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Family ownership and risk-taking: Exploring nonlinear effects in financial industry

Shu Ling Lin^{1*} and Ming Fung Wu²¹Department of Business Management, National Taipei University of Technology, 3, Zhongxiao E. Rd., Taipei City 106, Taiwan.²Robina Finance and Leasing Corporation, Taipei, Taiwan..

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This study examined the relevance of the family ownership on risk-taking. Using a sample selected from publicly listed companies among the financial institutions in Taiwan during 1996 to 2007, this study found that the family ownership had a significant negative effect on risk-taking in the financial industry. Moreover, these influences were non-linear by the range of family ownership. In contrast, when securities and the insurance industry were the major family-controlled shareholders, the increase of its shareholding percentage was unexpected to positively affect risk-taking. These results were consistent with the “convergence-of-interest hypothesis” and were robust for several proxies of risk-taking in Taiwan’s financial industry, providing insights as to the effectiveness of regulatory discipline and capital market discipline of family businesses, and facilitating better legislative monitoring of financial activities in risk-taking.

Key words: Family ownership, financial industry, risk-taking, family-controlled.

INTRODUCTION

Corporations need good corporate governance, especially in financial institutions. Banks are special economic units, which need to play the distinguishing role of financial intermediaries and protect the rights of customers and ensure financial stability (Pathan, 2009). If the operation encounters failure, it will have an impact on the entire economic system. Flannery (1998) indicated that financial institutions are more intensely regulated to avoid negative externalities from any systemic risk. The financial tsunami initiated by the sub-prime mortgage crisis in the US in August 2007 indicates how susceptible the economy is to imprudent risk-taking by financial institutions. The consequences of risk-taking behaviors by financial institutions via irresponsible lending activities are far reaching. In recent years, the Basel Committee on Banking Supervision and financial authorities has amended related laws to mandate the risks born by banks to be subject to effective external supervision. The

Basel II Capital Accords proposed in 2005 have made capital regulations better suit the risk elements of the banking industry and enforced banks to strengthen their risk assessment and management abilities. Furthermore, the Basel Committee on Banking Supervision (2006) in its consultative document placed the ownership structure in corporate governance as an essential part of regulatory reforms in financial institutions. Therefore, the influence of internal and external supervision of financial institutions on the risk-taking decisions has become an important issue. However, the effectiveness in doing so has not been tested. Most of the previous research related to ownership and corporate value has focused on the agency issue between managers and shareholders, with emphasis being placed on how operational performance is related to the holdings of directors, supervisors, managers, families, or groups. Literature such as: Demsetz and Lehn (1985); Baysinger and Butler (1985); Morck et al. (1988); Schillenger et al. (1989); McConnell and Servas (1990); Chaganti and Damanpour (1991); Santerre and Neum (1993); Yu and Zhou (1994); Yeh and Qiu (1996) all studied the link between the degree of ownership concentration and operational performance;

*Corresponding author. E-mail: shuling@ntut.edu.tw. Tel: +886-2-2771-2171 ext. 3426. Fax: +886-2-2776-3964.

however, their conclusions were all different. The results of the above-mentioned research could be summarized into the *convergence-of-interest hypothesis* (Jensen and Meckling, 1976), *entrenchment-of-interest hypothesis* (Jensen and Ruback, 1983) and *unrelated-of-interest hypothesis* (Fama, 1980).

Berle and Means (1932) proposed the “ownership dispersion hypothesis”, arguing that the separation of ownership from control in corporations creates an “agency problem” between shareholders and managers. However, Shleifer and Vishny (1986); Morck et al. (1988) indicated that even the ownership of US enterprises which are mature in the market are still concentrated on a few families and wealthy investors. According to Claessens et al. (1999a; b); Fan and Wong (2002), it was confirmed that the family factor could still be found in the ultimate control patterns of publicly listed companies in Taiwan. Members of these families usually get involved in the management of the companies and supervised as board directors. That is, a large percentage of equities are in the hands of a few shareholders. This fact hindered the supervision mechanism from being effective. In order to resolve and reduce the occurrence of agency problems, corporate governance has been vigorously promoted in Taiwan, in the hopes of preventing abuse caused by agency problems with the supervision mechanism. Shleifer and Vishny (1997) defined this mechanism as: “How do investors ensure the return on investments?” Therefore, the Bank for International Settlement (2006) and the governments of various countries consider the financial industry as an industry that needs close supervision. The closing down of a financial institution would affect not only the shareholders or creditors, but also all investors and even the stability of a nation’s financial system and economic development.

Financial institutions in Taiwan show a unique feature of family ownership, taking financial holding companies for example: Cathay United and Taipei Fubon are owned by the Tsai family, Taishin and Shin Kong by the Wu family, Chinatrust by the Gu family and Jih Sun by the Chen family. The motivation of focusing on the financial industry is related to the fact that as financial institutions are more intensely regulated, the characteristic may distort the relationship of family ownership and operational risk. Furthermore, a unique nature of family ownership in Taiwan’s financial institutions is that the relationship with agencies is embedded in past and ongoing parent-child relationships of the family business, and thus is characterized by altruism (Lubatkin et al., 2005). Altruism tends to generate a belief among family members employed by the family businesses that they have a residual claim or an option in the firm’s estate. This claim helps align preferences for the growth strategy and risk-taking between family and businesses. In addition, from the stewardship perspective, it argues that individuals are organizational and collectivistic when it comes to the need of higher-level demands such as self-esteem or self-actualization. This belief could also lead

family managers to operate for the benefit of the firm. Consequently, family ownership in Taiwan’s financial institutions has important features that influence corporate risk-taking. Given the significance of studying risk-taking in financial institutions, although Akhigbe and Martin (2008) presented evidence of the relevance of governing structure to bank risk of US financial services firms, there is no evidence to date on whether family ownership relates to risk-taking in financial institutions, especially for developing countries.

Publicly listed financial institutions in Taiwan, which are a typical family-central environment (Semkow, 1994; Chow et al. 1996), were selected as the subjects for analysis due to the fact that the focus of previous research was on general industries, excluding financial institutions which need close supervision. Furthermore, previous research has rarely explored the relation between ownership structure and operational risk in developing countries. According to the regulations of Basel II, financial institutions’ risk management abilities should be considered first when it comes to financial supervision. Therefore, the results of this study could complement previous research by exploring the relationship between the ownership structure of financial institutions and operational risk, and to further explore whether these influences of the relationship are non-linear in family ownership.

This study contributed to the existing literature in several important ways. The current work examined the nature of the relation between family ownership structure and risk-taking in Taiwan’s financial institutions from an agency theory perspective, to show that family ownership is relevant to the risk-taking of financial institutions. This study also contributed to existing risk-taking literature by covering a sample period of 1996-2007, which was a period of regulation for financial institutions in Taiwan. Thus, along with the family ownership structure, the empirical findings provided evidence as to the effectiveness of regulatory discipline and capital market discipline.

RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

Research on the performance of family businesses is growing, but results are mixed. A theory study on family businesses includes Burkart, et al. (2003). Previous studies have focused on examining the relationship between family ownership and business performance including Anderson and Reeb (2004); Villalonga and Amit (2006); Maury (2006); Westhead and Howorth (2006); Dyer (2006); Miller and Breton- Miller (2006); Van Auken and Werbel (2006); Martínez et al. (2007); Allouche et al. (2008); Sciascia and Mazzola (2008). Most of the literature use agency and stewardship theories to explore associations between ownership and management profiles, performance and objectives of family businesses. These empirical results conclude that publicly traded family-

controlled businesses (FCBs) actually outperform other types of businesses. Only Sciascia and Mazzola (2008) found a negative quadratic relationship between family involvement in management and performance. The literature stated previously mostly center around the relationships between ownership structure, financial crises and operational performance, with less in-depth discussions on the relationship between ownership structure and operational risk.

Evidence focused on examining the relationship between family-controlled ownership and risk has been presented by Naldi et al. (2007); Pathan (2009). Naldi et al. (2007) found that family-controlled businesses take risk to a lesser extent than non-family businesses. Pathan (2009) argued that a strong bank board positively affects bank risk-taking behavior, using a sample of US banks over the 1997-2004 periods. In contrast, CEO power negatively affects bank risk-taking. Wang et al. (2010) found that it is ironical to promotion of the corporate government system in Taiwan that increasing independence director holdings would increase the influence of discretionary accrual on fraud. Nevertheless, prior literatures have not found relevant evidence of family-controlled ownership on bank risk-taking in developing countries.

Galai and Masulis (1976); Jensen and Meckling (1976); John et al. (1991) indicated that due to the moral hazard problem with limited liability in corporations, shareholders have a preference for excessive risk in financial institutions. According to the explanation of Galai and Masulis (1976), shareholders would hold a call option on the corporate value with an exercise price of the total liabilities. If the interest rate is not properly priced to reflect the risk, then the shareholders would have an incentive to gain from this call option by increasing the corporate asset risk. Merton (1977) demonstrated that with a risk-insensitive deposit insurance premium, shareholders enjoy a subsidy that increased in value with corporate leverage and risk. Therefore, Merton (1977) implied that shareholders have even stronger incentives for excessively risky investments at the expense of the deposit insurance fund. Furthermore, Dewatripont and Tirole (1994) proposed that because of the high information asymmetry between shareholders and creditors, the dispersed creditors cannot avoid shareholders from undertaking more risk by initiating complete debt contracts on an ex-ante basis. Pathan (2009) then indicated that in the presence of moral hazard problems, shareholders have incentives for more risk. Thus, strong bank boards are expected to be positively associated with risk-taking.

On the other hand, according to the Berle and Means (1932) separation theory between shareholders and managers, this separation bestows portfolio decisions on managers who may not always act in the best interests of shareholders. Thus, Pathan (2009) proposed that when managers' wealth is mostly concentrated in the firms' that

the managers deal with, they would protect this internally by selecting "excessively safe assets" or by diversification (Smith and Stulz, 1985) at the corporate level (May, 1995). Furthermore, Pathan (2009) indicated that the managers could have different risk-taking incentives if they are compensated through wage and salary contracts rather than through shares and share option programs. Therefore, managers behaved in a risk-averse manner and thus are unlikely to employ the same moral hazard incentives as shareholders. Consequently, Guay (1999) found that shareholders want managers to invest in all positive net-present-value projects, irrespective of their associated risks. May (1995) indicate that risk-averse managers may accept some safe, value-reducing projects, and reject some risky but value-increasing projects? Accordingly, Pathan (2009) concluded that managers have reasons to prefer less risk, that is, risk-averse entrenched managers have incentives to take less risk.

As for the influence of financial institutions' ownership structures on operational risk, because the family factor dominates in the financial institutions in Taiwan, highly-concentrated ownership helps the authorities to make decisions quickly for investment projects with net present value greater than zero. According to the "*convergence-of-interest hypothesis*" proposed by Jensen and Meckling (1976) and "*moral hazard problem*" proposed by Galai and Masulis (1976), Jensen and Meckling (1976) and John et al. (1991), when a large percentage of shareholding is in the hands of managers, most of the losses caused by managers' expense-preference behavior would be borne by the managers. Under this circumstance, managers' behaviors tend to be more cautious and analytical, in order to maximize corporate value. The point is the more concentrated a corporate ownership is, the less its risk-taking would be. Therefore, this study tends to support that proposed by Pathan (2009), which asserted that the degree of ownership concentration might negatively affect risk-taking of financial institutions. When considering the government as the major controlling shareholder, the negative influence of financial institutions' ownership structures on operational risk would be more obvious. Thus, the hypotheses to be tested in this study are as follows:

H₁: Financial institutions with higher ratio of the family ownership and its external shareholding have lesser volatility of stock price during the period of 1996 to 2007, compared to those with less ratio of the family ownership. When the family in control is the government, the influence is still negative.

H₂: Financial institutions with higher ratio of the family ownership and its external shareholding have lesser volatility of assets' market value during the period of 1996 to 2007, compared to those with less ratio of the family ownership. When the family in control is the government,

the influence is still negative.

H₃: Financial institutions with higher ratio of the family ownership and its external shareholding have lesser ratio of controlling leverage during the period of 1996 to 2007, compared to those with less ratio of the family ownership. When the family in control is the government, the influence is still negative.

In order to further explore the non-linear effect between family ownership and risk-taking in financial institutions, this study presented the hypothesis as follows:

H₄: Financial institutions with higher ratio of the family ownership have lesser volatility of stock price during the period of 1996 to 2007, the influence is non-linear. When the family in control is the government, the influence is still negative and non-linear.

H₅: Financial institutions with higher ratio of the family ownership have lesser volatility of assets' market value during the period of 1996 to 2007, the influence is non-linear. When the family in control is the government, the influence is still negative and non-linear.

H₆: Financial institutions with higher ratio of the family ownership have lesser ratio of controlling leverage during the period of 1996 to 2007, the influence is non-linear. When the family in control is the government, the influence is still negative and non-linear.

METHODOLOGY

Empirical models and statistical methods

To test the hypothesis above, the following regression equation is formulated to test empirically the influence of family-controlled ownership on risk-taking of the H₁, H₂ and H₃ hypotheses, given the literature discussion above.

$$VOL = \alpha_0 + \alpha_1 fmytalhd + \alpha_2 managehd + \alpha_3 exnlscohd + \alpha_4 exfudhd + \alpha_5 exlscold + \alpha_6 is_finhold + \alpha_7 is_security + \alpha_8 is_insurance + \alpha_9 govcontrol + \varepsilon \quad (1)$$

Where VOL means risk-taking, which includes the annualized volatility of stock price ($PPSVol$), annualized volatility of assets' market value ($APSVol$), and the ratio of controlling financial leverage (CLR), respectively.

The following regression equation is formulated to test empirically the non-linear relationship between ownership and risk-taking of the H₄, H₅ and H₆ hypotheses, given the literature discussion.

$$VOL = \beta_0 + \beta_1 fmytalhd_{0\% \sim 10\%} + \beta_2 fmytalhd_{10\% \sim 25\%} + \beta_3 fmytalhd_{25\% \sim 50\%} + \beta_4 fmytalhd_{50\% \sim 100\%} + \beta_5 managehd + \beta_6 exnlscohd + \beta_7 exfudhd + \beta_8 exlscold + \beta_9 is_finhold + \beta_{10} is_security + \beta_{11} is_insurance + \beta_{12} govcontrol + \xi \quad (2)$$

The primary estimation method for Equations (1) and (2) is the ordinary least square (OLS) technique of multiple regressions.

Measures of family-controlled ownership

According to the research findings of Claessens et al. (1999a; b) and Fan and Wong (2002), the family factor could be found in the ultimate control patterns of public companies in Taiwan. Thus, this study attempted to use the "family ownership" as the proxy variable for family-controlled ownership. In addition, the hypotheses proposed by Jensen and Meckling (1976), Jensen and Ruback (1983); Fama (1980), all started with managers' benefits. Therefore, besides using the "family ownership" as the proxy for family-controlled ownership, the "managerial shareholding ratio" was used as the proxy variable for ownership structure that was not controlled by the founding families. Finally, by observing the families who controlled financial institutions in Taiwan, it was revealed that they often, for tax planning, evading regulations or other factors, usually used the names of other investment companies, companies registered abroad, or foundations to hold equities. Thus, indirectly they were able to obtain controlling rights or corporate management rights with the support from affiliate companies. Therefore, this study also considered the situation in which a family in control might use the above-mentioned methods to increase their substantial controlling rights. By including indicators such as "external shareholding of non-listed companies", "external shareholding of listed companies", and "external shareholding of foundations", etc. in the analysis, this study attempted to verify whether a family in control would use the names of external affiliates to indirectly increase its control over the corporate operation. The "family ownership" ($fmytalhd$)

is equal to the summation of the family ownership of family members, shareholding ratio of non-listed companies, shareholding ratio of foundations, and shareholding ratio of listed companies.

According to the second rule of "guidelines for the qualification of the percentage of voting shares owned by a single person or party exceeding a certain standard", when owning voting shares of the same financial holding company over 10, 25, 50, and 75%, it should be processed according to the guidelines, with the turning point being set to 10, 25, and 50%. This study argued that a family ownership exceeding 50% implied that the families had enough votes to influence the operational decisions of the company. Therefore, once the percentage exceeded over 50%, regardless if it was over 75% and the company's profits, the families' attitude fit the convergence-of-interest, the entrenchment-of-interest, or the unrelated-of-interest hypothesis. This was the same for the degree of operational risk taken by the companies. Therefore, in this study, the "family ownership" between turning points was defined as:

When the "family ownership" ($fmytalhd_{0\% \sim 10\%}$) of a sample company falls between 0 to 10%, it is equal to the "family ownership"; otherwise it is 0.

Measures of risk-taking behavior

In the aspect of risk-taking, "annualized volatility of stock price" and "annualized volatility of assets' market value" were used as indicators for measuring the degree of risk-taking in this study. Additionally, a "controlling leverage ratio" was proposed, from the concept of financial leverage. It was calculated by dividing the "assets' market value per share" by the "stock price per share". The ratio represents the amount of asset control rights obtained with each dollar a controlling shareholder spends on increasing ownership. Because the main possible loss of a controlling shareholder was only the market value of ownership, the higher the "controlling

leverage ratio”, the more possible a controlling shareholder would make decisions with high risk to increase profits. It also meant that the less protection there was for debts, the greater the risk that creditors would have to take.

(A) Annualized volatility of stock price ($PPSvol$): In this study, “daily stock return” was calculated using the “adjusted closing price” after the ex-dividend date of financial institutions during the period of 1996-2007. Then, the “daily volatility of stock price” was estimated with the population standard deviation of “annualized daily return” of the sample. By referencing the approach by Hull (1999), the estimation of “annualized volatility” was calculated using the root of the value by multiplying “daily volatility rate” with “number of trading days,” as shown below:

$$\sigma_{i,S} = \sqrt{\frac{\sum_{t=1}^n R_{i,t}^2}{n} - \left(\frac{\sum_{t=1}^n R_{i,t}}{n}\right)^2} \times \sqrt{n} \quad (3)$$

$$R_{i,t} = \ln \frac{S_{i,t}}{S_{i,t-1}} \quad (4)$$

where $\sigma_{i,S}$ is the annualized volatility of stock price; n is the number of trading days; $R_{i,t}$ is the stock return on the t day of i company during the period of 1996 to 2007 ($t=1996,1997,\dots,2007$); $S_{i,t}$ is the closing price on the t day of the i company during the period of 1996 to 2007.

(B) Annualized volatility of assets’ market value ($APSvol$): According to the Credit Grades model proposed by Risk Metrics Group (Finger, 2002), the definition is:

$$\sigma_{i,A} = \sigma_{i,S} \times \frac{S_{i,0}}{S_{i,0} + L_i \times D_i} = \sigma_{i,S} \times \frac{S_{i,0}}{V_{i,0}} \quad (5)$$

Where, $\sigma_{i,A}$ is the annualized volatility of the assets’ market value of the company during the period of 1996 to 2007; $S_{i,0}$ is the market price per share of the company during the period of 1996 to 2007; $V_{i,0}$ is the assets’ market value per share of the company during the period of 1996 to 2007. D_i is the liabilities per share of the company during the period of 1996 to 2007; L_i is

the average recovery rate of the company during the period of 1996 to 2007.

(C) Controlling leverage ratio (CLR): it is defined as “assets’ market value per share” divided by “stock price per share”, as shown below:

$$CLR_i = \frac{V_{i,0}}{S_{i,0}} \quad (6)$$

Control variables

When the family in control was the government, the value of “*govcontrol*” was 1, otherwise 0. The rules to define “

is_finhold,” “*is_security*” and “*is_insurance*” are the same.

Sample and data

The subjects of this study were publicly listed and OTC (over-the-counter) companies in the financial industry in Taiwan during the period of 1996 to 2007. Table 1 shows that there were 629 effective sample companies, which included 86 financial holding companies,

261 banks, 173 securities and bills, 74 property-liability insurance companies, and 35 life-insurance companies. Most of the samples were companies in the banking industry (41.49% of total number of samples), followed by the securities and bill industry, with the life-insurance industry being the industry with fewer samples. In this study, the sample cases with incomplete annual data and the sample cases that had not been publicly listed for more than one year were excluded. In addition, the sample cases of financial holding companies and their subsidiaries in the years of their establishments were excluded as well. Variables related to ownership structure were retrieved from the board structures and controlling holdings of the companies listed under the “corporate management” of Taiwan Economic Journal (TEJ) at the end of each year during 1996 to 2007.

Descriptive statistics

Family-controlled ownership

Panel A of Table 2 shows that there were 629 companies for the calculation of the “family ownership”. The mean value was 24.82%, with standard deviation of 20.35% during the period of 1996 to 2007. By observing the samples from each year, it was found that the variation of the average of the “family ownership” for financial institutions was small, with the standard deviations in 2001 and 2002 being higher than other years. Furthermore, Panel B of Table 2 show that the mean of the insurance industry was the highest, followed by the property-liability insurance and securities industry, with the financial holding industry being the industry with the lowest mean of “family ownership”.

Panel A of Table 2 shows that the mean value of the “manager-owned shareholding ratio” was 0.29%, with standard deviation of 0.72% during the period of 1996 to 2007. By observing the samples from each year, it was found that the trend of the mean value was stationary, while the standard deviation had been decreasing year by year. Furthermore, Panel B of Table 2 show that the mean and standard deviation of the “manager-owned shareholding ratio” in the life insurance industry were the highest, followed by the securities industry and property-liability insurance industry, with the financial holding industry having the lowest mean and standard deviation. As for the “external shareholding of non-listed companies”, Panel A of Table 2 show that the mean value was 8.56%, with standard deviation of 10.11% during the period of 1996-2007. By observing the samples from each year, it was found that the trend of the mean value had been stationary from 1996 to 2004. After 2004, the mean had been increasing whereas standard deviation was still stationary. Furthermore, Panel B of Table 2 show that the mean value of the “external shareholding of non-listed companies” in the financial holdings industry was 11.59%, which was the highest. As for the standard deviation, it was significantly lower in the securities industry than other industries, which was

Table 1. The study subjects in the financial industry in Taiwan during 1996 to 2007.

Year	Financial Holding company	Banking industry	Securities and bill finance industry	Property-liability insurance industry	Life insurance industry	Total
1996	0	25	17	4	3	49
1997	0	26	17	5	4	52
1998	0	28	17	5	4	54
1999	0	28	18	6	4	56
2000	0	28	18	9	4	59
2001	3	28	18	9	4	62
2002	13	19	10	8	2	52
2003	14	15	11	6	2	48
2004	14	17	11	6	2	50
2005	14	17	12	6	2	51
2006	14	17	12	5	2	50
2007	14	13	12	5	2	46
Total	86	261	173	74	35	629

6.76%.

Panel A of Table 2 show that the mean value of the “external shareholding of foundations” was 0.92%, with standard deviation of 2.7% during the period of 1996-2007. By observing the samples from each year, it was found that the mean value began to increase after 2004, which was the same for the corresponding standard deviation. Furthermore, Panel B of Table 2 show that the mean value of the “external shareholding of foundations” in the financial holdings industry was 1.82%, which was the highest, followed by the securities industry, with the life insurance industry having the lowest average. As for the standard deviation, it was significantly lower in the life insurance industry than other industries, which was 1.71%. Panel A of Table 2 show that the mean value of the “external shareholding of listed companies” was 3.75%, with standard deviation of 6.08% during the period of 1996 to 2007. By observing the samples from each year, it was noted the mean value and standard deviation had been stationary from 1996 to 2004. After 2004, the mean value began increasing. Furthermore, Panel B of Table 2 show that the mean value of the “external shareholding of listed companies” in the securities industry was 4.45%, which was the highest, followed by the financial holdings industry, with the banking industry having the lowest average. As for the standard deviation, it was significantly higher in the securities industry than other industries, which is 7.78%.

Risk-taking behavior

Panel A of Table 3 show that the mean value of the “annualized volatility of stock price” was 38.32%, with standard deviation of 13.09% during the period of 1996- 2007. By observing the samples from each year, it was found that there were no significant trends for the mean value and the standard deviation. Furthermore, Panel B of Table 3 shows that the mean value of the “annualized volatility of stock price” in the securities industry was the highest, which was around 45.05%. The standard deviation of the financial holding company was 8.38%, which was significantly lower than other industries.

Panel A of Table 3 show that the mean value of the “annualized volatility of assets’ market value” was 14.11%, with standard deviation of 11.85% during the period of 1996 to 2007. By observing the samples from each year, it was found that the mean value had been decreasing since 1997, while there was no significant trend for the

standard deviation. Furthermore, Panel B of Table 3 show that the mean value of the “annualized volatility of assets’ market value” in the securities industry was the highest, which was 25.59%. As for the standard deviation, it was lower in the financial holding industry and the life insurance industry than in other industries, which were 5.65 and 5.88%, respectively. Panel A of Table 3 show that the mean value of the “control leverage ratio” was 6.4819, with standard deviation of 25.157 during the period of 1996-2007. By observing the samples from each year, it was found that there was an inverted V-shape for the mean value and standard deviation during the years except for 2006. Furthermore, Panel B of Table 3 show that the mean and standard deviation of the “control leverage ratio” in the banking industry were the highest, which were 11.81 and 38.42, respectively.

RESULTS

Effects of family-controlled ownership on risk-taking

Table 4 shows the results of regression analyses of the influences of “family-controlled ownership” on “annualized volatility of stock price,” “annualized volatility of assets’ market value,” and “controlling leverage ratio,” respectively. The results from the F-test and the VIF test showed that the three regression models fit well, without collinearity. Panel A of Table 4 show that the estimate coefficients of “family ownership,” “external shareholding of non-listed company,” and “external shareholding of foundation” were -0.094, -0.1498 and - 0.6552, respectively, which were all significantly negative at 1%. That is, higher “family ownership,” “external shareholding of non-listed companies,” and “external shareholding of foundations” lead to lower “annualized volatility of stock price”. The result supported the hypothesis H_1^1 of this study. In addition, the estimate coefficient of “family-controlled government- owned” was -0.0305, which was significantly negative at 5%. This means, when the family

Table 2. Descriptive statistics of family ownership.

Variable	Panel A: Comparison by year						Panel B: Comparison by Industry					
	Year	Obs.	Mean	Std. Dev	Max.	Min	Industry	Obs.	Mean	Std. Dev	Max.	Min
Family-owned shareholding ratios	1996	49	0.2175	0.1787	0.6529	0.0000						
	1997	52	0.2505	0.2090	0.8571	0.0001						
	1998	54	0.2349	0.1831	0.8571	0.0002						
	1999	56	0.2272	0.1619	0.5461	0.0000						
	2000	59	0.2327	0.1731	0.7413	0.0000						
	2001	62	0.3009	0.2841	1.0000	0.0011						
	2002	52	0.2925	0.2833	1.0000	0.0062						
	2003	48	0.2405	0.1800	0.7955	0.0063	F.H.C.	86	0.1897	0.1271	0.6151	0.0011
	2004	50	0.2386	0.1808	0.7884	0.0064	Banking	261	0.2194	0.2099	1.0000	0.0000
	2005	51	0.2394	0.1735	0.7883	0.0064	Securities	173	0.2506	0.1984	1.0000	0.0000
	2006	50	0.2574	0.1974	0.9539	0.0064	Property-Liability	74	0.3444	0.2229	1.0000	0.0062
	2007	46	0.2467	0.1727	0.7838	0.0000	Life Insurance	35	0.4043	0.1470	1.0000	0.1567
	Full	629	0.2482	0.2035	1.0000	0.0000	Full sample	629	0.2482	0.2035	1.0000	0.0000
	Manager-owned shareholding ratios	1996	49	0.0033	0.0105	0.0736	0.0000					
1997		52	0.0037	0.0102	0.0737	0.0000						
1998		54	0.0032	0.0098	0.0716	0.0000						
1999		56	0.0029	0.0097	0.0719	0.0000						
2000		59	0.0024	0.0095	0.0727	0.0000						
2001		62	0.0012	0.0019	0.0105	0.0000						
2002		52	0.0013	0.0020	0.0083	0.0000						
2003		48	0.0035	0.0046	0.0207	0.0000	F.H.C.	86	0.0012	0.0016	0.0084	0.0000
2004		50	0.0036	0.0048	0.0291	0.0000	Banking	261	0.0017	0.0029	0.0208	0.0000
2005		51	0.0040	0.0053	0.0253	0.0000	Securities	173	0.0036	0.0044	0.0291	0.0000
2006		50	0.0034	0.0051	0.0221	0.0000	Property-Liability	74	0.0031	0.0039	0.0139	0.0000
2007		46	0.0028	0.0033	0.0146	0.0000	Life Insurance	35	0.0122	0.0252	0.0737	0.0000
Full		629	0.0029	0.0072	0.0737	0.0000	Full sample	629	0.0029	0.0072	0.0737	0.0000
External shareholding of non-listed company		1996	49	0.0865	0.1165	0.5254	0.0000					
	1997	52	0.0807	0.1088	0.5254	0.0000						
	1998	54	0.0699	0.0862	0.3982	0.0000						
	1999	56	0.0707	0.0871	0.4240	0.0000						
	2000	59	0.0763	0.0925	0.4184	0.0000						
	2001	62	0.0677	0.0871	0.3425	0.0000						
	2002	52	0.0757	0.0885	0.3608	0.0000						

Table 2. Continued.

External shareholding of non-listed company	2003	48	0.0803	0.0910	0.3528	0.0000	F.H.C.	86	0.1159	0.1183	0.3612	0.0000
	2004	50	0.0814	0.0984	0.4373	0.0000	Banking	261	0.0738	0.1109	0.5895	0.0000
	2005	51	0.0990	0.1079	0.3983	0.0000	Securities	173	0.0835	0.0676	0.2845	0.0000
	2006	50	0.1105	0.1138	0.4533	0.0000	Property-Liability	74	0.0885	0.0946	0.3113	0.0000
	2007	46	0.1283	0.1270	0.5895	0.0000	Life Insurance	35	0.0852	0.1178	0.2846	0.0000
	Full	629	0.0856	0.1011	0.5895	0.0000	Full sample	629	0.0856	0.1011	0.5895	0.0000
External shareholding of foundation	1996	49	0.0014	0.0045	0.0205	0.0000						
	1997	52	0.0020	0.0052	0.0182	0.0000						
	1998	54	0.0018	0.0048	0.0238	0.0000						
	1999	56	0.0016	0.0048	0.0227	0.0000						
	2000	59	0.0049	0.0211	0.1518	0.0000						
	2001	62	0.0019	0.0068	0.0429	0.0000						
	2002	52	0.0032	0.0083	0.0441	0.0000						
	2003	48	0.0043	0.0108	0.0518	0.0000	F.H.C.	86	0.0182	0.0269	0.1285	0.0000
	2004	50	0.0094	0.0237	0.1108	0.0000	Banking	261	0.0051	0.0281	0.4001	0.0000
	2005	51	0.0158	0.0266	0.1042	0.0000	Securities	173	0.0104	0.0259	0.1866	0.0000
	2006	50	0.0334	0.0647	0.4001	0.0000	Property-Liability	74	0.0086	0.0272	0.1518	0.0000
2007	46	0.0302	0.0415	0.1866	0.0000	Life Insurance	35	0.0044	0.0171	0.0924	0.0000	
Full	629	0.0092	0.0270	0.4001	0.0000	Full sample	629	0.0092	0.0270	0.4001	0.0000	
External shareholding of listed company	1996	49	0.0378	0.0516	0.2114	0.0000						
	1997	52	0.0293	0.0418	0.1748	0.0000						
	1998	54	0.0326	0.0583	0.3565	0.0000						
	1999	56	0.0264	0.0370	0.1970	0.0000						
	2000	59	0.0305	0.0349	0.1269	0.0000						
	2001	62	0.0324	0.0449	0.2073	0.0000						
	2002	52	0.0291	0.0467	0.2686	0.0000						
	2003	48	0.0363	0.0494	0.2689	0.0000	F.H.C.	86	0.0405	0.0450	0.1868	0.0000
	2004	50	0.0354	0.0571	0.2928	0.0000	Banking	261	0.0304	0.0517	0.2928	0.0000
	2005	51	0.0418	0.0712	0.3343	0.0000	Securities	173	0.0445	0.0778	0.4873	0.0000
	2006	50	0.0545	0.0913	0.4659	0.0000	Property-Liability	74	0.0373	0.0582	0.2689	0.0000
2007	46	0.0635	0.1095	0.4873	0.0000	Life Insurance	35	0.0380	0.0652	0.3565	0.0000	
Full	629	0.0375	0.0608	0.4870	0.0000	Full sample	629	0.0375	0.0608	0.4870	0.0000	

Table 3. Descriptive statistics of risk-taking behavior.

Variable	Panel A: Comparison by Year						Panel B: Comparison by Industry					
	Year	Obs.	Mean	Std. Dev.	Max.	Min	Industry	Obs.	Mean	Std. Dev.	Max.	Min
Annualized volatility of stock price	1996	49	0.3444	0.0983	0.5720	0.1155						
	1997	52	0.4114	0.1308	0.6632	0.2406						
	1998	54	0.3806	0.1098	0.5964	0.2278						
	1999	56	0.4379	0.0805	0.6130	0.2473						
	2000	59	0.5139	0.1029	0.7015	0.1233						
	2001	62	0.4320	0.1825	1.5030	0.0000						
	2002	52	0.4134	0.1120	0.7242	0.2177						
	2003	48	0.3659	0.0865	0.6011	0.1618	F.H.C.	86	0.2908	0.0838	0.5273	0.0000
	2004	50	0.3991	0.0941	0.6657	0.1713	Banking	261	0.3898	0.1299	1.5030	0.1155
	2005	51	0.2521	0.0785	0.5079	0.0897	Securities	173	0.4505	0.1308	0.7015	0.0897
	2006	50	0.2929	0.1048	0.5974	0.1229	Property-Liability	74	0.3330	0.1076	0.7443	0.1087
	2007	46	0.3553	0.1239	0.7443	0.1893	Life Insurance	35	0.3989	0.0903	0.5904	0.1697
	Full	629	0.3832	0.1309	1.5030	0.0000	Full sample	629	0.3832	0.1309	1.5030	0.0000
	Annualized volatility of assets' market value	1996	49	0.1853	0.0865	0.4293	0.0354					
1997		52	0.2197	0.1411	0.4758	0.0570						
1998		54	0.1600	0.1230	0.3859	0.0232						
1999		56	0.1603	0.1177	0.4498	0.0211						
2000		59	0.1723	0.1475	0.5841	0.0151						
2001		62	0.1514	0.1352	0.5195	0.0000						
2002		52	0.1188	0.1001	0.4981	0.0153						
2003		48	0.1147	0.0932	0.4764	0.0218	F.H.C.	86	0.0703	0.0565	0.3025	0.0000
2004		50	0.1362	0.1120	0.4790	0.0112	Banking	261	0.0779	0.0912	0.5841	0.0025
2005		51	0.0753	0.0710	0.3408	0.0105	Securities	173	0.2559	0.0988	0.4790	0.0129
2006		50	0.0788	0.0634	0.2825	0.0040	Property-Liability	74	0.2036	0.0833	0.3928	0.0449
2007		46	0.1205	0.1059	0.3796	0.0135	Life Insurance	35	0.1078	0.0588	0.2397	0.0292
Full		629	0.1411	0.1185	0.5841	0.0000	Full sample	629	0.1411	0.1185	0.5841	0.0000
Annualized volatility of stock price		1996	49	2.1331	0.7666	3.4049	1.0028					
	1997	52	2.5708	1.2767	4.8538	1.0101						
	1998	54	4.3024	2.8709	11.6937	1.0107						
	1999	56	5.3374	4.4914	18.2131	1.0182						
	2000	59	7.7320	8.3301	42.6171	1.0253						
	2001	62	0.4320	0.1825	1.5030	0.0000						
	2002	52	0.4134	0.1120	0.7242	0.2177						

Table 3. Contd.

	2003	48	0.3659	0.0865	0.6011	0.1618	F.H.C.	86	0.2908	0.0838	0.5273	0.0000
	2004	50	0.3991	0.0941	0.6657	0.1713	Banking	261	0.3898	0.1299	1.5030	0.1155
	2005	51	0.2521	0.0785	0.5079	0.0897	Securities	173	0.4505	0.1308	0.7015	0.0897
	2006	50	0.2929	0.1048	0.5974	0.1229	Property-Liability	74	0.3330	0.1076	0.7443	0.1087
	2007	46	0.3553	0.1239	0.7443	0.1893	Life Insurance	35	0.3989	0.0903	0.5904	0.1697
	Full	629	0.3832	0.1309	1.5030	0.0000	Full sample	629	0.3832	0.1309	1.5030	0.0000
	1996	49	2.1331	0.7666	3.4049	1.0028						
	1997	52	2.5708	1.2767	4.8538	1.0101						
	1998	54	4.3024	2.8709	11.6937	1.0107						
	1999	56	5.3374	4.4914	18.2131	1.0182						
	2000	59	7.7320	8.3301	42.6171	1.0253						
	2001	62	16.5330	76.1993	604.0393	1.0375						
Controlling leverage ratio	2002	52	7.2752	8.4091	47.3681	1.2364						
	2003	48	5.9280	5.4713	23.8944	1.1415	F.H.C.	86	5.4408	2.5469	14.2432	1.2822
	2004	50	5.1360	3.9245	20.5431	1.3564	Banking	261	11.8107	38.4198	604.0393	1.0028
	2005	51	6.4889	5.0973	21.1086	1.1844	Securities	173	1.9869	0.9407	7.8713	1.0208
	2006	50	8.7866	20.7081	148.8338	1.4303	Property-Liability	74	1.7814	0.5340	3.3128	1.1103
	2007	46	5.5590	3.8521	15.7029	1.2913	Life Insurance	35	4.8643	2.6281	11.9347	1.6086
	Full	629	6.4819	25.1570	604.0393	1.0028	Full sample	629	6.4819	25.1570	604.0393	1.0028

Table 4. Effects of family ownership on risk-taking

$$VOL = \alpha_0 + \alpha_1 fmytalhd + \alpha_2 managehd + \alpha_3 exnlscohd + \alpha_4 exfudhd + \alpha_5 exlscold + \alpha_6 is_finhold + \alpha_7 is_security + \alpha_8 is_insurance + \alpha_9 govcontrol + \varepsilon \quad (1)$$

	0.1155	0.0897	0.1087	0.1697	0.0000	1.0028	1.0101	1.0107	1.0182	1.0253	1.0375	1.2364	1.1415	1.3564	1.1844	1.4303	1.2913	1.0028
	0.1155	0.0897	0.1087	0.1697	0.0000	1.0028	1.0101	1.0107	1.0182	1.0253	1.0375	1.2364	1.1415	1.3564	1.1844	1.4303	1.2913	1.0028

fmytalhd

! " # " # " *managehd*

\$ % # " & # ' *exnlscohd*

\$ % # " & & (# *exfudhd*

Table 4. Cont'd

\$ % # " & # ' *exlscohd*
 '# & ' # " ' *is_finhold*
 '# (# (*is_security*
 '# (# (*is_insurance*
 '# ") # *govcontrol*

*** Significance at 1%; ** Significance at 5%; * Significance at 10%.

in control was the government, the “annualized volatility of stock price” would be lowered by 3.05%. Finally, the estimate coefficients of “family-controlled financial holding company” and “family-controlled securities industry” were -0.0865 and 0.0677, respectively, which were both significant at 1%. This means, when the sample company was in a financial holding company, its “annualized volatility of stock price” would be on average 8.65% lower than in the banking industry, while if in the securities industry, its “annualized volatility of stock price” would be on average 6.77% higher than in the banking industry.

Panel B of Table 4 show the results of regression analysis of the influence of “family-controlled ownership” on “annualized volatility of assets’ market value”. The estimate coefficients of “family ownership,” “manager-owned shareholding ratio,” “external shareholding of foundations”, and “external shareholding of listed companies” were -0.0512, -1.2832, -0.4876, and -0.1142, which were significantly negative at 1, 5, 1, and 10%, respectively. This means that higher “family ownership,” “manager-owned shareholding ratio,” “external shareholding of foundations,” and “external shareholding of listed companies” lead to lower “annualized volatility of assets’ market value”. The results supported the hypothesis H_2 of this study.

this study. In addition, estimate coefficients of “family-controlled securities industries” and “family-controlled insurance industries” were 0.1867 and 0.1097, respectively, which were both significantly positive at 1%. This means, when the sample company was in the securities or insurance industry, its “annualized volatility of assets’ market value” would be on average 18.67% and 10.97% higher than in the banking industry, respectively.

Finally, Panel C of Table 4 shows the results of regression analysis of the influence of “family-controlled ownership” on “controlling leverage ratio”. The estimate coefficients of “family-controlled financial holding companies,” “family-controlled securities industries,” and “family-controlled insurance industries” were -5.9412, -9.38 and -7.5081, which were significantly negative at 10, 1, and 5%, respectively. The results implied that when the sample company was a financial company, securities industry, or insurance industry, the “controlling leverage ratio” would be lower.

The non-linear relationship between family-controlled ownership and risk-taking

Table 5 shows the non-linear relationship between

“family-controlled ownership” and “annualized volatility of stock price,” “annualized volatility of assets’ market value” and “controlling leverage ratio”. The results from the F-test and the VIF test indicated that the three regression models fit well, without collinearity. Panel A of Table 5 show that the estimate coefficients of “family ownership” in the ranges of 0 to 10% and 50 to 100% were 0.4723 and -0.0683, which were significant at 10 and 5%, respectively. The influence was positive when the “family ownership” fell in the range of 0 to 10%, and was negative in the range of 50 to 100%. This means, the influence reached the highest when the “family ownership” was less than 10%. When it exceeded 50%, the influence turned negative. This study inferred that when the “family ownership” was over 50%, if its shareholding was increased, the number of transactions in the stock market would be less. Therefore, the stock price would be more stable and the “annualized volatility of stock price” would be lower. As for the results of the turning points, they still supported the hypothesis H_4 of this study. In other words, there existed a non-linear relationship between “family ownership” and “annualized volatility of stock price”.

Panel B of Table 5 shows the non-linear relationship between “family-controlled ownership” and “annualized volatility of assets’ market value”.

Table 5. Non-linear relationship between family ownership and risk-taking

$$VOL = \beta_0 + \beta_1 fmytalhd_{0\% \sim 10\%} + \beta_2 fmytalhd_{10\% \sim 25\%} + \beta_3 fmytalhd_{25\% \sim 50\%} + \beta_4 fmytalhd_{50\% \sim 100\%} + \beta_5 managehd + \beta_6 exnlscohd + \beta_7 exfudhd + \beta_8 exlscold + \beta_9 is_finhold + \beta_{10} is_security + \beta_{11} is_insurance + \beta_{12} govcontrol + \xi \quad (2).$$

	1	2	3	4	5	6	7	8	9	10	11	12
β_0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_1	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146	-0.146
β_2	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998	-0.0998
β_3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_{10}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_{11}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
β_{12}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ξ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

The estimate coefficients of “family ownership” in the ranges of 10 to 25% and 25 to 50% were - 0.146 and - 0.0998, which were significantly negative at 5 and 1%, respectively. There were turning points when the “family ownership” was equal to 10 and 25%. This means, when the “family ownership” was less than 25% or higher than 50%, an increase or decrease would not influence the “annualized volatility of assets’ market value”. When it was in the range of 10 to 25%, the negative influence reached the highest.

After it exceeded 25%, the influence became lower. This supported the hypothesis H₅ of this study. In other words, there existed a non-linear relationship between the “family ownership” and the “annualized volatility of assets’ market value”. Panel C of Table 5 shows that, regardless of the range of the “family ownership”, there was no significant influence on the “controlling leverage ratio”. Therefore, there was no evidence to support the hypothesis that there was a non-linear relationship between “family ownership” and

“controlling leverage ratio”. From the analysis results above, it was found that the influences of the “family ownership” on “annualized volatility of stock price” and the “annualized volatility of assets’ market value” were significant and negative. That is, when the ownership was more concentrated, the “annualized volatility of stock price” and the “annualized volatility of assets’ market value” were lower. The results supported the “convergence-of-interest hypotheses” of this study. That is, the correlation between the degree of

concentration of ownership and the risk-taking of financial institutions was negative. The influences of “external shareholding of non-listed companies” and “external ownership of foundations” on “annualized volatility of stock price” were significant and negative. In addition, the influences of “managerial-owned shareholding ratios”, “external ownership of foundations” and “external shareholding of listed companies” on “annualized volatility of assets’ market value” were also significant and negative. The results indicated that a family in control might indeed use the names of managerial-owned, external non-listed companies, foundations and listed companies to enhance its control over corporate management to achieve the objective of reducing business risk.

Finally, the results suggested that there was a non-linear relationship between ownership structure and risk-taking. When the “family ownership” fell in different ranges, its influences on the “annualized volatility of stock price” and the “annualized volatility of assets’ market value” would be different. Turning points did exist. This supported the hypothesis that the correlation between the degree of concentration of ownership and the risk-taking of financial institutions was negative.

Conclusions

This study contributed to the existing literature in several important ways. The current work examined the nature of the relation between family-controlled ownership and risk-taking in Taiwan’s financial institutions from an agency theory perspective, to show that family ownership is relevant to risk-taking in financial institutions in a way consistent with the financial contracting environment. This study also contributed to existing risk-taking literature by covering a sample period of 1996 to 2007, considered to be a period of regulation for financial institutions in Taiwan. The results showed that the influences of the “family ownership” on “annualized volatility of stock price” and “annualized volatility of assets’ market value” are significant and negative and that these influences are non-linear. It was accepted that under the circumstance of controlling shareholders trying to protect their own interests, low-risk management decisions are preferred. On the other hand, the results showed that the influences of “external shareholding of non-listed companies” and “external shareholding of foundations” on the “annualized volatility of stock price” are significantly negative. Similarly, “manager-owned shareholding ratios,” “external shareholding of foundations,” and “external shareholding of listed companies” on the “annualized volatility of assets’ market value” are significant and negative. That is, the more ownership is concentrated in the controlling family, managers, and external controlling shareholders, the lower the risk-taking of that financial institution. It was suggested that investors and creditors may take the family-controlled ownership as a reference when choosing financial institutions. Furthermore, the “family

ownership” may also be used as a supervisory indicator for the authorities.

As for the correlation between “family-controlled financial holding companies,” “family-controlled securities industries,” “family-controlled insurance industries” and “controlling leverage ratios” are significant and negative. The result showed that when financial holding companies, securities and insurance industry are the major controlling shareholders, the increase of its shareholding percentage is expected to have a negative influence on the “controlling leverage ratio”. One inference was that when the major shareholder of a financial institution is a financial holding company, securities or insurance industry, its scale is generally greater than those whose major shareholder is not the government; thus, its risk-taking is lower as well. On the other hand, the correlation between “family-controlled securities industries,” “family-controlled insurance industries” and “annualized volatility of assets’ market value” were significant and positive at 1%. The result showed that when the securities and insurance industry are the major controlling shareholders, the increase of its shareholding percentage is expected to have a positive influence on the “annualized volatility of assets’ market value”. Additionally, the correlation between “family-controlled securities industries” and “annualized volatility of stock price” is significant and positive at 1%. The result showed that when the securities industry is the major controlling shareholder, the increase of its shareholding percentage is expected to have a positive influence on the “annualized volatility of stock price”. On the contrary, the correlation between “family-controlled financial holding companies” and the “annualized volatility of stock price” is significant and negative at 1%. The result showed that when financial holding companies are the major controlling shareholders, the increase of its shareholding percentage is expected to have a negative influence on the “annualized volatility of stock price”.

Finally, the results in this study also showed that non-linear relationships exist between the “family ownership”, “annualized volatility of stock price” and the “annualized volatility of assets’ market value”. This was consistent with the findings by Morck et al. (1988); Santerre and Neum (1993). Moreover, these results were consistent with the “convergence-of-interest hypothesis” and robust for several proxies for risk-taking in Taiwan’s financial industry, which provided insights as to the effectiveness of regulatory discipline and capital market discipline of family businesses, as well as facilitating better legislative monitoring of financial activities in risk-taking.

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