31	22.72	22.08	19.12
Pr > F	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

1. All variables are as defined in Table 2.
2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
3. The VIF of all variables is less than 2.

4.4 Endogeneity analyses

4.4.1 Heckman's two-stage estimation

The estimation of Model 1 may suffer from endogeneity. In other words, a company with a higher level of firm risk may be more likely to be a non-family firm. To alleviate the concern about endogeneity, Heckman's two-stage estimation is used to mitigate self-selection bias (Heckman, 1979; Ball and Schivakumar, 2005; Katz, 2009; Zhang *et al.*, 2014).

Following the Heckman (1979) procedure and referring to other studies, such as Lee and Liao (2004), Claessens *et al.* (2000), Faccio and Lang (2002), Villalonga and Amit (2006), Chen and Ho (2009), Lin and Chang (2009), and Tang (2010), I estimate a probit model in the first stage with the ratio of family members serving as directors on the board, a dummy variable for whether the family shareholding ratio exceeds the critical proportion of shares (which is according to Cubbin and Leech (1983)), the number of family members serving as managers, and the number of family members serving as directors. I also add D, YEAR, and INDUSTRY to respectively control for trading type, firm-year, and industry influence. The adjusted R square of the first stage model is 0.282; therefore, it is suitable for this research to employ the above-mentioned variables as predictors in the first stage. The inverse Mill's ratio (MILLS) for each firm is calculated and added to the second stage as an instrument variable.

The estimated coefficients of MILLS in Table 6 are 0.113, 0.121, and 0.201, and the t values are 2.05, 1.92, and 1.98. Therefore, employing Heckman's two-stage estimation to solve self-selection bias is workable in this study. The results of Table 6 show that if the paper defines RISK as ROESD, ROASD, or RETSD, then the t values of FAMILY are -1.85, -1.98, and -1.81, the t values of FAMILY*GROWTH are 1.82, 1.90, and 2.03, and the t values of FAMILY*SEP are 1.88, 1.97, and 2.03. The results are consistent with previous findings herein.

Table 6 Regression statistics of Heckman's two-stage estimation (N=9,651)

$RISK_{i,t}$

$=\beta_0+\beta_1 FAMILY_{i,t}+\beta_2 GROWTH_{i,t}+\beta_3 SEP_{i,t}+\beta_4 FAMILY_{i,t}*GROWTH_{i,t}+\beta_5 FAMILY_{i,t}*SEP_{i,t}+\beta_6 SIZE_{i,t}+\beta_7 DEBT_{i,t}+\beta_8 ROA_{i,t}+\beta_9 CAPEX_{i,t}+\beta_{10} SG_{i,t}+\beta_{11} D_{i,t}+\beta_{12} INDUSTRY_{i,t}+\sum_{2010}^{2017}\beta_{13} YEAR_{i,t}+\varepsilon_t$

	RISK=ROESD		RISK=ROASD		RISK=RETSD	
Variable	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate	Parameter Estimate
Intercept	6.502	5.943	5.101	5.102	8.403	8.601
	(1.51)	(1.61)	(1.27)	(1.50)	(1.48)	(1.54)
FAMILY	-0.109	-0.401	-0.141	-0.462	-0.588	-0.644
	(-1.89)*	(-1.85)*	(-1.68)*	(-1.98)**	(-1.82)*	(-1.81)*
GROWTH	0.129	0.039	0.152	0.054	0.145	0.165
	(1.69)*	(2.00)**	(1.94)*	(1.84)*	(1.76)*	(1.84)*
SEP	0.014	0.014	0.012	0.005	0.008	0.004
	(1.74)*	(1.85)*	(1.75)*	(1.72)*	(1.79)*	(1.92)*
FAMILY*GROWTH	-	0.688	-	0.201	-	0.221
		(1.82)*		(1.90)*		(2.03)**
FAMILY*SEP	-	0.239	-	0.020	-	0.232
		(1.88)*		(1.97)**		(2.03)**
SIZE	-2.702	-2.604	-2.759	-2.802	-1.651	-1.615
	(-5.51)***	(-4.07)***	(-5.31)***	(-5.09)***	(-10.45)***	(-10.02)***
DEBT	6.544	6.761	6.522	6.539	2.803	2.760
	(4.12)***	(4.21)***	(3.97)***	(3.81)***	(5.01)***	(5.45)***
ROA	-10.803	-10.783	-10.940	-10.394	-5.519	-5.708
	(-3.03)***	(-3.64)***	(-3.63)***	(-3.51)***	(-8.12)***	(-8.21)***
CAPEX	-0.002	-0.003	-0.002	-0.004	-0.032	-0.021
	(-0.04)	(-0.05)	(-0.08)	(-0.09)	(-1.43)	(-1.32)
SG	-0.005	-0.001	-0.001	-0.004	-0.004	-0.004
	(-0.14)	(-0.19)	(-0.16)	(-0.25)	(-1.25)	(-1.12)
D	-2.185	-2.203	-2.227	-2.333	-1.189	-1.194
	(-2.92)***	(-2.91)***	(-2.81)***	(-2.91)***	(-2.84)***	(-2.90)***
MILLS	0.110	0.113	0.123	0.121	0.207	0.201
	(2.02)**	(2.05)**	(1.93)*	(1.92)*	(1.94)*	(1.98)**
INDUSTRY	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
$AdjR^2$	0.025	0.027	0.037	0.041	0.182	0.210
F Value	9.51	9.40	22.77	23.04	104.0	95.72
Pr > F	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

1. All variables are as defined in Table 2.
2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
3. The VIF of all variables is less than 2.

4.4.2 Reverse causality issue

As it is possible that the results herein are driven by reverse causality, I refer to other studies, like Tai *et al.* (2015), and replace my dependence variable of $RISK_{i,t}$ with $RISK_{i,t+1}$ to solve the problem of reverse causality. My findings demonstrate that if I define RISK as ROESD, ROASD, or RETSD, then the t values of FAMILY are -1.91, -2.02, and -1.86, the t values of FAMILY*GROWTH are 1.88, 1.95, and 2.09, and the t values of FAMILY*SEP are 1.92, 2.05, and 2.11, respectively. The results are consistent with previous findings herein.

4.4.3 Fixed effect model

The estimation of Model 1 may suffer from endogeneity. For example, it is likely that this study omits some unobservable variables that simultaneously affect risk and the relationships among family firm, growth opportunities, and control-cash flow right deviation. To alleviate the concern about the omitted variable problem, I refer to other studies, such as Conyon and He (2011) and Zhang *et al.* (2014), and employ the fixed effect model to solve it.

The fixed-effect model can mitigate the endogeneity that arises from omitted unobservable variables, and it is used to analyze longitudinal data with repeated measures on both independent and dependent variables. It has the attractive feature of controlling for all stable characteristics of the observations, whether measured or not. Therefore, I employ a fixed-effect model to control both firm-fixed effect and year-fixed effect, re-run Model 1 to alleviate the concern about the omitted variable problem, and examine my hypotheses again.

My empirical results show that when I define RISK as ROESD, ROASD, or RETSD, then the t values of FAMILY are -1.94, -2.08, and -1.89, the t values of FAMILY*GROWTH are 1.92, 1.99, and 2.11, and the t values of FAMILY*SEP are 1.96, 2.07, and 2.14, respectively. These results are consistent with prior results.

5. Conclusions

According to prior Taiwanese research, such as Kuo and Wang (2017) reported that around 67% of TSE-listed companies in Taiwan are family firms. Therefore, family firms are an important organization in Taiwan, and so its topic is worth using Taiwanese data for further exploration. In addition, uncertainty exists in the actual economic environment, and this is the reason why an evaluation of firm risk is not only the focus of academic studies, but also for many investors. Thus, this paper uses listed firms in Taiwan from 2010 to 2017 to investigate whether the level of firm risk for family firms is lower than that for non-family firms and further examines the moderating effects of growth opportunities and control-cash flow right deviation under the viewpoint of the risk effect of the convergence of interest hypothesis.

The empirical results show that no matter whether firm risk is defined as standard deviation of return on equity (ROESD), standard deviation of return on assets (ROASD), or standard deviation of stock return (RETSD), the level of risk for family firms is lower than that for non-family companies. These findings are consistent with the risk effect of the convergence of interest hypothesis, which claims that the higher the shareholdings of managers are, the more consistent their interests and those of family members will be. Because the shareholdings of family members are higher, family members and managers in the family firm will seek to aggressively manage such firm risk, and thus the level of risk is lower at family firms. In short, the three measures of firm risk all support that both growth opportunities and control-cash flow right deviation for family members mitigate the negative correlation between the level of firm risk and family firms. Moreover, as the study employs data during the financial crisis period (2008-2009), the findings document that the level of firm risk for family firms is higher than that for non-family firms, which run opposite to the results using data after the financial crisis period.

In summary, this study offers some implications to the risk effect of the convergence of interest hypothesis. The first implication is using the risk effect of the convergence of interest hypothesis to explore whether the level of firm risk for family firms is lower than that for non-family firms and to further examine the moderating effects of growth opportunities and control-cash flow right deviation. According to my findings, the level of firm risk for family firms

is lower than that for non-family firms. Moreover, growth opportunities and control-cash flow right deviation mitigate the negative correlation between the level of firm risk and family firms.

Second, this paper uses three different measures to proxy firm risk and achieves consistent results. Therefore, the findings of this study are robust and can serve as a supplement to the literature related with the risk effect of the convergence of interest hypothesis.

Third, the study uses data during the financial crisis period (2008-2009) to examine H1. The results are consistent with the findings of Chen *et al.* (2012), who employed listed family firms from Taiwan before the global financial crisis occurred, indicating that the level of firm risk for family firms is higher than that for non-family firms during a financial crisis. In short, through comparing empirical results of these two papers, researchers can realize that the global financial crisis really did impact the correlation between the level of firm risk and family/non-family firms, implying during the global financial crisis period, the level of firm risk for non-family firms is lower than that for family firms; however, after the global financial crisis period, the level of firm risk for non-family firms is higher than that for family firms. To sum up, during the global financial crisis period, the empirical results do not support the risk effect of the convergence of interest hypothesis; however, after the global financial crisis period, the findings support the risk effect of the convergence of interest hypothesis. The above discussions can complement the shortcomings of this hypothesis.

My work also offers five implications to practitioners. First, both return rate and risk are key concerns of investors; in other words, investments with a high return rate are not necessarily better investments than those with a low return rate, because investors also have to consider the level of risk related to the rate of return. According to my results, the level of firm risk for non-family firms is higher than that for family firms, which offer some implications to investors. Second, this study uses three different measures to proxy firm risk and obtains consistent results, and said results are robust and can serve as a reference for practitioners. Third, this study also explores the moderating effects of growth opportunities and control-cash flow right deviation. The empirical results with regard to the moderating effects can be used as a

reference for investors when they make investment decisions related to growth opportunities and control-cash flow right deviation. Fourth, this work's results are also relevant to insurance companies' research and practice, because during their investment process investors or insurance companies may take on the roles of antecedents and outcomes of family firms' risk aversion as seen in Anderson *et al*. (2012). Fifth, I find during (after) the global financial crisis period that the level of firm risk for non-family firms is lower (higher) than that for family firms. The findings are consistent with Johnson *et al.* (2000), Chen (2009), Chen *et al.* (2012), and Wang (2013), showing that the results using data during the financial crisis period run opposite to the results using data after the financial crisis period.

This study has four recommendations for future research. (1) There are two opposing effects of the convergence of interest hypothesis: a reward effect and a risk effect. Among the two, the reward effect captures the increase in family members' wealth associated with risk increases when their equity ownership can be viewed as an option on the levered firm with the value of equity ownership increasing with stock risk; however, the risk effect captures the decline in utility for risk-averse family members associated with greater risk when their human capital and wealth are highly concentrated in the same firm and are exposed to that risk. In my paper, I adopt the viewpoint of the risk effect to develop my hypothesis. Thus, my findings may not continue to be workable under the viewpoint of the reward effect, and therefore I suggest that future studies can try to develop a hypothesis that considers the two effects simultaneously.

(2) Most family firm analyses have focused on the association between family firm characteristics and firm performance (Berle and Means, 1932; Demsetz, 1983; Anderson and Reeb, 2003; Dyer and Whetten, 2006; Maury, 2006; Lin *et al.*, 2011). However, there are many issues that can be further explored, such as a monitoring mechanism in a family firm.

(3) This study defines risk as the standard deviation of return on equity, the standard deviation of return on assets, and the standard deviation of stock return. Future scholars can use other definitions of risk in this context to explore other avenues of analysis.

(4) The purpose of my study is to explore the mitigation effect of growth opportunities and control-cash flow right deviation on the negative correlation between the level of firm risk and family firms, instead of exploring the differences of the mitigation effect of these two variables between family firms and non-family firms. Therefore, I recommend future scholars to separate samples into two sub-samples, family firms and non-family firms, and compare the mitigation effect of these two variables on these two sub-samples.

Lastly, this study has the following limitation. Different studies have different definitions of a family firm. As such, the empirical results herein could vary if alternative definitions are used.

Reference

Ahmed, A. S., Billings, B. K., Morton, R. M., and Stanford, H. M. 2002. The Role of Accounting Conservatism in Mitigating Bondholder-shareholder Conflicts over Dividend Policy and in Reducing Debt Costs. *The Accounting Review* 77(4): 867-890.

Ali, A., Chen, T. Y., and Radhakrishnan, S. 2007. Corporate Disclosures by Family Firms. *Journal of Accounting and Economics* 44(1-2): 238-286.

Ali, M., Kang, G. H., Yang, H. S., Jeong, J. Y., Hwang, Y. H., Park, G. B., and Joo, S. T. 2007. A Comparison of Meat Characteristics between Duck and Chicken Breast. *Asian-Australasian Journal of Animal Sciences* 20(6): 1002-1006.

Anderson, R. C., Duru, A., and Reeb, D. M. 2012. Investment Policy in Family Controlled Firms. *Journal of Banking and Finance* 36(6): 1744-1758.

Anderson, R. C. and Reeb, D. M. 2003. Founding-family Ownership and Firm Performance: Evidence from the S&P 500. *The Journal of Finance* 58(3): 1301-1328.

Anderson, R. C. and Reeb, D. M. 2004. Board Composition: Balancing Family Influence in S&P 500 Firms. *Administrative Science Quarterly* 49: 209-237.

Armstrong, C. S., Larcker, D. F., Ormazabal, G., and Taylor, D. J. 2013. The Relation between Equity Incentives and Misreporting: The Role of Risk-taking Incentives. *Journal of Financial Economics* 109(2): 327-350.

Ball, R. and Shivakumar, L. 2005. Earnings Quality in UK Private Firms: Comparative Loss Recognition Timeliness. *Journal of Accounting and Economics* 39: 83-128.

Basco, R., Bassetti, T., Dal Maso, L., and Lattanzi, N. 2021. Why and When do Family Firms Invest Less in talent management? The suppressor effect of risk aversion. *Journal of Management and Governance*: 1-30.

Bathala, C. T. and Rao, R. P. 1995. The Determinants of Board Composition: An Agency Theory Perspective. *Managerial and Decision Economics* 16(1): 59-69.

Berle, A. and Means, G. 1932. *The Modern Corporation and Private Property*. New York, NY: Harcourt, Brace, and World.

Bianco, M., Bontempi, M. E., Golinelli, R., and Parigi, G. 2013. Family Firms' Investments, Uncertainty and Opacity. *Small Business Economics* 40: 1035-1058.

Bloom, M. and Milkovich, G. T. 1998. Relationships among Risk, Incentive Pay, and Organizational Performance. *Academy of Management journal* 41(3): 283-297.

Brick, I. E., Palmon, and Wald, J. K. 2006. CEO Compensation, Director Compensation, and Firm Performance: Evidence of Cronyism? *Journal of Corporate Finance* 12(3): 403-423.

Casillas, J. C., Moreno, A.M., and Barbero, J. L. 2010. A Configurational Approach of the Relationship between Entrepreneurial Orientation and Growth of Family Firms. *Family Business Review* 23(1): 27-44.

Casillas, J. C., Moreno, A. M., and Barbero, J. L. 2011. Entrepreneurial Orientation of Family Firms: Family and Environmental Dimensions. *Journal of Family Business Strategy* 2(2): 90-100.

Chen, E. T. and Nowland, J. 2010. Optimal Board Monitoring in Family-owned Companies: Evidence from Asia. *Corporate Governance: An International Review* 18(1): 3-17.

Chen, L. R., Peng, J. L., and Wang, J. L. 2010. The Impacts of Corporate Governance Structures on Risk Taking by Insurance Companies in Taiwan.

Management Review 29: 1-18.

Chen, M. C. 2009. The Causes, Impacts and Responses of the Global Financial Crisis. *Economic Research* 9: 261-296.

Chen, S., Chen, X. I. A., and Cheng, Q. 2008. Do Family Firms Provide More or Less Voluntary Disclosure? *Journal of Accounting Research* 46(3): 499-536.

Chen, Y. P., Lin, T. J., Hou, C. P., Chang, L., and Hsieh, P. C. 2012. The Relationship among Family Ownership, Corporate Governance and Risk-Taking. *Fu Jen Management Review* 19: 59-90.

Chen, Y. R. and Ho, C. Y. 2009. The Impact of Family Control and Board Characteristics on Corporate Policies. *Journal of Management* 26(1): 1-16.

Claessens, S., Djankov, S., and Klapper, L. 1999. Resolution of Corporate Distress: Evidence from East Asia's Financial Crisis. The First Annual World Bank Group-Brookings Institution Conference, Palisades, New York.

Claessens, S., Djankov, S., and Lang, L. H. 2000. The Separation of Ownership and Control in East Asian Corporations. *Journal of Financial Economics* 58(1-2): 81-112.

Claessens, S., Djankov, S., Fan, J. P., and Lang, L. H. 2002. Disentangling the Incentive and Entrenchment Effects of Large Shareholdings. *The Journal of Finance* 57(6): 2741-2771.

Coles, J. L., Daniel, N. D., and Naveen, L. 2008. Boards: Does One Size Fit All? *Journal of Financial Economics* 87(2): 329-356.

Conyon, M. J. and He, L. 2011. Executive Compensation and Corporate Governance in China. *Journal of Corporate Finance* 17(4): 1158-1175.

Core, J. E., Holthausen, R. W., and Larcker, D. F. 1999. Corporate Governance, Chief Executive Officer Compensation, and Firm Performance. *Journal of Financial Economics* 51(3): 371-406.

Cubbin, J. and Leech, D. 1983. The Effect of Shareholding Dispersion on the Degree of Control in British Companies: Theory and Measurement. *The Economic Journal* 93(370): 351-369.

Dal Maso, L., Basco, R., Bassetti, T., and Lattanzi, N. 2020. Family Ownership

and Environmental Performance: The Mediation Effect of Human Resource Practices. *Business Strategy and the Environment* 29(3): 1548-1562.

Demsetz, H. 1983. The Structure of Ownership and the Theory of the Firm. *The Journal of Law and Economics* 26(2): 375-390.

Dow, S. and McGuire, J. 2016. Family Matters? A Cross-national Analysis of the Performance Implications of Family Ownership. *Corporate Governance: An International Review* 24(6): 584-598.

Du, J. and Dai, Y. 2005. Ultimate Corporate Ownership Structures and Capital Structures: Evidence from East Asian Economies. *Corporate Governance: An International Review* 13(1): 60-71.

Duran, P., Kammerlander, N., and Essen, M. V. 2016. Doing More with Less: Innovation Input and Output in Family Firms. *Academy of Management Journal* 59(4): 1224-1264.

Dyer Jr, W. G. and Whetten, D. A. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory and Practice* 30(6): 785-802.

Elston, J., Hofler, R., and Lee. J. 2011. Dividend Policy and Institutional Ownership: Empirical evidence using a propensity score matching estimator. *Journal of Accounting and Finance* 11(1): 89-102.

Entwisle, B., Henderson, G. E., Short, S. E., Bouma, J., and Fengying, Z. 1995. Gender and Family Businesses in Rural China. *American Sociological Review*: 36-57.

Erbetta, F., Menozzi, A., Corbetta, G., and Fraquelli, G. 2013. Assessing Family Firm Performance Using Frontier Analysis Techniques: Evidence from Italian Manufacturing Industries. *Journal of Family Business Strategy* 4(2): 106-117.

Ettredge, M. L., Xu, Y., and Yi, H. S. 2014. Fair Value Measurements and Audit Fees: Evidence from the Banking Industry. *Auditing: A Journal of Practice & Theory* 33(3): 33-58.

Evert, R. E., Sears, J. B., Martin, J. A., and Payne, G. T. 2018. Family Ownership and Family Involvement as Antecedents of Strategic Action: A

Longitudinal Study of Initial International Entry. *Journal of Business Research* 84: 301-311.

Faccio, M. and Lang, L. H. 2002. The Ultimate Ownership of Western European Corporations. *Journal of Financial Economics* 65(3): 365-395.

Fahlenbrach, R. 2009. Founder-CEOs, Investment Decisions, and Stock Market Performance. *Journal of Financial and Quantitative Analysis* 44(2): 439-466.

Fama, E. F. and Jensen, M. C. 1983. Separation of Ownership and Control. *The Journal of Law and Economics* 26(2): 301-325.

Fan, J. P. and Wang, T. J. 2002. Corporate Ownership Structure and the Informativeness of Accounting Earnings in East Asia. *Journal of Accounting and Economics* 33(3): 401-425.

Frankenreiter, J., C. Hwang, Y. Nili, and E. L. Talley. 2021. Cleaning Corporate Governance. *University of Pennsylvania Law Review* 170(1): 1-70.

Garvey, G. and Milbourn, T. 2003. Incentive Compensation When Executives can Hedge the Market: Evidence of Relative Performance Evaluation in the Cross Section. *The Journal of Finance* 58(4): 1557-1582.

Gaver, J. J. and Gaver, K. M. 1993. Additional Evidence on the Association between the Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Accounting and Economics* 16(1-3): 125-160.

Gomes, A. 2000. Going Public without Governance: Managerial Reputation Effects. *The Journal of Finance* 55(2): 615-646.

Gow, I. D., G. Ormazabal, and D. J. Taylor. 2010. Correcting for Cross-sectional and Time-series Dependence in Accounting Research. *The Accounting Review* 85 (2): 483-512.

Granovetter, M. S. 1973. The Strength of Weak Ties," American Journal of Sociology 78(6): 1360-1380.

Guay, W. R. 1999. The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants. *Journal of Financial Economics 53*(1):

43-71.

Hanushek, E. A. and Jackson, J. E. 1977. Models with Discrete Dependent Variables. *Statistical Methods for Social Scientists*: 179-216.

Heckman, J. J. 1979. Sample Selection Bias as a Specification Error. *Econometrica: Journal of the Econometric Society* 47: 153-161.

Herath, S. K., Herath, A., and Azeez, A. A. 2006. Family Firms and Corporate Culture: A Case Study from a Less Developed Country (LDC). *International Journal of Management and Enterprise Development* 3(3): 227-243.

Hermalin, B. E. and Weisbach, M. S. 2001. Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature. *National Bureau of Economic Research* No. 8161.

Hiebl, M. R. 2012. Risk Aversion in Family Firms: What do We Really Know? *The Journal of Risk Finance* 14(1): 49-70.

Hsueh, C. H. 2008. Research on the Interrelationship among Stock Ownership by Directors and Supervisors, Earnings Smoothing, and Enterprise Risk. *International Journal of Accounting Studies* 46: 107-130.

Hutchinson, M. 2003. An Analysis of the Association between Firm Risk, Executive Share Options and Accounting Performance: Some Australian Evidence. *Review of Accounting and Finance* 2(3): 48-71.

James, H. S. 1999. Owner as Manager, Extended Horizons and the Family Firm. *International Journal of the Economics of Business* 6(1): 41-55.

Jensen, M. C. and Meckling, W. H. 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3(4): 305-360.

Johnson, S., La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. 2000. Tunneling. *American Economic Review* 90(2): 22-27.

Katz, S. P. 2009. Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors. *The Accounting Review* 84: 623-658.

Kuo, T. L. and Wang, C. Y. 2017. How does Corporate Governance Affect the Performance of Family Businesses? A Long-term Longitudinal Analysis. *Journal of Accounting Review* 64: 61-111.

La, Porta. R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. 2000. Investor Protection and Corporate Governance. *Journal of Financial Economics* 58(1-2): 3-27.

Lee, C. L., Shih, Y. N., and Tsai, Y. L. 2011. The Impact of the Alignment between Performance Measures, Uncertainty and CEO Compensation on Firm Performance. *Organization and Management* 4(2): 39-77.

Lee, J. and Liao, Y. 2004. Board of Director Characteristics and Earnings Management: Evidence from the Effect of Family-controlling on Taiwan Corporations. *Taiwan Accounting Review* 5(1): 1-39.

Lennox, C. 2005. Management Ownership and Audit Firm Size. *Contemporary Accounting Research* 22(1): 206-227.

Lin, Y. F., Hong, C. H., and Chen, Y. Z. 2011. The Relationship between Managerial Successions of Family-controlled and Non-family-controlled Businesses and Relative Performances: An Empirical Study of Taiwan Listed Companies. *Management Review* 30(3): 25-47.

Lin, Z. J. and Liu, M. 2013. The Effect of Managerial Shareholding on Audit Fees: Evidence from Hong Kong. *International Journal of Auditing* 17(3): 227-245.

Linck, J. S., Netter, J. M., and Yang, T. 2008. The Determinants of Board Structure. *Journal of Financial Economics* 87(2): 308-328.

Maury, B. 2006. Family Ownership and Firm Performance: Empirical Evidence from Western European Corporations. *Journal of Corporate Finance* 12(2): 321-341.

McGrath, R. G. 1997. A Real Options Logic for Initiating Technology Positioning Investments. *Academy of Management Review* 22: 974-996.

Miller, D., Le Breton-Miller, I., and Scholnick, B. 2008. Stewardship vs. Stagnation: An Empirical Comparison of Small Family and Non-family Businesses. *Journal of Management Studie* 45(1): 51-78.

Miller, D., Lee, J., Chang, S., and Le Breton-Miller, I. 2009. Filling the Institutional Void: The Social Behavior and Performance of Family vs. Non-family Technology Firms in Emerging Markets. *Journal of International*

Business Studies 40(5): 802-817.

Miller, J. S., Wiseman, R. M., and Gomez-Mejia, L. R. 2002. The Fit between CEO Compensation Design and Firm Risk. *Academy of Management Journal* 45(4): 745-756.

Miller, K. D. and Folta, T. B. 2002. Option Value and Entry Timing. *Strategic Management Journal* 23: 655-665.

Miralles-Marcelo, J. L., Miralles-Quirós, M. D. M., and Lisboa, I. 2015. Does Family Control Reduce Firm Risk? *Revista de Empresa Familiar* 5(1): 25.

Nguyen, P. 2011. Corporate Governance and Risk-taking: Evidence from Japanese Firms. *Pacific-Basin Finance Journal* 19(3): 278-97.

Peterson, M. A. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *The Review of Financial Studies* 22(1): 435-480.

Pucci, T., Brumana, M., Minola, T., and Zanni, L. 2020. Social Capital and Innovation in a Life Science Cluster: The Role of Proximity and Family Involvement. *The Journal of Technology Transfer* 45(1): 205-227.

Ray, S., Mondal, A., and Ramachandran, K. 2018. How does Family Involvement Affect a Firm's Internationalization? An Investigation of Indian Family Firms. *Global Strategy Journal* 8(1): 73-105.

Rogers, W. H. 1993. Regression Standard Errors in Clustered Samples. *Stata Technical Bulletin* 13:19-23.

Rosen, S. 1982. Authority, Control, and the Distribution of Earnings. *The Bell Journal of Economics*: 311-323.

Schulze, W. S., Lubatkin, M. H., and Dino, R. N. 2002. Altruism, Agency, and the Competitiveness of Family Firms. *Managerial and Decision Economics* 23(4-5): 247-259.

Schulze, W. S., Lubatkin, M. H., and Dino, R. N. 2003. Exploring the Agency Consequences of Ownership Dispersion among the Directors of Private Family Firms. *Academy of Management Journal* 46(2): 179-194.

Sirmon, D. G. and Hitt, M. A. 2003. Managing Resources: Linking Unique Resources, Management, and Wealth Creation in Family Firms. *Entrepreneurship Theory and Practice* 27(4): 339-358.

Smith Jr, C. W. and Watts, R. L. 1992. The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Financial Economics* 32(3): 263-292.

Suess, J. 2014. Family Governance-Literature Review and the Development of a Conceptual Model. *Journal of Family Business Strategy* 5(2): 138-155.

Sulong, Z., Gardner, J. C., Hussin, A. H., Mohd-Sanusi, Z., and McGowan, C. B. 2013. Managerial Ownership, Leverage and Audit Quality Impact on Firm Performance: Evidence from the Malaysian Ace Market. *Accounting and Taxation* 5(1): 59-70.

Tai, Y. H. 2017. Does the Separation of Ownership and Control Affect the Incentive Intensity of Executive Performance-based Compensation? *Journal of Accounting Review* 65: 1-43.

Tai, Y. H., and Hwang, N-C R. 2020. Market Reactions to Corporate Governance Ranking Announcements: Evidence from Taiwan. *Abacus* 56(4): 627-638.

Tai, Y. H., Tseng, C. Y., and Ko, C. E. 2015. An Empirical Analysis of the Relation between Inside Director's Excess Compensation and Firm's Future Performance: Implicit Contract Perspective. *NTU Management Review* 25(2): 149-180.

Tang, L. F. 2010. Family-controlled Firms Characteristics and Earnings Quality. *Journal of Contemporary Accounting* 11: 137-410.

Tsai, H. F., Chung, H. M., and Lin, S. Y. 2003. Ownership Structure and the Informativeness of Earnings: Evidence from Taiwan. *Journal of Contemporary Accounting* 4(2): 143-168.

Villalonga, B. and Amit, R. 2006. How do Family Ownership, Management, and Control Affect Firm Value? *Journal of Financial Economics* 80(2): 385-417.

Wang, D. 2006. Founding Family Ownership and Earnings Quality. *Journal of Accounting Research* 44(3): 619-656.

Wang, L. S. 2013. Financial Risk Impact- Concurrently Discusses to Influence Taiwan. *Yu Da Academic Journal* 34: 43-62.

Weber, J., Lavelle, L., Lowry, T., Zellner, W., and Barrent, A. 2003. Family Inc. *Businessweek* 3857: 100-114.

Wright, P., Ferris, S., Sarin, A., and Awasthi, V. 1996. Impact of Corporate Insiders, Blockholder, and Institutional Equity Ownership on Firm Risk Taking. *Academy of Management Journal* 39(2): 441-463.

Yeh, Y. H., Lee, T. S., and Woidtke, T. 2001. Family Control and Corporate Governance: Evidence from Taiwan. *International Review of Finance* 2(1-2): 21-48.

Zhang, M., Gao, S., Guan, X., and Jiang, F. 2014. Shareholder-manager Collusion and Tunneling: Evidence from China. *Corporate Governance: An International Review* 22(6): 440-459.