行政院國家科學委員會專題研究計畫 成果報告

保險公司管理策略對再保險、經營績效與風險承擔行為之影響分析(第 3 年)
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中文摘要：　保險業之經營具有高度的社會性，其經營管理之安全性也是眾所關切的議題，因此對於保險業經營風險決策行為的研究，一直都是個十分重要的議題，再加上我國保險法對董監事及經理人課以無限清償責任，這樣特有的高度監理法規，提供了保險研究文獻上檢視公司治理結構與保險公司風險決策行為關係之特殊研究環境。本研究以代理理論與公司治理相關文獻為基礎，探討保險業之代理問題，及其對保險業經營業務上風險決策行為的影響。本研究蒐集我國人壽保險與產物保險公司 2000 年至 2002 年的公司治理結構變數，採用迴歸模型分析公司治理對保險公司整體營運、業務與投資等風險決策行為之影響。實證結果發現，保險公司股東投票權偏離現金流量權的幅度以及股權集中度對於保險業風險決策行為有正向影響；而現金流量請求權、董事會規模、獨立董事、總經理兼任董事長等變數，對於風險決策行為有負向影響。另外，內部經理人持股率與投資風險決策行為呈現倒 U 型關係。

英文摘要：　This paper investigates the impacts of corporate governance structures on risk-taking behavior in the insurance industry. The corporate governance structure of the insurance industry in Taiwan, which holds board members fully responsible for cases of bankruptcy, offers an interesting environment in which to explore its unique regulatory impact on insurers' risk-taking behavior. Evidence shows that even under sticker regulatory rules, corporate governance still plays an important role in influencing risk taking by both property-liability and life insurers in Taiwan. Specifically, deviations of voting rights from cash-flow rights and ownership concentration have positive impacts on risk taking, whereas cash-flow rights, board size, board independence, and CEO duality have negative impacts on insurers' risk taking. The relationship between risk taking and insider ownership is inversely U-shaped.

行政院國家科學委員會補助專題研究計畫 □ 成 果 報 告 □期中進度報告

（計畫名稱）

保險公司管理策略對再保險、經營績效與風險承擔行為之影響分析

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第一年計畫：The Analysis of Changes in the Demand for Reinsurance of Converting Insurance Company
第二年計畫：The Impact of Corporate Governance Reform on the Efficiency Performance of Property-liability Insurance Industry
第三年計畫：The Impacts of Corporate Governance Structures on Risk Taking of Insurance Companies

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本成果報告包括以下應繳交之附件：
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第一年計畫：The Analysis of Changes in the Demand for Reinsurance of Converting Insurance Company

I. 中文摘要

本研究蒐集美國產險公司之實證資料探討相互保險公司在改變成股票型態後，也就是進行非相互化 (demutualization) 後，是否會改變其再保險需求。就保險公司而言，透過再保險的安排轉嫁風險是最直接，也是最方便的方法，而再保險需求一直也是保險研究文獻中的重要問題。過去文獻對於相互保險公司與股票保險公司在再保險需求上的異同與比較已有許多討論，但是針對相互保險公司在改變成股票型態後是否會改變其再保險需求之議題，文獻中則未有任何探討。本研究蒐集美國產險公司之實證資料，探討進行非相互化之產險公司在再保險需求上之變化，我們分析進行非相互化之產險公司在改變成股票型態之前與之後，其再保險需求是否有顯著的改變狀況，並進一步利用迴歸分析方法檢證哪一類型的非相互化產險公司較容易改變其再保險需求。研究發現整體而言，非相互化之產險公司在改變成股票型態之後其再保險需求並沒有顯著的改變。但是，我們也發現非相互化之產險公司在改變成股票型態之前增加對其他非關係企業再保險公司的保險需求，但在改變成股票型態之後，卻降低對其他非關係企業再保險公司的保險需求。

關鍵詞：再保險策略，非相互化，產險公司

I. Abstract

This study investigates whether U.S. property-liability insurers change their demand for reinsurance after demutualization. Our empirical results show that the overall demand for reinsurance of converting insurers is not statistically different after the conversion. Furthermore, we find that converting insurers decrease the demand for reinsurance from non-affiliated reinsurers, but increase the demand for reinsurance from affiliated reinsurers after the conversion. One possible explanation is that converting insurers may treat reinsurance to affiliated reinsurers as risk retention rather than risk transfer so that they can reduce reinsurance cost. One other interesting finding is that converting insurers increase demand for reinsurance from non-affiliated reinsurers before conversion.

Key Words: reinsurance, demutualization, property-liability insurers.

II. Introduction

To protect against non-diversifiable risks, insurers traditionally have used the reinsurance market as a hedge. The ceding insurer can reduce its cash flow volatility and mitigate its financial pressure by transferring risk to reinsurance companies. Thus, purchasing reinsurance represents an important mechanism insurers use to limit their risk. In addition, such purchases shift some portion of the insurer's risk to reinsurers and reduce the probability and expected cost of potential bankruptcy. As a result, reinsurance contracts can be viewed as indispensable and effective risk management tools that insurers employ to confront unexpected losses (Mayers and Smith, 1990; Garven and Lamm-Tennant, 2003).

Prior studies have modeled the demand for reinsurance by considering motives such as investment incentives, probability of bankruptcy, tax effects, and the availability of real services (Mayers and Smith, 1990; Garven and Lamm-Tennant, 2003; Cole and McCullough, 2006). They also find empirical evidence that the size, profitability, geographic concentration, and line of business concentration reduce the demand for reinsurance, whereas tax-favored characteristics, direct business written, and under loss reserve increase demand for it.

Mayers and Smith (1990) suggest that the organizational form of the insurers could influence their risk-taking behavior and alter the demand for reinsurance. Their empirical results show that stock insurers purchase less reinsurance than do mutual insurers. However, several subsequent empirical papers, such as Garven and Lamm-Tennant (2003) and Cole and McCullough (2006), use different data and/or an alternative methodology to reexamine this issue and find evidence that leads them to conclude that stock insurers demand less reinsurance than do the mutuals. In other words, the empirical evidence is mixed. The purpose of this paper is to provide additional evidence and sheds light on this issue by using time-series data and new methodology.

Most previous research has investigated whether stock insurers demand less reinsurance than mutual insurers by using cross-sectional data. In this paper, we reexamine this issue with a specific sample of demutualization insurers. Our approach may be better because we examine the demand for reinsurance for the same insurers before and after the conversions rather than different insurers (stock insurers versus mutual insurers). Using the same insurers has the advantages of observing the changes in demand for reinsurance before and after the conversions. In addition, most of the prior studies use reinsurance ratios to measure the demand for reinsurance. As suggested by Powell and Sommer (2007), reinsurance ratio may be biased because it double counts direct and retroceded premiums in inter-company pooling arrangement. To avoid this problem, we separate the effect of reinsurance transfer of affiliated reinsurers from non-affiliated reinsurers. Finally, we conduct a two-stage selection regression model. In the first stage we examine whether or not insurer demutualized, and in the second stage we investigate the changes in reinsurance demand during the sample period. The two-stage selection regression model is used to control for the joint endogeneity problem which may be caused in the selection issue.

In this paper, we use recent property-liability insurance conversions during 1990–2004 as our sample. We find that converting insurers decrease their demand for reinsurance from

non-affiliated reinsurers, but increase their demand for reinsurance from affiliated reinsurers. Thus, the overall demand for reinsurance after the conversions is not statistically different. In other words, we are not able to reject the hypothesis that, all else being equal, demutualized insurers reduce their overall demand for reinsurance after conversion. We also find the demand for reinsurance from non-affiliated reinsurers is higher before the conversion. The results are robust when we exclude converting insurers whose purposes of converting are related to mergers and acquisitions (M&A) from our sample.

II. Data and Methodology

1. Research Hypothesis

In this paper, we extend the line of research regarding demand for reinsurance by using a sample of demutualization insurers. Why do mutual insurers undergo the organizational structure change? A number of previous studies have proposed some solid explanations, such as financial distress and risk diversification, efficiency argument, agency cost consideration, and constraints on financial market (Fitzgerald, 1973; McNamara and Rhee, 1992; Jeng, Lai, and McNamara, 2007; Viswanthan and Cummins, 2003; Viswanathan, 2006). Viswanathan and Cummins (2003) find that the property-liability mutuals with lower surplus-to-asset ratios are more likely to demutualize and that converting life-health mutuals tend to hold a significantly lower proportion of liquid assets. In addition, mutual insurers may take advantages from converting process by considering accounting effects. Mayers and Smith (2004) indicate that converting firms manage accounting information primarily by adjusting liabilities and selectively establishing investment losses. Other factors (such as line of business Herfindahl index, operating ratio, and long tail lines) may also affect the conversion decision, but do not yield the conclusive empirical results.

As mentioned above, Mayers and Smith (1990) suggest that a mutual firm likely has greater difficulty accessing sources of new capital in the event of a large loss and therefore purchases more reinsurance. Thus, we expect that demutualized insurers will decrease their demand for reinsurance after they convert into stock insurers and define the main research hypothesis as follows:

Hypothesis: All else being equal, converting insurers reduce their demand for reinsurance after conversion.

2. Data and Variables Description

Our data set initially consisted of all property-liability insurers for the period from 2000 to 2007. There were initially 24,161 data points (number of firms times years of data available, "firm-years"). We focus on publicly-traded, pure-play, insurers because the Sarbanes-Oxley Act applies only to publicly-traded companies. These companies have more complete corporate governance data available than companies that are not publicly-traded. Given the statistical technique employed, we excluded firms that reported negative output and input variables (7,368 firm-year observations) and firms with fewer than 8 years of complete data available (5,402 firm-year observations). These restrictions result in a final sample 28 publicly-traded firms with

224 firm-year observations.1 These companies have complete data available in the National Association of Insurance Commissioners (NAIC) database over the eight-year period. We obtained corporate governance data from Form DEF 14A (Definitive Proxy Solicitation Material) which these insurers filed with the Security and Exchange Commission (SEC).

3. Methodology

The prior academic literatures used many performance measurements, such as ROA and Tobin' Q. A growing body of recent researches advances in the measurement of efficiency has been made using econometric (parametric) approach, and the mathematical programming (non-parametric) approach (Cummins and Weiss 2000). Such measure dominates traditional techniques in terms of developing meaningful and reliable measures of firm performance.

Firm characteristics that are likely to be important include organizational form, distribution systems, corporate governance, and vertical integration. Frontier methodologies have been used to analyze a wide range of such hypotheses (Cummins and Weiss, 2000). Following many literatures of performance in insurance industry, we use non-parametric mathematical linear programming approach, such as data envelopment analysis (DEA) to measure corporate performance (Cummins et al., 1999; Cummins and Weiss, 2000; Hardwick et al., 2003; Jeng and Lai, 2005) and examine the relation between performance and corporate governance. DEA estimates efficiency in firms with multiple inputs and outputs; moreover, it is less demanding than parametric approaches in terms of the degrees of freedom, the form of the production function and it avoids the problem of vulnerability to specification errors frequently encountered when using the econometric approach (Cummins and Weiss, 2000; Diacon et al., 2002; Hardwick et al., 2003).

Data Envelopment Analysis

To save space, we do not discuss the methodology of the data envelopment approach and the cross-frontier method in details. Cummins and Weiss (2000) provide a detailed review of the DEA approach. To estimate the relative efficiency for the nonspecialists and specialists, we adopt the cross-frontier analysis used by Cummins, Weiss, and Zi (1999). DEA requires multiple inputs and outputs to estimate efficiency. Three of the approaches among others to measure outputs in the financial services sector are the value-added approach, the asset or financial intermediary approach, and the user-cost approach. The approach applied in the study is value-added approach. We identify the input/output measures according to Cummins and Weiss (1993), Berger, Cummins, and Weiss (1997), Cummins, Weiss and Zi (1999), and Jeng and Lai (2005).

Outputs

The output variables include the loss amounts for different product lines and total invested assets. Cummins and Weiss (1993) suggest that insurers provide consumers with services associated with insured losses, risk-pooling, and risk-bearing. Following Cummins and Weiss (1993), Cummins, Weiss and Zi (1999), and Cummins et al. (2004), we use loss incurred for different product lines as proxies for outputs. We further separate the losses into four categories: losses incurred in short-tail personal lines (y1), losses incurred in long-tail personal lines (y2),

[1] Please see Table 1 for details.

losses incurred in short-tail commercial lines (y3) and losses incurred in long-tail commercial lines (y4). Based on Berger, Cummins, and Weiss (1997), we also include invested assets (y5) as an output variable. All output numbers are deflated to the base year 1997 with the Consumer Price Index (CPI).

Inputs

The inputs used in measuring the efficiency performance include labor (x1), business service (x2), equity (x3), and debt capital (x4). Labor input is the labor cost divided by average weekly employee wages. We measure the price of labor (p1) as average weekly wages for insurance agent (Standard Industrial Classification (SIC) Class 6411) using U.S. Department of Labor data. The second input, business services, consists of agent commissions and loss adjustment expenses. Both the business service and price of labor are deflated to the base year 1997. The price of business services (p2) is the average weekly earnings of workers in SIC 7300. The third input is the equity. We use policyholder surplus as the proxy for the equity. To avoid the problem of improper estimates, we do not take the ratio of an insurer's net income to capital (ROE) as the price of policyholder because insurers with poor performance are more likely to have negative net incomes and price cannot be negative. Consequently, we utilize the debt-equity ratio of the insurer as the price of equity (p3). Following Cummins, Weiss and Zi (1999), and Cummins et al. (2004), we consider debt capital as an input variable and use insurance reserves as the proxy for debt. The price of debt (p4) is ratio of the difference between total investment income and investment income attributed to equity capital to debt capital.

3.2 Regression Analysis

To analyze further how corporate governance structure influences the performance of insurance companies, we conduct a regression analysis with efficiency performance as dependent variables and firm characteristics as the independent variables. We adopt three DEA efficiency measures to represent the efficiency performance of insurers—that is, technical efficiency (TE), allocative efficiency (AE), and cost efficiency (CE)—as well as return on assets (ROA) to serve as a proxy of financial performance. To test our hypothesis regarding the influence of corporate governance, we include the tenure of the director (Tenure) and shares held by block shareholders (Block), the proportion of compensation committee members on the board (Compen), proportion of executive directors on the board (Officer), average number of directorships that directors serve concurrently (Dirapp), the average number of appointments that directors serve concurrently (Other) variables in the regressions. In addition, previous research has repeatedly shown that company size has an impact on corporate performance (e.g., Chen 2001; O'Sullivan and Diacon, 2003; Hardwick et al., 2003). Therefore, we incorporate firm size as control variable in the regression. Size is measured by the natural logarithm of the total assets of firms. We construct a regression model as follows:

$$ES_{it} = \alpha + \beta_1 Tenure_{it} + \beta_2 Block_{it} + \beta_3 Compen_{it} + \beta_4 Officer_{it} + \beta_5 Dirapp_{it} + \beta_6 Other_{it} + \beta_7 Size_{it} + \varepsilon_{it}$$

III. Research Results and Conclusion

This study investigates whether converting property-liability insurers change their demand for reinsurance after conversion. Our regression results cannot reject the hypothesis that converting insurers reduce their demand for reinsurance after conversion. When we categorize the reinsurance purchase decision into two sources: from non-affiliated reinsurers and from affiliated reinsurers. We find that converting insurers decrease the demand for reinsurance from the non-affiliated reinsurers, but increase the demand for reinsurance from affiliated reinsurers after conversion. The result is robust when the sample consists of only non-M&A insurers. A possible explanation is converting insurers try to reduce total reinsurance costs through the purchase of reinsurance from affiliated reinsurers.

Consistent with the findings of Viswanathan and Cummins (2003), we also find that converting insurers use more reinsurance from non-affiliated reinsurers than their mutual counterparts before their conversion. This result is in contrast to the result of the demand for reinsurance after conversion. Our conjecture is that converting insurers use more reinsurance from non-affiliated reinsurers to improve their financial statements such that the conversion can be approved by policyholders and regulator before their conversion.

Other major findings are summarized below. First, the evidence implies that converting insurers with higher profits decrease overall reinsurance after conversions. Second, we find that converting insurers with higher leverage would increase demand for reinsurance from non-affiliated reinsurers but decrease from affiliated reinsurers after conversions. One possible explanation is that converting insurers try to protect themselves from bankruptcy. Finally, the evidence shows that firm size is negatively related to the demand for reinsurance.

第二年計畫：The Impact of Corporate Governance Reform on the Efficiency Performance of Property-liability Insurance Industry

I. 中文摘要

公司治理的結構與其組成要素是否影響保險公司之經營績效,一直是保險研究文獻中的重要問題，雖然過去文獻有許多討論，但是實證結果較多以製造業為主，尤其針對保險公司之公司治理的結構與其組成要素是否影響保險公司之經營績效，文獻中卻沒有一致的答案，因此本研究探討透過良好的公司治理是否真能提升保險公司之經營績效。美國最近實施 Sarbanes-Oxley Act 要求公司強化公司治理制度，本研究蒐集美國產險公司 2000 到 2007 年的實證資料，希望檢驗 Sarbanes-Oxley Act 是否真能有效改善公司治理並進一步提升美國保險公司效率。本研究利用資料包絡分析法 (data envelopment analysis)以及公司治理相關變數，檢證 Sarbanes-Oxley Act 前後產險公司之經營績效是否有明顯差異，以及透過良好的公司治理是否真能提升產險公司之經營績效。研究結果發現美國產險公司之公司治理的結構與其組成要素的確顯著影響到保險公司之經營績效，而且在 Sarbanes-Oxley Act 頒訂之後，美國產險公司已實際執行相關公司治理要求，並增聘更多獨立審計與董事人員，但整體而言，卻並未發現在 Sarbanes-Oxley Act 之後美國產險公司之經營績效有明顯的提升。

關鍵詞 ：公司治理，風險承擔行為，資料包絡分析法，Sarbanes-Oxley 法案，產險公司

I. Abstract

This study examines the relation between corporate governance and the performance of the U.S. property-liability insurance industry during the period from 2000 to 2007. We find a significant relation between performance and corporate governance (board size, proportion of independent directors on the audit committee, proportion of financial experts on the audit committee, director tenure, proportion of block shareholding, average number of directorships, proportion of insiders on the board, and auditor independence). We also find property-liability insurers have complied with the Sarbanes-Oxley Act to a large extent. While SOX achieved the goal of more auditor independence and might have prevented Enron-like scandals, it had some unexpected effects. For example, insurers became less efficient when they had more independent auditors because the insurers were unable to recoup the benefits of auditor independence.

Key Words: corporate governance, efficiency, data envelopment analysis, Sarbanes-Oxley Act, property-liability insurers.

II. Introduction

The role and quality of corporate governance mechanisms is the subject of current debate in the United States. The impetus for much of this interest was a series of unexpected accounting scandals (e.g. Enron and WorldCom) that highlighted the apparent weaknesses in the system of governance and accountability. The principal response to these concerns was passage of the Sarbanes-Oxley Act (SOX) in 2002. This law imposes a number of corporate governance, auditor independence, financial disclosure, and other rules on all publicly-traded companies in the United States. Passage of SOX provides additional motivation for insurers to address corporate governance issues.

The past decade has also witnessed increased interest in the quality of corporate governance in academic research. Many empirical studies examine the effect of corporate governance on the performance of industrial firms (e.g., Prowse, 1998; Rajan and Zingales, 1998; Vafeas and Theodorou, 1998, and Core et al., 1999). While much public and academic interest has been directed at non-financial service industries, little attention has been paid to the insurance industry with few exceptions. The issue of the role of board structure for property-liability insurers is important, because they face a different set of agency costs and more intense regulatory scrutiny than do the boards of non-financial firms. Prior studies use profitability measures (e.g., return on equity) or Tobin's Q as proxies for performance, but they have not examined the relation between corporate governance and performance in the U.S. property-liability insurance industry. Performance in this study is measured by efficiency scores estimated using data envelopment analysis (DEA).

Using 224 firm-year observations of U.S. property-liability industry over the period from 2000 to 2007, this study examines the relation between corporate governance and firm performance. In addition, we investigate whether the SOX affects insurer performance through changes in corporate governance. We find a significant relation between performance and corporate governance (board size, proportion of independent directors on the audit committee, proportion of financial experts on the audit committee, director tenure, proportion of block shareholding, average number of directorships, proportion of insiders on the board, and auditor independence). We also find property-liability insurers have complied with the Sarbanes-Oxley Act to a large extent. For example, independence of auditor as measured by the ratio of nonaudit fee to total fees decreased from 37.2% to 13.9%. While SOX achieved the goal of greater auditor independence and might have prevented Enron-like scandals, it had some unexpected consequences. For example, insurers became less efficient when they had more independent auditors because the insurers were unable to reap the benefits of auditor independence.

We believe our findings shed additional light on the issues related to corporate governance. This is the first study to document a relation between corporate governance and firm performance in the U.S. property-liability insurance industry. Second, SOX has imposed a number of changes in corporate governance for U.S. publicly-traded companies since 2002. However, no study has examined compliance with SOX by property-liability insurers. This study not only examines compliance, but explores the relation between corporate governance mechanisms and firm performance after implementation of the SOX. Our results have important policy

implications. For example, evidence of a linkage between board characteristics and performance measures could enable regulators to decide whether or not to improve the existing governance mechanisms of property-liability insurers.

SOX also requires auditor independence. One of the problems with Enron was that the auditing firm was collecting large fees for rendering additional services to Enron. The results of this study are important not only for understanding auditor independence after the implementation of the Sarbanes-Oxley Act, but also the impact of auditor independence upon insurers' performance.

III. Data and Methodology

1. Research Hypothesis

In this paper, we develops nine hypotheses we test to examine the relation between corporate governance and performance in the U.S. property-liability insurance industry as follows:.

Hypothesis 1: There is no relation between board size and firm performance in the U.S. property-liability insurance industry.

Hypothesis 2: There is no relation between the independence of the audit committee and firm performance in the U.S. property-liability insurance industry.

Hypothesis 3: There is no relation between the proportion of directors with financial expertise on the audit committee and firm performance in the U.S. property-liability insurance industry.

Hypothesis 4: There is no relation between the average tenure of directors and firm performance in the U.S. property-liability insurance industry.

Hypothesis 5: There is no relation between the proportion of block shareholders and firm performance in the U.S. property-liability insurance industry.

Hypothesis 6: There is no relation between the average number of appointments that directors serve concurrently and firm performance in the U.S. property-liability insurance industry.

Hypothesis 7: There is no relation between the average number of directorships that directors serve concurrently and firm performance in the U.S. property-liability insurance industry.

Hypothesis 8: There is no relation between the proportion of executive directors on the board and firm performance in the U.S. property-liability insurance industry.

Hypothesis 9: There is no relation between auditor independence and firm performance in the U.S. property-liability insurance industry.

2. Data and Variables Description

Our data set initially consisted of all property-liability insurers for the period from 2000 to 2007. There were initially 24,161 data points (number of firms times years of data available, "firm-years"). We focus on publicly-traded, pure-play, insurers because the Sarbanes-Oxley Act

applies only to publicly-traded companies. These companies have more complete corporate governance data available than companies that are not publicly-traded. Given the statistical technique employed, we excluded firms that reported negative output and input variables (7,368 firm-year observations) and firms with fewer than 8 years of complete data available (5,402 firm-year observations). These restrictions result in a final sample 28 publicly-traded firms with 224 firm-year observations. These companies have complete data available in the National Association of Insurance Commissioners (NAIC) database over the eight-year period. We obtained corporate governance data from Form DEF 14A (Definitive Proxy Solicitation Material) which these insurers filed with the Security and Exchange Commission (SEC).

3. Methodology

Previous studies examining performance have used a number of measures, such as return on assets (Core et al., 1999; Anderson and Reeb, 2003; Lai and Limpaphayom, 2003; Filatotchev et al., 2004) and Tobin's Q (Chen, 2001; Evans et al., 2002; Anderson and Reeb, 2003). A growing body of recent literature utilizes alternative measures of efficiency as proxies for performance. Specifically, the econometric (parametric) approach of data envelopment analysis (DEA) and the mathematical programming (non-parametric) approach of DEA (see Cummins and Weiss, 2000) have been employed to measure efficiency. These alternative methods provide meaningful and reliable measures of firm performance.

Following previous literature in the insurance industry, we use the non-parametric mathematical linear programming approach of data envelopment analysis (DEA) to measure efficiency (see Cummins et al., 1999; Cummins and Weiss, 2000; Hardwick et al., 2003; Jeng and Lai, 2005, and Jeng et al., 2007). One advantage of the DEA approach is that multiple inputs and outputs are considered when estimating efficiency. Moreover, it is less demanding than parametric approaches in terms of degrees of freedom. Finally, it avoids the problem of vulnerability to specification errors frequently encountered when the econometric approach is used (Cummins and Weiss, 2000; Diacon et al., 2002; Hardwick et al., 2003). To save space, we do not discuss the DEA approach in detail here. Please see Cummins and Weiss (2000) for a description of the technique.

The DEA approach requires multiple inputs and outputs to estimate efficiency. We use the value-added approach of DEA to measure outputs (Cummins et al., 1999; Jeng and Lai, 2005; Jeng et al., 2007).

We define insurance output as losses incurred (e.g., Cummins and Weiss, 1993; Berger et al. 1997). Because underwriting risk and service intensity vary by line of business, we further disaggregate losses into four categories: short-tail personal lines, long-tail personal lines, short-tail commercial lines, and long-tail commercial lines. Losses are deflated to the base year 2000 using the Consumer Price Index (CPI). In addition to pooling losses and providing insurance services, insurers also perform a financial intermediation function by borrowing funds from policyholders and investing the funds in financial securities. We use total invested assets as the output for the intermediation function. Total invested assets are deflated to the base year (2000) using the Consumer Price Index (CPI).

Following Cummins et al. (1999) and Cummins and Weiss (2000), we define four inputs: labor, business services, equity capital, and debt capital. Labor input is the sum of salaries, employee benefits, payroll taxes, and other employment-related costs. The quantity of labor input is defined as labor costs divided by a salary deflator, which indexes average weekly employee wages for the North American Industry Classification System (NAICS) code 524126. The salary deflator is the price of the labor input. Business services consist of outside service costs (measured by agents' commissions) and material costs (measured by loss adjustment expenses). The price of business services is the labor price index which indexes average weekly wages for the North American Industry Classification System (NAICS) code 54. Following Jeng and Lai (2005), we use current surplus to measure equity capital. The price of capital input equals the debt-equity ratio of the previous year. The last input is debt capital supplied by policyholders, which consists primarily of funds borrowed from policyholders. These funds are measured in real terms as the sum of loss reserves and unearned premium reserves, deflated by the CPI to the base year (2000). The price of the debt input is equal to investment income attributed to debt divided by total debt capital.

In addition to univariate analysis, we also conduct regression analysis to explain the efficiency scores. The regression model is specified below:

$$ES_{it} = \alpha + \beta_1 Bosize_{it} + \beta_2 Audind_{it} + \beta_3 Aud\exp_{it} + \beta_4 Tenure_{it} + \beta_5 Block_{it} + \beta_6 Conmgt_{it} + \beta_7 Condir_{it} + \beta_8 Insider_{it} + \beta_9 Auditdependence_{it} + \beta_{10} Size_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable in the model, ES (Efficiency Score), is the efficiency variable which can be technical efficiency (TE) or cost efficiency (CE).

The independent variables are defined as follows. Bosizeit is the total number of directors on the board for firm i in year t. Audindit is defined as the proportion of independent non-executive directors on the audit committee for firm i in year t. Audexpit is defined as the proportion of the members of the audit committee who have financial expertise for firm i in year t. Tenureit is defined as the average number of years the directors have been on the board for firm i in year t. Blockit is defined as shares held by block shareholders divided by the outstanding shares for firm i in year t. Conmgtit is defined as the average number of appointments that directors serve concurrently for firm i in year t. Condirit is defined as the average number of directorships that directors serve concurrently for firm i in year t. Insiderit is defined as the proportion of executive directors on the board for firm i in year t. Auditdependenceit is defined as the ratio of the non-audit fee to the total fee charged by the auditor for firm i in year t. Previous research has repeatedly shown that company size has an impact on corporate performance (e.g., Chen 2001; O'Sullivan and Diacon, 2003; Hardwick et al., 2003). Therefore, we incorporate firm size as a control variable in the regression. Size is measured by the natural logarithm of the total equity of the firm.

In addition, we further conduct regression analysis to examine our hypotheses. The above regression model assumes that corporate governance is exogenous. If corporate governance variables are endogenously determined, the regression model may be misspecified. We use the two-stage least squares method (2SLS) to deal with the endogeneityissue. The Durbin-Wu-Hausman (DWH) test is performed to justify the use of 2SLS. First, a "suspicious"

endogenous variable (e.g., Bosize) is regressed against all the exogenous variables and instrumental variables, and the residuals are saved. The regression is specified as: Endogenous variables = f(instrumental variables, corporate governance variables, and control variables). The instrumental variables are Tobin's Q, sales growth rate, and cash flow growth rate. Tobin's Q is defined as the market value of equity plus the book value of debt divided by the book value of total assets. Second, the residuals of the endogenous variable obtained from first stage are added as an additional independent variable in the following equation:

$$ES_{it} = \alpha + \beta_1 Bosize_{it} + \beta_2 Audind_{it} + \beta_3 Aud\exp_{it} + \beta_4 Tenure_{it} + \beta_5 Block_{it} + \beta_6 Conmgt_{it} + \beta_7 Condir_{it} + \beta_8 Insider_{it} + \beta_9 Auditdependence_{it} + \beta_{10} Size_{it} + \beta_{11} Bosize\_res_{it} + \varepsilon_{it}$$

IV. Research Results and Conclusion

This study examines the effects of corporate governance on firm efficiency and the impact of implementation of the Sarbanes-Oxley Act on the relation between corporate governance mechanisms and firm efficiency in the U.S. property-liability insurance industry. We summarize our findings below. We find the following corporate governance variables are significantly and positively related to cost efficiency: board size, the proportion of independent directors on the audit committee, director tenure, proportion of block shareholding, the average number of directorships, the proportion of insider on the board, and auditor dependence. On the other hand, we find that the proportion of financial experts on the audit committee and the percentage of ownership of block shareholders are negatively related to cost efficiency. The results of the relation between corporate governance and technical efficiency are very similar to the relation between corporate governance and cost efficiency.

The results of the difference of means tests for corporate governance variable prior to and following SOX implementation show that some governance measures changed significantly. The most important finding is that auditors are more independent post-SOX implementation, implying auditors in property liability insurance industry complied with the independence requirement under SOX. The overall results suggest that the property-liability insurance industry has responded to the implementation of the Sarbanes-Oxley Act.

We examine the impact of SOX on the relation between corporate governance and efficiency. The evidence shows that there is no difference in terms of efficiency prior to or following SOX implementation. We find that the greater independence of the audit committee has a positive effect on efficiency scores after the implementation of SOX, although the effect is marginal. The evidence also shows that although insurers have more financial expert seats on the audit committee post-SOX, efficiency declined. The results show insurers with greater auditor independence have lower firm efficiency following SOX implementation. In summary, SOX did not increase the overall efficiency of insurers, but has had an impact on three corporate governance variables.

Proponents of government intervention in corporate governance argue that there is a positive relation between the use of governance measures and firm performance. Therefore, proper governance measures should be mandated through law (e.g. Vafeas and Theodorou, 1998). Our overall results have important public policy implications. They show that most corporate

governance variables do have a statistically significant impact on the efficiency of insurers. Although consistent with most previous literature, two results are somewhat surprising. First, a higher proportion of financial expert seats on the audit committees was associated with lower firm efficiency. Second, auditor independence has a negative effect on firm efficiency. SOX required more independence of auditor and the industry complied. While the regulation achieved the goal of more auditor independence and might have prevented Enron-like scandals, it has unexpected effects: insurers became less efficient when they have more independent auditors because insurers were not able to enjoy the spillover effect of auditor dependence.

第三年計畫：The Impacts of Corporate Governance Structures on Risk Taking of Insurance Companies

I. 中文摘要

保險業之經營具有高度的社會性，其經營管理之安全性也是眾所關切的議題，因此對於保險業經營風險決策行為的研究，一直都是個十分重要的議題，再加上我國保險法對董監事及經理人課以無限清償責任，這樣特有的高度監理法規，提供了保險研究文獻上檢視公司治理結構與保險公司風險決策行為關係之特殊研究環境。本研究以代理理論與公司治理相關文獻為基礎，探討保險業之代理問題，及其對保險業經營業務上風險決策行為的影響。本研究蒐集我國人壽保險與產物保險公司 2000 年至 2002 年的公司治理結構變數，採用迴歸模型分析公司治理對保險公司整體營運、業務與投資等風險決策行為之影響。實證結果發現，保險公司股東投票權偏離現金流量權的幅度以及股權集中度對於保險業風險決策行為有正向影響；而現金流量請求權、董事會規模、獨立董事、總經理兼任董事長等變數，對於風險決策行為有負向影響。另外，內部經理人持股率與投資風險決策行為呈現倒 U 型關係。

關鍵詞 ：公司治理，投票權，現金流量權權、風險承擔行為，保險公司

I. Abstract

This paper investigates the impacts of corporate governance structures on risk-taking behavior in the insurance industry. The corporate governance structure of the insurance industry in Taiwan, which holds board members fully responsible for cases of bankruptcy, offers an interesting environment in which to explore its unique regulatory impact on insurers' risk-taking behavior. Evidence shows that even under sticker regulatory rules, corporate governance still plays an important role in influencing risk taking by both property-liability and life insurers in Taiwan. Specifically, deviations of voting rights from cash-flow rights and ownership concentration have positive impacts on risk taking, whereas cash-flow rights, board size, board independence, and CEO duality have negative impacts on insurers' risk taking. The relationship between risk taking and insider ownership is inversely U-shaped.

Keywords: Insurance Industry; Corporate Governance; Risk Taking

II. Introduction

Both finance and business research documents a variety of agency conflicts within corporations. Agency theory predicts that there are mainly three types of agency problems: agency problem between manager and shareholder, between shareholder and debt holder, and between ultimate owner and minority shareholder. The latter two types are especially problematic in the insurance industry in Taiwan because highly leveraged equity increases residual claimants' incentive to increase risk (e.g. Saunders, Strock, and Travols ,1990; Esty, 1998). The literature have already suggested that corporate governance structure plays an important role in influencing risk taking by banks and non-insurance firms (e.g., Saunders, Strock, and Travols ,1990; Wright et al., 1996; Anderson and Fraser ,2000; Du and Dai, 2005; Sullivan and Spong, 2007). However, the influence of corporate governance mechanisms on corporate risk taking remains largely unexamined in insurance literature. Previous insurance studies involving ownership structures and risk taking focus mainly on comparing the risk-taking behavior of mutual insurers and stock insurers, but little is known about the impact of other corporate governance factors. This article attempts to fill up this gap.

In addition, this issue is also important partly because of the presence of insurance regulators who imposed stricter regulations regarding liabilities of board members and managers to prevent bankruptcy and discourage excessive risk taking by insurers. The insurers' risk taking behavior is important because insurers have higher pressure to pay the cost of debt than other financial institutions. The debts of insurers mainly include prepaid premiums and policy reserves for future claim. Insurers grant implicit credit to these debts by discounting expected cash flow when estimating insurance premium, and most life insurers sometime also recognize investment income or guarantee interest rate on policyholder funds. Therefore, insurer may adopt strategic risk taking to meet the future obligations arising from written insurance contracts. In addition to the arguments mentioned above, the relation between corporate governance and risk taking is more important in the insurance industry because of its high debt-to-equity ratio, the complexity of long-term life insurance contracts, and the existence of insurance guarantee fund, which gives incentives to shareholders and managers of insurance companies to engage in excessive risk-taking, causing higher expected costs of financial distress, bankruptcy, or liquidation. The insurance industry plays a crucial role in performing financial intermediary function and in providing stability to the economy as a whole.

Second, we also examine the impacts of corporate governance structures on risk taking in the insurance industry. Our article extends prior literature on corporate governance in several ways. First, our study is the first to consider the impact of deviations of voting rights from cash-flow rights on risk taking by insurance firms; others have addressed this issue in other industries(e.g., Lee and Yeh 2004; Du and Dai 2005). Because insurance industry is a highly regulated and leveraged industry, its risk taking incentives and consequences differ from those of non-financial industries, and results derived from other industries cannot extend to financial service industries. By including voting rights and cash-flow rights into our analysis, we investigate whether conflicts of interest between majority and minority shareholders exist and whether these conflicts influence insurers' risk taking. Second, we also examine the impact of

managerial ownership and board structure on risk taking by insurance firms. Most previous insurance studies involving the agency problem and risk taking emphasize ownership structures by comparing risk taking of mutual insurers and stock insurers. Nevertheless, extant studies in non–financial service industries and banking industry show that risk taking may be influenced by other corporate governance systems, such as managerial ownership or board compositions, suggesting that our analysis may be fruitful(e.g., Saunders, Strock, and Travols 1990; Wright et al. 1996; Anderson and Fraser 2000; Sullivan and Spong 2007).

Third, the unique characteristics of the insurance industry in Taiwan serves as a good research sample to investigate the impacts of corporate governance structures on risk taking. The Insurance Law requires that the board directors and managers maintain unlimited liability for bankruptcy three years after his dismissal from the position. Saunders, Strock, and Travols (1990) and Esty (1998) find that ownership incentives towards risk taking may be weaker in stricter regulatory regimes. Following Saunders, Strock, and Travols (1990) and Esty (1998) findings, it is predicted that ownership incentives towards risk taking may be weaker under the unlimited liability rule in Taiwan. Thus, it is interesting to examine whether stricter constraints of insurance regulations perform internal governance function to reduce ownership incentives towards risk taking as prior studies predict. Another distinct characteristic of Taiwanese insurance companies is that most insurance firms remain family controlled. Burkart, Panunzi, and Shleifer (2003) suggest that the controlling family would usually select a chief executive officer (CEO) to maximize its benefits, which include the value of its ownership and the private benefits obtained only if control is held within the family. The controlling family would make the decisions to enhance its private benefits, which might affect the risk taking decision. In addition, most insurance firms are characterized by relatively low proportions of outside board members and by few takeovers. Moreover, the financial service industry in Taiwan was affected by the financial crisis in 1997, which have highlighted the need for corporate governance reform. Because of these characteristics and the unique environment in insurance industry in Taiwan, we believe that our empirical findings provide additional insights into the impact of corporate governance on risk taking by insurance firms.

We collect unique data on corporate governance and risk taking information during 2000–2005 from both property-liability and life insurance companies in Taiwan. Our evidence confirms that corporate governance plays an important role in influencing risk taking in the two industry segments. Specifically, deviations of voting rights from cash-flow rights and ownership concentration have positive impacts on profit risk for life insurance firms and investment risk for property-liability insurance firms, whereas cash-flow rights, board size, board independence, and CEO duality have negative impacts on insurers' different risks. Moreover, the relationship between investment risk and insider ownership is inversely U-shaped for both property-liability and life insurance companies. In addition, our findings suggest that stricter constraints of insurance regulations may reduce or replace some internal corporate governance functions of controlling shareholders' incentives towards risk taking as prior studies predict. The implication of our findings is important for stakeholders and insurance regulators. First, it suggests that some of the corporate governance mechanisms could help to prevent insurance firms from engaging in

excessive risk taking. Second, stricter liability rule imposed on the insurance firm does not effectively discourage risk taking as a whole.

III. Data and Methodology

1. Data

To estimate the level of risk taking for life and property-liability insurers, we collect financial data from the *Annual Report of Life Insurance* and the *Non-Life Insurance Review* filed with the Taiwan Insurance Institute over the sample period from 2000 to 2005. Furthermore, to generate corporate governance variables, including voting rights and cash-flow rights, we collect insurers' shareholder data from annual statements for regulators from 2000 to 2002. Our final sample contains 35 life and property-liability insurance companies, together accounting for about 85.51% of industry total premiums in 2002.

We specifically trace cash-flow rights and voting rights held by the controling shareholder for each sample company, according to the ultimate control concept proposed by La Porta, Lopez-de-Silanes, and Shleifer (1999). In addition, we define family ownership as ownership held by a group of people with blood or marriage ties to an immediate family and the legal entities controlled by these family members. Because many life and property-liability insurance firms in Taiwan have concentrated ownership, usually by family groups, we use family ownership as the basic analysis unit. In most cases, the families control the firm through a chain of companies. To confirm family ownership, we consult various information sources and documents to verify the relationship of the main shareholders. Ownerships held by family-affiliated members represent the family's voting rights. Family cash-flow rights equal the product of their ownership of intermediate corporations along the chain. Finally, we add individual cash-flow rights along the chain to derive the total level of family cash-flow rights. These unique data pertaining to the corporate governance structures of insurance company enable us to investigate the relationship between corporate governance structures and risk taking.

2. Methodology

We examine how corporate governance structures influence risk taking by conducting a regression analysis with risk taking variables as the dependent variables and corporate governance and other control variables as explanatory variables. Because we consider both life and property-liability insurance companies, we require proxies for risk taking that are applicable to both segments of the insurance industry and that enable us to compare the corporate governance factors that influence risk in two different industry segments using the same measurements.

2.1 Risk Taking Variables

To measure risk taking behavior by life and property-liability insurance firms, we refer to prior literature on risk taking by insurance firms (e.g., Lamm-Tennant and Starks 1993; Lee, Mayers, and Smith 1997; Berger et al. 2000; Viswanathan and Cummins 2003) and incorporate

three established risk taking proxies: business risk, investment risk, and profit risk. We take the standard deviation of the log value of underwriting income as the proxy for business risk, use the standard deviation of stock holdings as a proxy for investment risk, and consider the standard deviations of returns on equity (ROE) as the proxy for profit volatility. We take business activities and investment activities of insurers into account because insurers perform risk management as well as financial intermediary functions. According to Lamm-Tennant and Starks (1993), we measure business risk as underwriting income volatility. In line with Lee, Mayers, Smith (1997) and Ibbotson and Sinquefield (1989), we take the standard deviation of stock holdings in the total invested assets as a proxy for investment risk. The standard deviation of stock holdings is hypothesized to relate to the uncertainty of future profitability from stock holdings. Their findings suggest that the standard deviation of stock holdings reflects the investment stability and discretion agents have to adjust the investment holdings to pursue their risk taking goal. As for the proxy for profit volatility, following Berger et al. (2000) and Berger and Patti (2006), we use the standard deviations of ROE. We do not use the measurement of risk that reflects market value, such as portfolio risk in the Capital Asset Pricing Model (CAPM) context, because most insurers in Taiwan are not publicly traded firms and such data are not available for most life and property-liability insurers.

2.2 Corporate Governance Variables

To address the question of how cash-flow rights and the deviation between voting rights and cash-flow rights affect risk, we include these measures in the regression analysis. As mentioned previously, risk should be lower as the cash-flow rights held by the controling shareholder increase; however, the deviation between voting rights and cash-flow rights (voting rights – cash-flow rights or voting rights / cash-flow rights) may also be associated with greater risk taking. To test whether the relationship between risk taking and the share of insider stock ownership is inversely U-shaped as prior studies predicts, we follow Cebenoyan, Cooperman, and Register (1999) and include insider ownership and the square of insider ownership in the model. To examine the effectiveness of the board in monitoring risk taking, we also consider board of director components, namely, ownership concentration, board size, board independence, and CEO duality. With regard to the additional explanatory variables, we follow previous studies (e.g., Lamm-Tennant and Starks, 1993; Berger et al., 2000; Mayers and Smith, 2000; Baranoff and Sager, 2002, 2003) and include the capital-to-asset ratio, line of business concentration (i.e., Herfindahl concentration index), average rate of return, and size as control variables.

The rationales for using these proxies are as follows. The capital-to-asset ratio is related to financial leverage and risk, though we do not have a clear prediction for the direction of this relationship. According to the transaction cost economics (Williamson,1988), debt financing is harder for firms that have more risk, because riskier firms face greater uncertainty with regard to fulfilling their obligations to repay the debt. Thus, firms with more risk must hold more capital assets, and the capital-to-asset ratio should relate positively to risk. However, Cummins (1988) argues that the characteristics of the premiums for insurance guaranty funds in the insurance industry cause guaranteed funds to increase risk at lower levels of capital, in which case the

capital-to-asset ratio would relate negatively to risk.

We also predict that the expansion into different lines of business relates negatively to risk; that is, firms focusing on single line of business may suffer more risk. We capture the expansion into different lines of business by examining the firm's line of business Herfindahl concentration index, a measure of line concentration. Thus, we expect that the Herfindahl concentration index relates positively to risk.

Theoretically, higher returns are accompanied by high risk. Furthermore, return represents an objective that firms attempt to maximize by taking appropriate risks. Baranoff and Sager (2002) find that higher returns on capital are associated with higher product risk by insurance firms. With regard to the relationship between firm size and risk taking, Baranoff and Sager (2003) find that larger insurance firms likely have more risky asset portfolios than smaller firms. In addition, Lamm-Tennant and Starks (1993) contend that the size of insurance firm is a critical means to control for risk. Thus, we hypothesize that the size of insurance company relates to risk. However, prior studies (e.g., Saunders, Strock, and Travols 1990; Cummins and Sommer 1996) yield inconclusive results; hence, we do not have a clear prediction for the direction of the relationship between size and risk.

According to Mayers and Smith (2000), reinsurance is also a mechanism to reduce risk, thus we expect that the property-liability insurers ceding a higher proportion of their premiums to reinsurers have less risk. Therefore, we also include a reinsurance ratio in the model for property-liability insurers to control for the possible influence of reinsurance on a firm's risk.

3.Regression Model

Because the unique characteristics that may influence a firm's risk taking differ across industries, we further separate our regression analyses of life insurers and property-liability insurers and include specific control variables that may affect each industry. Prior studies on corporate governance (e.g., Bromiley 1991; Wright et al. 1996) argue that corporate governors may make decisions today, but the impact of those decisions on risk taking may be reflected in the future. Thus, our regression analysis includes the time lag between corporate governance and risk.

The regression equations for life insurers are specified as follows:

$$\begin{aligned} RISK_i^j &= \beta_0 + \beta_1 CR_i + \beta_2 DEV_i + \beta_3 INSIDER_i + \beta_4 INSIDERSQ_i + \beta_5 BSIZE_i \\ &+ \beta_6 BIND_i + \beta_7 DUAL_i + \beta_8 \text{OWNCON}_i + \beta_9 CAP_i + \beta_{10} HI_i + \beta_{11} RETURN_i + \beta_{12} SIZE_t \\ &+ \beta_{13} \text{Year 2000} + \beta_{14} \text{Year 2001} + \varepsilon_i \end{aligned} \quad (1)$$

and those for property-liability insurers are:

$$\begin{aligned} RISK_i^j &= \beta_0 + \beta_1 CR_i + \beta_2 DEV_i + \beta_3 INSIDER_i + \beta_4 INSIDERSQ_i + \beta_5 BSIZE_i \\ &+ \beta_6 BIND_i + \beta_7 DUAL_i + \beta_8 \text{OWNCON}_i + \beta_9 CAP_i + \beta_{10} HI_i + \beta_{11} RETURN_i + \beta_{12} SIZE_t \\ &+ \beta_{13} REINS + \beta_{14} \text{Year 2000} + \beta_{15} \text{Year 2001} + \varepsilon_i \end{aligned} \quad (2)$$

where j = 1, 2, and 3. Risk[1] equals business risk measured by the standard deviation of the

log of underwriting income; $Risk^2$ equals investment risk, which is measured by the standard deviations of the proportion of stock investment in the total invested assets; and $Risk^3$ equals the standard deviations of ROE. Following Gorton and Rosen (1995) and Wright et al. (1996), we examine whether the relationship between risk taking and the share of insider stock ownership is inversely U-shaped by including INSIDER and INSIDERSQ in regression analysis, where INSIDER is the percentage of shares owned by the director and officers and INSIDERSQ is the square of INSIDER. We also include cash-flow rights (CR) variable in the regressions, such that CR is the cash-flow rights held by controlling shareholders. As we stated previously, the deviation between voting rights and cash-flow rights (DEV) may influence a firm's risk taking. Following La Porta et al. (2002), Claessens, Djankov, and Lang (2000), and Yeh (2005), we adopt two measures, including the difference between voting rights and cash-flow rights and the ratio of voting rights to cash-flow rights, to represent the magnitude of deviation between voting rights and cash-flow rights. We also distinguish the cash-flow rights held by the controlling shareholders from insider ownership. Because insiders mainly receive salary and/or bonus compensation, whereas the controlling shareholders generally receive benefits from their cash-flow rights, we must examine the impact of the cash-flow rights of controling shareholder and the ownership of director and officers on risk taking separately.

To determine whether the board plays an important role, we include four board composition variables—ownership concentration (OWNCON), board size (BSIZE), board independence (BIND), and CEO duality (DUAL)—that we deem important for effective board monitoring in our regression. The OWNCON variable equals the percentage of shares owned by the first 10 largest stockholders; BSIZE is the number of members on the board; BIND is the board independence, which equals the percentage of outside directors among the board members; and DUAL is a CEO duality dummy, which equals 1 if the CEO also serves as the chairperson of the board and 0 otherwise.

We include the following control variables: Herfindahl concentration index (HI), firm size (SIZE), and capital-to-assets ratio (CAP). For the property-liability insurance industry, we also include the reinsurance ratio (REINS). HI is used to control for a possible influence from line of business on risk taking by firms; SIZE is the natural log of total assets; CAP is the ratio of equity capital to total assets; and REINS is the ratio of reinsurance premiums ceded to the sum of the direct premiums written and reinsurance premiums. For each risk variable, we also employ a return control variable (RETURN). We use the ROE standard deviation and business risk and the book value of rate of return on assets for investment risk to control for a possible influence from return on risk.[2] Finally, we include Year 2000 and Year 2001 as year dummies.

III. Research Results and Conclusion

This paper investigates the impacts of corporate governance structures on risk taking in the property-liability and life insurance industry. Our study thus extends existing literature on corporate governance on two main fronts. First, the corporate governance system of the insurance

[2] We do not use the market value of ROE and ROA, because most insurers in Taiwan are not publicly traded firms and data on market value are not available for most life and property-liability insurers.

industry in Taiwan, which holds board members and managers fully responsible for bankruptcy, offers an interesting environment in which to explore its unique regulatory impact on insurers' risk taking behavior. Second, Taiwanese insurance firms are primarily family controlled, with a high degree of ownership concentration. In such an ownership background, corporate governance mechanisms are more important as a means to prohibit possible misconduct by controlling shareholders, especially in the insurance industry, where insurers use their great financial leverage to conduct business. To our knowledge, ours is the first study to examine the effects of voting rights and cash-flow rights ownership on insurers' risk taking behavior in the insurance industry.

In general, our results provide evidence in support of the claim that corporate governance structure plays an important role in influencing insurers' risk taking behavior even under sticker regulatory rules. Consistent with prior literature, we find that deviations between voting rights from cash-flow rights have positive impacts on profit risk for life insurers and investment risk for property-liability insurers. However, the evidences should be interpreted with caution because some coefficients on these variables which were statistically significant in the prior studies are not statistically significant. Thus, the results implies that stricter liability constraint may discourage insurers' risk taking behavior or may reduce/replace the effect of some corporate governance factors on insurers' risk taking behavior. This result is consistent with the results of Saunders, Strock, and Travols (1990) and Esty (1998). It is an interesting finding of this paper and provides us with additional insight concerning corporate governance research filed.

The relationship between investment risk and insider ownership is inversely U-shaped for both segments of insurance industry. Furthermore, for life insurance, board independence and board size is negatively related to business risk; CEO duality relates negatively to investment risk; higher cash flow right and board independence may discourage profit risk. Among property-liability insurance firms, CEO duality, board independence, and board size also have negative impacts on insurers' different risks. In particular, CEO duality relates negatively to business risk; the relationship between investment risk and board independence is negative; board independence and board size have negative impact on profit risk.

Additional findings suggest that compared with property-liability insurance companies, corporate governance variables have greater impact on the risk taking behavior for life insurance industry. The empirical results seem to further imply that the difference of business practice between these two segments of insurance industry may lead to different impact on the risk taking. Comparing to the property-liability insurers, life insurers have higher leveraged equity and exposure position. Thus, life insurers bear higher liabilities and greater solvency risk. As a results, the corporate governance variables may have greater impacts on discouraging the risk taking behavior of life insurance companies to avoid insolvency problem.

The implication of our findings is that some of the corporate governance mechanisms have real and predictable effect on monitoring risk taking by insurance firms. In addition, our evidence shows that stricter liability rule, which holds board members and managers fully responsible for cases of bankruptcy, does not effectively discourage risk taking as a whole. Insurance regulator may minimize excessive risk taking by alternative means, such as higher minimum capital

requirement, stricter risk-based capital rule, or prompt disclosure about improper transaction.

The analysis of this paper suggests some future avenues for future research. First, our findings imply that stricter liability constraint may reduce/replace the effect of some corporate governance factors on insurers' risk taking behavior. Whether unlimited liability rule has negative effects on insurers' risk taking deserves further study. The second potential avenue for future research is to examine whether different insurance regulation has different effects on insurers' risk taking behavior. For example, the risk-based capital regulation and the investment restriction in Taiwan may discourage the risk taking by insurance firms. Thus, a comparison of between insurers' risk taking among different countries would provide more insights to this issue. We also encourage additional studies to examine whether poor corporate mechanisms increase the probabilities of financial distress or bankruptcy by using different proxies to measure risk in the insurance industry.

國科會補助計畫衍生研發成果推廣資料表

日期:2011/10/31

國科會補助計畫	計畫名稱: 保險公司管理策略對再保險、經營績效與風險承擔行為之影響分析
	計畫主持人: 王儷玲
	計畫編號: 97-2410-H-004-042-MY3　　學門領域: 財務

無研發成果推廣資料

97 年度專題研究計畫研究成果彙整表

計畫主持人：王儷玲	計畫編號：97-2410-H-004-042-MY3
計畫名稱：保險公司管理策略對再保險、經營績效與風險承擔行為之影響分析	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	3	3	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	3	3	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	無

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：(以 100 字為限)

本研究之三篇論文皆已發表於國際與國內之一流優秀期刊論文

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限)

1.本研究之三篇論文皆已發表於國際與國內之一流優秀期刊論文，如下：

1.’Corporate Governance and Efficiency: Evidence from U.S. Property-Liability Insurance Industry,’ special issue of Journal of Risk and Insurance on Corporate Governance, 2011 forthcoming.（SSCI，國科會保險精算領域 A 級期刊）

2.’Demutualization and Demand for Reinsurance,’ The Geneva Papers on Risk and Insurance: Issues and Practice, 2009, Vol. 33, pp. 566-584.（SSCI，國科會保險精算領域 B 期刊）

3. ’The Impacts of Corporate Governance Structures on Risk Taking by Insurance Companies in Taiwan,’ 管理評論金融機構專刊，2010 年 10 月，第二十九卷，第四期，1-18 頁。(TSSCI)

2.三篇論文之實證結果對保險監理與保險公司實務經營上都有重要參考價值