

INVISIBLE GATEKEEPER? DIRECTOR & OFFICER INSURANCE IN
CORPORATE GOVERNANCE: AN EMPIRICAL LEGAL STUDY OF
TAIWAN

BY

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DISSERTATION

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ABSTRACT

After the problems experienced by Enron, WorldCom and other companies in various financial crises, the monitoring function of Directors' and officers' (D&O) insurance has been discussed more frequently. Given this tendency, discussions of this issue have become more popular in Taiwan. This research analyzes the role of D&O insurance in corporate governance in Taiwan. The monitoring hypothesis suggests that firms with weak corporate governance have a greater incentive to purchase D&O insurance. D&O insurance and other monitoring mechanisms are substitutes for each other. Firms which have better corporate governance have less demand for D&O insurance. Information about insured firms' corporate governance can be conveyed by D&O insurance. In contrast, this study proposes an alternative hypothesis to the monitoring hypothesis. It argues that D&O insurance has a positive signal effect to the market. Accordingly, the signal effect is an important consideration in D&O insurance purchases.

This research empirically analyzes the purchase of D&O insurance of around 4,000 listed firms in Taiwan from 2008 to 2010. A variety of econometric and statistical methods are applied. Empirical evidence shows that the monitoring function of D&O insurance is rejected and the signal effect of D&O insurance is supported. The positive signal effect of D&O insurance is a more important consideration than the monitoring function or indemnification for insured firms. This study also finds that there is no evidence

supporting the existences of moral hazard and adverse selection. Thus, the findings regarding the rejection of the monitoring hypothesis and support for the signal hypothesis will not be affected. In conclusion, this dissertation analyzes the association among D&O insurance and corporate governance by comparative law and empirical methods. It concludes that the D&O insurance may signal the information of insured firms' corporate governance, but the mandatory insurance rule is not recommended.

To My Family

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CHAPTER 1

INTRODUCTION

1.1 Structure of inquiry

1.1.1 Research background

About the Enron case, John C. Coffee commented that: “Enron is more about gatekeeper failure than board failure”.¹ The “gatekeepers” are reputational intermediaries who provide verification and certification services to investors, including lawyers, accountants, investment bankers, auditors and debt rating agencies.² In general, major opinions attribute the reason for failure of corporate governance to the failure of gatekeepers.³ In this line of reasoning, one important gatekeeper is discussed more and more in recent years, which is Directors’ and officers’ (D&O) liability insurer.

Directors’ and officers’ liability insurance is an agreement to indemnify corporate directors and officers against judgments, settlements, and fines arising from negligence suits, shareholder actions, and other business-related lawsuits.⁴ Like other insurance,

¹ John C. Coffee, *Understanding Enron: "It's About the Gatekeepers, Stupid"*, 57 BUS. LAW. 1403, 1419 (2002).

² *Id.* at 1405.

³ See Frank Partnoy, *Barbarians at the Gatekeepers?: A Proposal for a Modified Strict Liability Regime*, 79 WASH. U. L.Q. 491, 492 (2001). See John C. Coffee, *Gatekeeper Failure and Reform: The Challenge of Fashioning Relevant Reforms*, 84 B. U. L. REV. 301, 349 (2004).

⁴ See Black's Law Dictionary (9th ed. 2009). In fact, directors’ and officers’ liabilities could be managed in two main ways: indemnification and D&O liability insurance. Indemnification is a protection provided by companies for employees against suits. See also *VonFeldt v. Stifel Financial Corp.*, 714 A.2d 79, 84 (Del. 1998). These two both can indemnify the losses but they are different. The main difference between indemnification and D&O liability insurance is that the former transfers risk to the company, whereas the latter transfers risk to the third party insurer. Also, risks for events which have already occurred or known risks are usually covered by company compensation, but not by D&O liability insurance. Dir. & Off. Liab § 4:2.

D&O insurance has the fundamental function of indemnification. In addition to corporations themselves,⁵ D&O insurance can provide protection for directors and officers,⁶ and thus let them concentrate on management without worrying about potential liability or fearing the risk associated with becoming a director or officer of a corporation.⁷ Also, based on the risk management nature of the insurer, the insurer will decrease the loss as much as possible, and thus protect the interests of the stakeholders.⁸ In other words, this is not only because insurers assume responsibility for losses but also because this assumption of responsibility makes them more credible providers of loss-prevention services than alternative governance institutions.⁹ The underwriting information is helpful for the market to understand the status of corporate governance. For example, when underwriting is in progress, insurers may examine the financial status of insured companies, which will thus allow outside investors to understand more about

⁵ In general, D&O policy can be classified as three types with separate functions. First, coverage A (Side A coverage), or the individual side coverage, reimburses officers and directors for losses that they have suffered as a result of their wrongful acts for which they are not indemnified by the company. Secondly, coverage B (Side B coverage), or company reimbursement coverage, reimburses the company for the expense of indemnifying its directors and officers as a result of claims made against them. Third, coverage C (Side C coverage), or entity coverage, provides coverage for a corporation's losses which separates from the losses of directors and officers. *Jensen v. Snellings*, 841 F.2d 600, 611 (5th Cir. 1988). See Tom Baker & Sean Griffith, *The Missing Monitor in Corporate Governance: The Directors' and Officers' Liability Insurer*, 95 GEO. L.J. 1795, 1842 (2007). Hence, under the coverage B and C, the loss of company will be compensated.

⁶ However, because D&O liability insurance is paid by shareholders to protect directors, some consider D&O liability insurance a means to protect the shareholders' wealth more than the directors'. See M. Martin Boyer, *Directors' and Officers' Insurance and Shareholder Protection* 8-9 (2005), <http://ssrn.com/abstract=886504>.

⁷ See IAN YOUNGMAN, *DIRECTORS' AND OFFICERS' LIABILITY INSURANCE: A GUIDE TO INTERNATIONAL PRACTICE* 3 (2d 1999). Hence, the most commonly cited reason for the purchase of D&O insurance is the recruitment and retention of qualified officers and directors. See Tom Baker & Sean J. Griffith, *Predicting Corporate Governance Risk: Evidence from the Directors' & Officers' Liability Insurance Market*, 74 U. CHI. L. REV. 487, 502 (2007). For more discussion about the development of the market for directors' and officers' liability insurance, see Dan L. Goldwasser, *Directors' and Officers' Liability Insurance 1994*, 692 PLI/COMM 9, 12-3 (1994).

⁸ See Tom Baker & Sean J. Griffith, *supra* note 5, at 1796.

⁹ See Tom Baker & Sean J. Griffith, *supra* note 7, at 491.

the financial situation of company. D&O insurance can both transfer risk and offer incentives for insured companies to improve their corporate governance. In addition, insurers will force poor quality corporations to pay higher D&O premiums than high quality corporations; and the insured corporations will endeavor to improve corporate governance to decrease insurance premiums.¹⁰ Hence, it is usually believed that D&O insurance has a positive effect on corporate governance. In other words, D&O insurance is a type of liability insurance of which the primary purpose is to compensate for the losses experienced by directors and officers when specific legal liabilities arise. D&O insurance may also serve the function of monitoring the governance of companies.

After the problems experienced by Enron, WorldCom and other companies in various financial crises, the monitoring function of D&O insurance has been discussed more frequently, particularly in common law. In the United States, Congress passed the Sarbanes-Oxley Act in 2002. The act focuses on improving corporate governance by protecting shareholders and resulted in increased litigation and more fines and penalties.¹¹ This also increases the demand of D&O insurance.¹² Delaware General Corporation Law regulates that a corporation shall have power to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the

¹⁰ *Id.*, at 489.

¹¹ See Pub. L. No. 107-204, 116 Stat. 745 (2002). According to a 2002 survey, 19% of firms had at least one lawsuit brought against their directors in the previous ten years. See M. Martin Boyer, *Three Insights from the Canadian D&O Insurance Market: Inertia, Information and Insiders*, 14 CONN. INS. L.J. 75, 76 (2007).

¹² This positive impact is generally recognized. More detailed discussion and examination, see Anna Oh, *Insuring against Another Enron: The Role of Cross-listing Status of Canadian Firms on the Purchase of Directors' and Officers' Insurance in the aftermath of Sarbanes-Oxley Act of 2002*, 20-1 (2009), <http://ecommons.cornell.edu/bitstream/1813/14231/2/AnnaOhFinalThesis1.pdf>.

corporation.¹³ So far, the majority of listed corporations in the United States have purchased D&O insurance.¹⁴ Given this tendency,¹⁵ discussions of this issue have become more popular in Taiwan.¹⁶

Taiwan is an island south of China. It is 36,000 square kilometers in area, has a population of 22.8 million people and 420.7 US\$ billion GDP in 2009.¹⁷ The reasons for researching Taiwan include its special background and relationship to the D&O insurance issue. Taiwan primarily follows a civil law tradition,¹⁸ but private laws of it are also affected by common law.¹⁹ D&O insurance originated in, and was developed in, common law countries, including the United Kingdom, the United States and Canada. Most companies in the US purchase D&O insurance. This research will examine the function of D&O insurance in corporate governance in the context of civil law countries.

The general development of the insurance industry in Taiwan is also significant. The first

¹³ See 8 Del.C. § 145 (g).

¹⁴ After the advent of coverage C in 1996, D&O liability insurance protects not only the individual's assets but also those of the corporation. This increases the popularity of D&O liability insurance. In the United States, over 90% of the D&O insured reported having entity coverage as of 2002. See John C. Coffee, *Reforming the Securities Class Action: An Essay on Deterrence and Its Implementation*, 106 COLUM. L. REV. 1534, 1570 (2006).

¹⁵ After Enron and WorldCom scandals, reforms of the Sarbanes-Oxley and New York Stock Exchange Listing standards, the 1997-98 financial crisis in Asia had a similar effect on Taiwan. See Ronald J. Gilson & Curtis J. Milhaupt, *Choice as Regulatory Reform: The Case of Japanese Corporate Governance*, 53 AM. J. COMP. L. 343, 343 (2005). For more discussion about financial crisis in Taiwan, see Lawrence L. C. Lee, *Taiwan's Current Banking Development Strategy: Preparing for Internationalization by Preventing Insider Lending*, 17 UCLA PAC. BASIN L.J. 166, 206 (Fall 1999/Spring 2000).

¹⁶ This can be found by prospering relevant researches, such as: Jui-I Chang, *Essays on Directors' and Officers' Liability Insurance and Firm Behavior*, (Jnu.23, 2010) (Unpublished Ph.D. dissertation, National Chengchi University). Tsai-Jyh Chen & Chia-Hui Pang, *An Analysis of Determinants of the Corporate Demand for Directors' and Officers' Liability Insurance*, 18:2 NTU MGMT. REV. 171, 178 (2008).

¹⁷ See The Non-Life Insurance Association of the R.O.C., *NON-LIFE INSURANCE BUSINESS IN TAIWAN*, 2 (2009). This can be obtained via <http://www.nlia.org.tw/modules/smartsection/item.php?itemid=325> (last visited Jan. 15, 2013).

¹⁸ See Michael M. Hickman, *Protecting Intellectual Property in Taiwan — Non-Recognized United States Corporations and Their Treaty Right of Access to Courts*, 60 WASH. L. REV. 117, 119 (1984).

¹⁹ See Andrew Jen-Guang Lin, *Common Law Influences in Private Law - Taiwan's Experiences Related to Corporate Law*, 4 NAT'L TAIWAN U. L. REV. 107, 132 (2009).

D&O insurance policy was issued in 1997, and the percentage of listed companies that purchase D&O insurance is approximately 50% to date. The D&O insurance industry developed in a stable manner in Taiwan. The first issued D&O insurance policies were issued in Taiwan in 1997 and 47.5%²⁰ of listed companies are currently insured by D&O. This is lower than in the United States, Canada and United Kingdom, but higher than China.²¹ In Taiwan, according to the articles of incorporation or resolution adopted in the shareholders' meeting, a TSEC/GTSM listed corporation may take out liability insurance for directors with respect to their liabilities resulting from exercising their duties during their terms of occupancy.²² It is important to observe the development of D&O insurance and its monitoring function with respect to the background of Taiwan.

While the importance of D&O insurance has been noticed, more and more recent researchers have expressed opposing opinions. Some empirical studies indicate that in the vast majority of instances, insurers do not provide corporate governance.²³ What is more, because of the differences from the United States, such as the short history of D&O insurance, immature litigation systems, and defects in relevant regulations, how is the impact of D&O insurance on corporate governance in Taiwan? What role does D&O insurance play in corporate governance in Taiwan? Is the purchase of D&O insurance positively related to corporate governance? Is the monitoring function of D&O insurance

²⁰ Please refer to the empirical analysis below.

²¹ This can be obtained in the website of Taiwan Financial Supervisory Commission, http://www.fscey.gov.tw/Layout/main_en/AllInOne_Show.aspx?path=1871&guid=5da0af18-fb31-4ffb-8dfc-05c37d3d0d0e&lang=en-us (last visited Jan. 15, 2013).

²² Corporate Governance Best-Practice Principles for TSEC/GTSM Listed Companies art. 39 (2006).

²³ See Tom Baker & Sean J. Griffith, *supra* note 5, at 1808.

sustainable in Taiwan? Is it necessary for Taiwan to compulsorily disclose the information about insured corporations, or even to regulate D&O insurance as compulsory for listed corporations? All these issues are not only worth more academic studies, but they are also significant for practice in Taiwan.

The purpose of this dissertation is to refine the test on the impact of D&O insurance on corporate governance in the background of Taiwan. This dissertation will distinguish the differences in backgrounds of the United States and Taiwan, and try to find optimal solutions for Taiwan. Empirical methods will be employed to test the hypotheses in this dissertation. In conclusion, this research is supposed to contribute suggestions for the United States, Taiwan, and even other countries which are considering this issue.

1.1.2 Hypothesis development

This study attempts to analyze the role of D&O insurance in corporate governance in Taiwan. What will be discussed here includes the monitoring hypothesis, signal hypothesis, the attributes and problems of corporate governance in Taiwan, the differences between common law and civil law, and the function that D&O insurance serves in Taiwan. This dissertation proposes that the purchase of D&O insurance is roughly and positively related to the corporate governance of insured companies in Taiwan. Even given that the industry is not as well developed as is the case the United States, the positive relationship still can be observed. Conversely, the reason why a difference exists between Taiwan and the United States can be explained by the attributes

of the conditions in Taiwan, such as the design of corporate governance structures, the prevalence of D&O insurance, the development of the litigation system and so on. In addition to the rejection of monitoring hypothesis, the signal hypothesis that D&O insurance can emit positive signal is proposed and tested in this dissertation. By a series of empirical tests, sufficient evidence will be offered to establish signal theory.

1.1.3 Methodology

In addition to basic science research methodology, induction and deduction,²⁴ three legal research methodologies will be applied in this study.

1.1.3.1 Qualitative methodology²⁵

Based on a detailed review of literature, this research will explore theories and structures of D&O insurance and corporate governance system in the United States and Taiwan completely. This study not only analyzes the existing data but also searches for the direction for further study in the future.

1.1.3.2 Comparative methodology²⁶

²⁴ See Anita Schnee, *Logical Reasoning "Obviously"*, 3 LEGAL WRITING: J. LEGAL WRITING INST. 105, 117 (1997).

²⁵ There are at least three types of qualitative analytical properties: (1) analysis-based, (2) coordination-based, and (3) decision-based properties. See James E. Holloway, *A Primer on the Theory, Practice, and Pedagogy: Underpinning a School of Thought on Law and Business*, 38 U. Mich. J.L. Reform 587, 616 (2005). For further discussion about the legal methodology of American law, See Richard B. Cappalli, *The Disappearance of Legal Method*, 70 TEMPLE L. REV. 393, 399-400 (1997).

²⁶ On the eve of the 21st Century, the comparative method is emphasized as an indispensable tool of legal science, law reform, and international conflict resolution and unification. See Hiram E. Chodosh,

This dissertation not only analyzes D&O insurance and corporate governance system in the United States, but also has a detailed analysis on Taiwan. What is more, some regulations and policies in Taiwan were derived from those in the United States, but they ignored the idiosyncrasies of the economic and social environments in their jurisdictions, which caused some conflict. Hence, it is important to recognize the similarities and differences among different jurisdictions and thus explore different optimal solutions for different situations.

1.1.3.3 Empirical methodology²⁷

This dissertation will collect empirical data of D&O insurance and corporate governance in Taiwan, and test the proposed hypotheses by empirical methods. The data used in this study is obtained from databases or websites below: Taiwan Economic Journal,²⁸ Taiwan Stock Exchange Corp.,²⁹ Market Observation Post System,³⁰ Financial Supervisory Commission, Executive Yuan, R.O.C.,³¹ Taiwan Insurance Institute,³² and Securities and Futures Investors Protection Center.³³ This study will empirically analyze the purchase of D&O insurance by public companies in Taiwan during 2008 to 2010. Data about all

Comparing Comparisons: In Search of Methodology, 84 IOWA L. REV. 1025, 1027 (1999).

²⁷ For further discussion, see Thomas S. Ulen, *Empirical and Experimental Methods of Law: A Nobel Prize in Legal Science: Theory, Empirical Work, and the Scientific Method in the Study of Law*, 2002 U. ILL. L. REV. 875, 880 (2002).

²⁸ Taiwan Economic Journal, <http://www.finasia.biz/ensite/> (last visited Jan. 15, 2013).

²⁹ Taiwan Stock Exchange Corp., <http://www.twse.com.tw/ch/index.php> (last visited Jan. 15, 2013).

³⁰ Market Observation Post System, http://emops.tse.com.tw/emops_all.htm (last visited Jan. 15, 2013).

³¹ Financial Supervisory Commission, Executive Yuan,

http://www.fscey.gov.tw/Layout/main_ch/index.aspx?frame=1 (last visited Jan. 15, 2013).

³² Taiwan Insurance Institute, <http://www.tii.org.tw/> (last visited Jan. 15, 2013).

³³ Securities and Futures Investors Protection Center, <http://www.sfiipc.org.tw/english/main.asp> (last visited Jan. 15, 2013).

public companies will be collected. Relevant arguments discussed in this research include whether or not the purchase of D&O insurance is positively related to the corporate governance of the insured companies, and whether D&O insurance have monitoring or signaling effect or not. A series of empirical works will be processed to test these hypotheses. Finally, this dissertation will synthesize the results of these methods and propose suggestions.

1.1.4 Research process

In Chapter 1, this study begins with an introduction of the research background, hypothesis development, and methodology. Afterwards, rival theories regarding the purpose of director and officer insurance are introduced and discussed. Previous literature concerning D&O insurance and corporate governance will be completely reviewed, and arguments for and against it will be presented. Then, this dissertation will develop an alternative hypothesis to the monitoring hypothesis, which is a signal hypothesis. The monitoring hypothesis and the signal hypothesis are two main arguments which will be tested in this study. Then, the framework of D&O insurance development will be introduced. This provides the background for the following hypothesis development and empirical tests within Chapter 2 and 3.

In Chapter 2 and 3, a series of empirical tests will be carried out to examine the monitoring hypothesis and the signal hypothesis, and whether or not these hypotheses are affected by exogenous factors. Because the monitoring function of D&O insurance may

be affected by moral hazard and asymmetric information, this study will clarify these two concerns prior to the test for the monitoring hypothesis. This research proposes that there is no moral hazard problem in the Taiwanese market. Hence, D&O insurance does not imply the problem of opportunism and moral hazard, and the reasoning of the monitoring function would not be affected. Similarly, this study also hypothesizes that transaction bargaining and underwriting function well, there is no problem of asymmetric information or adverse selection, and the market is close to being homogenous.

In terms of the tests for the monitoring hypothesis and the signal hypothesis, this dissertation proposes that D&O insurance is an index for corporate governance and can emit positive signals to the market. Firms in Taiwan could purchase D&O insurance to increase their reputation and even attract more investment. However, D&O insurance does not have a monitoring function and the quality of corporate governance is not inversely related to the demand for D&O insurance. Thus, the monitoring hypothesis is rejected and the signal hypothesis is supported.

In conclusion, this study will explore theories of D&O insurance and structures of corporate governance in Taiwan in detail. The monitoring and signal hypotheses will be developed by examining the differences between the United States and Taiwan, reviewing relevant literature and conducting analyses using a comparative viewpoint. Then, this study will test the proposed hypotheses by theoretical and empirical methods, and propose optimal suggestions for D&O insurance and corporate governance systems in Taiwan.

1.2 Rival Theories of the Purpose of Director & Officer Insurance

1.2.1 Monitoring Hypothesis: positive arguments

1.2.1.1 Analysis of literature

In 1990, Clifford G. Holderness pioneered research on D&O insurance and corporate governance. He has several important findings and arguments. First, ownership structure of a corporation has an impact on its performance and corporate governance. Because of more significant segregation between ownership and management, there are fewer agency conflicts for those corporations which have D&O insurance.³⁴ He proposed that insurers provide an external monitoring function of boards of directors and officers. This so-called “monitoring hypothesis” is supported by the results of his empirical research.³⁵ This monitoring hypothesis significantly affected many subsequent studies.

In sum, Clifford G. Holderness proposes that the monitoring function of D&O insurance has three dimensions.³⁶ First, before a policy is issued, the insurer will investigate the factors which affect exposure. This information is critical for the determination of premiums. Corporate governance issues of the insured affect both the potential legal risks of the insured and the indemnification liability of the insurer. In addition, the monitoring function is also revealed in policy coverage, and the conditions and duration of

³⁴ See Clifford G. Holderness, *Liability Insurers as Corporate Monitors*, 10 INT'L REV. L. & ECON. 115, 127 (1990).

³⁵ *Id.*, 129 (1990).

³⁶ *Id.*, at 118-20.

litigation.³⁷ Given the possibility of being forced to pay compensation, insurers have substantial incentives to monitor the status of the insured and prevent the occurrence of losses. Therefore, the corporate governance of the insured will be monitored.

In addition, the duties of directors³⁸ are always emphasized and proper risk management method for directors should not be ignored.³⁹ Otherwise, directors might manage businesses in a conservative way to avoid potential liability, or even be afraid to take the position. D&O insurance can both relieve the risks faced by boards of directors and encourage them to manage corporations in an active manner. Moreover, good corporate governance contributes to lowering the premiums needed to maintain D&O insurance.⁴⁰

D&O insurance can provide incentive for good corporate governance. George Kalchev confirms that insurance can mitigate the risk of bankruptcy, and firms with higher returns have demand less insurance.⁴¹ M. Martin Boyer even suggests that D&O insurance protects the wealth of shareholders to a greater extent than is the case for boards of directors.⁴²

The monitoring hypothesis has also discussed and tested in jurisdictions other than the United States. In 1997, Noel O'Sullivan empirically tested Holderness' monitoring

³⁷ *Id.*, at 119-20.

³⁸ Fiduciary duty can be divided in to two main branches - the duty of loyalty and the duty of care. The duty of loyalty is primarily a negative duty not to harm the principal. The duty of care is positive - a duty to promote the ends of the principal. See Arthur B. Laby, *Resolving Conflicts of Duty in Fiduciary Relationships*, 54 AM. U. L. REV. 75, 78 (2004). For more discussion, see Alan R. Palmiter, *Reshaping the Corporate Fiduciary Model: A Director's Duty of Independence*, 67 TEX. L. REV. 1351, 1353 (1989).

³⁹ See IAN YOUNGMAN, *supra* note 7, at 3.

⁴⁰ See Joshua Gold, *Director and Officer Insurance Personal and Advertising Injury Liability*, 32662 NBI-CLE 99, 118 (2006).

⁴¹ See George Kalchev, *The Demand for Directors' and Officers' Liability Insurance by US Public Companies* 53 (2004), <http://ssrn.com/abstract=565183>.

⁴² See M. Martin Boyer, *supra* note 6, at 8.

hypothesis in the United Kingdom. Noel O'Sullivan sampled 366 companies. He examined the relationship between purchases of D&O insurance and board composition, managerial ownership, and external shareholder control. His research supported the monitoring hypothesis.⁴³ John E. Core gathered data from Canadian firms, and examined the factors that determine firms' demand for D&O insurance. He found that companies that face greater litigation risks are more likely to purchase insurance and to carry higher limits and deductibles.⁴⁴ Confirmatory evidence was provided that the D&O insurance premium reflects the quality of the firm's corporate governance.⁴⁵ The overall results suggest that D&O premiums contain useful information about the quality of firms' governance. In Taiwan, Tsai-Jyh Chen and Chia-Hui Pang surveyed 105 of the largest 500 enterprises in 2008. Their research found that the potential demand for D&O insurance is related to overseas investments and the stock holdings of inside directors. In other words, purchases of D&O insurance is significantly related to corporate governance.⁴⁶

1.2.1.2 How the monitoring function works

1.2.1.2.1 Incentive of insurers

⁴³ See Noel O'Sullivan, *Insuring the Agents: The Role of Directors' and Officers' Insurance in Corporate Governance*, 64 J. RISK & INS. 545, 554 (1997).

⁴⁴ See John E. Core, *On the Corporate Demand for Director' and Officers' Insurance*, 64 J. RISK & INS. 63, 63 (1997).

⁴⁵ The other research of John E. Core supports this conclusion as well. See John E. Core, *The Directors' and Officers' Insurance Premium: An Outside Assessment of the Quality of Corporate Governance*, 16 J.L. ECON. & ORG. 449, 450 (2000).

⁴⁶ See Tsai-Jyh Chen & Chia-Hui Pang, *supra* note 16, at 171.

The difference between other outside monitors, such as credit rating agencies and auditors, is that insurers will suffer from the insured loss directly if the damage occurs. Hence, insurers have more incentive than other monitors to watch out for the quality of insured companies.⁴⁷ Similarly, because D&O insurance is quite competitive, insurers have to more carefully and seriously scrutinize the insured firms.⁴⁸ Based on his knowledge for the insured people, insurers can educate the insureds to decrease or even avoid risks.⁴⁹ In addition, insurers can use insurance clauses, obligations of disclosure and exclusions to control the insured risk and encourage the insured to mitigate risk.⁵⁰ In other words, insurers in Taiwan can use the regulations in Insurance Law to increase monitoring function. After considering the proposal of Clifford G. Holderness, in which the monitoring function of D&O insurance has three dimensions, the monitoring function of D&O insurance in Taiwan is analyzed in the following paragraphs.

1.2.1.2.2 Premiums

The insurance premium, the price that a company pays for D&O insurance, will convey important information about the quality of corporate governance of the insured corporations.⁵¹ Generally, the firms with higher risk and poor governance have to pay

⁴⁷ See Lea H. Stern & M. Martin Boyer, *Is Corporate Governance Risk Valued? Evidence from Directors' and Officers' Insurance* 29 (2010), <http://ssrn.com/abstract=1571752>.

⁴⁸ *Id.*

⁴⁹ See Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 210 (2012).

⁵⁰ See Wallace Wang, *The Relationship between the Deterrence Effect of D&O Insurance and Corporate Governance*, 156 TAIWAN L. REV. 141, 150-1 (2008).

⁵¹ See Sean J. Griffith, *Uncovering a Gatekeeper: Why the SEC Should Mandate Disclosure of Details concerning Directors' and Officers' Liability Insurance Policies*, 154 U. PA. L. REV. 1147, 1024 (2006).

more in insurance premiums.⁵² Differentiated premium provides people the “price” which results from their behavior, and incentives to change their activities.⁵³ Furthermore, experience rating is a mechanism which is usually used to control moral hazard.⁵⁴ Insurer will adjust premium according to the record of the insured.⁵⁵ Thus, great loss will result in higher insurance premium.⁵⁶ On the other hand, experience rating provides the insured to optimize his activity and then to decrease loss.⁵⁷ In such circumstance, premium can reflect the risk of the insured, and thus the disclosure of insurance premium is helpful for investors to evaluate the quality of the insured firms.

1.2.1.2.3 Amounts

In addition to premiums, the amount of D&O insurance, including the policy’s retentions and limits, can also provide information about the corporate governance of the insured companies.⁵⁸ Also, deductible and copayment provide the insured incentives to control loss, because he has to share the loss if that happens.⁵⁹ The information about insurance

⁵² *Id.* at 1185.

⁵³ See Omri Ben-Shahar & Kyle D. Logue, *supra* note 49, at 207-8.

⁵⁴ *Id.*, at 199. Patricia M. Danzon, *Tort Liability: A Minefield for Managed Care?*, 26 J. LEGAL STUD. 491, 479 (1997). Henry Hansmann & Reinier Kraakman, *Toward Unlimited Shareholder Liability for Corporate Torts*, 100 YALE L.J. 1879, 1890 (1991).

⁵⁵ Experience rate is still prospective, because insurer considers the record of the insured in the previous period and then decides the rate in the next period. In contrast, retrospective rate is to consider loss data in the period when insurance policy is still in effect. See John J. Koresko, V & Jennifer S. Martin, *Vevas, Welfare Plans, and Sec. 419a(F)(6): Is The IRS Trying to Regulate or Spread Propaganda?*, 32 SW. U. L. REV. 1 (2003).

⁵⁶ See Eric D. Beal, *Posner and Moral Hazard*, 7 CONN. INS. L.J. 81, 86 (2001).

⁵⁷ See Kenneth S. Abraham, *Environmental Liability and the Limits of Insurance*, 88 COLUM. L. REV. 942, 950 (1988).

⁵⁸ See Sean J. Griffith, *supra* note 51, at 1185.

⁵⁹ See Omri Ben-Shahar & Kyle D. Logue, *supra* note 49, at 208-9.

amount demonstrates what insurers are willing to pay and reflects insurers' evaluation for the insureds' qualities and risks. Additionally, this is helpful to make the comparison between different companies more meaningful.⁶⁰

1.2.1.2.4 Type of coverage

The amount of side A coverage can convey the signal about the confidence of the managers concerning the liability risk they might face.⁶¹ Side B and C coverage provides information regarding the extent to which managers use corporate capital to enhance their personal compensation packages.⁶²

1.2.1.2.5 Identity of Insurers

Different insurers may have different reputations for screening governance risk.⁶³ The investors may draw different conclusions from whether the insurer is a market leader, unknown or cut-rate insurer.⁶⁴

1.2.1.2.6 Exclusions

Exclusions in D&O insurance policies are also important for monitoring function. Moral hazard is typically referred to the tendency to reduce incentives to protect against loss or

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² *Id.* at 1024-5.

⁶³ *Id.* at 1025.

⁶⁴ *Id.* In order to win more market share, the cut-rate insurer may lower the premium and thus lessen the concern for corporate governance of insured firms. Hence, the D&O insurance information should be considered more diligently if contracted with such insurer.

to minimize the cost of a loss.⁶⁵ In order to mitigate moral hazard⁶⁶ and control risk, there are exclusion clauses in insurance policies to exclude uninsured risk. As the same as general insurance policies, there are exclusions in almost all D&O insurance policies. The most common exclusions include personal injury exclusions, personal conduct exclusions, insured v. insured exclusions, and pollution exclusions.⁶⁷ Claims for personal injury or bodily injury are excluded by most D&O policies.⁶⁸ These losses are covered by other types of insurances, such as commercial general liability ("CGL"). Insured v. insured exclusions indicate that the insurer is not liable for the damage which is brought by one insured against another insured.⁶⁹ The purpose is to avoid conflicts among the insured.⁷⁰ Essentially, in order to avoid unpredictable risk, damages caused by pollutions or catastrophes are also usually excluded.

Among these exclusions, what is more related with corporate governance is conduct exclusions.⁷¹ Usually, the insurer is not liable for the intentional behavior of the insured.

⁶⁵ See TOM BAKER, INSURANCE LAW AND POLICY: CASES AND MATERIALS 4 (2d ed. 2008).

⁶⁶ For more discussion about moral hazard in insurance, see Tom Baker, *On the Genealogy of Moral Hazard*, 75 Tex. L. Rev. 237, 247 (1996).

⁶⁷ See Travis S. Hunter, *Ambiguity in the Air: Why Judicial Interpretation of Insurance Policy Terms Should Force Insurance Companies to Pay for Global Warming Litigation*, 113 PENN ST. L. REV. 267, 275 (2008).

⁶⁸ See Joseph P. Monteleone & Emy Poulad Grotell, *Symposium: Coverage for Employment Practices Liability under Various Policies: Commercial General Liability, Homeowners', Umbrella, Workers' Compensation, and Directors' and Officers' Liability Policies*, 21 W. NEW ENG. L. REV. 249 (1999).

⁶⁹ *National Union Fire Insurance Co. v. Seafirst Corp.*, 662 F. Supp. 36, 38 (WD Wash. 1986). *Foster v. Kentucky Hous. Corp.*, 850 F. Supp. 558, 561 (ED Ky. 1994).

⁷⁰ There is no use for this exclusion when derivative actions are brought by shareholders against directors and officers or actions are brought by a receiver or bankruptcy trustee. This is because these entities are deemed to act for the benefit of the corporation's creditors but not for the corporations. See Robert D. Chesler & Cindy R. Tzvi, *D&O Insurance: Now You See It, Now You Don't*, 13:6 METROPOLITAN CORP. COUNS. 38, 38 (2005), available at <http://www.metrocorp.counsel.com/articles/5509/project-corporate-counsel-law-firms-do-insurance-now-you-see-it-now-you-dont>.

⁷¹ See Wallace Wang, *supra* note 50, at 156.

In other words, if the insured cause the occurrence of the insured accident intentionally, the insurer is not liable for indemnification. The substance of insurance is to protect unpredictable risk, and the occurrence of accident caused by intentional behavior is obvious not unpredictable. Indemnification to such accident is contrary to the substance of insurance which is also contrary to public policy. In addition, in order to decrease moral hazard, it is also necessary to decline the indemnification for the fraud or intentional behavior. In D&O insurance, cases of fraud and gross negligence are usually excluded as well.⁷² Hence, if the insured commits the exclusions above, he or she will not get compensation from his or her D&O insurer. This can create deterring effect and thus secure corporate governance of the insured companies.

1.2.1.2.7 Summary

From the analysis above, it is illustrated that the D&O insurance is beneficial to corporate governance. Because of the potential compensation liability, insurers should have strong incentives to securitize insured corporations and thus decide premiums. Insurers will charge more against insured corporations which have higher litigation risk, and charge less against insured corporations which have lower litigation risk. In order to decrease premiums, corporations will strive to decrease litigation risk, and thus corporate governance will be improved. This argument positively evaluates D&O insurance's

⁷² See <http://www.generali.com/Generali-Group/Governance/corporate-bodies/D-and-O-Policy/> (last visited Jan. 15, 2013).

impact on corporate governance. However, compared with the number of studies in the United States, there are fewer relevant studies in Taiwan. Therefore, this proposal aims to test this hypothesis in the backgrounds of Taiwan.

1.2.2 Missing monitor: opponent arguments

By contrast, some researchers argue against the monitoring hypothesis and the positive relationship between the purchase of D&O insurance and corporate governance. Tom Baker and Sean J. Griffith examine how liability insurers transmit and transform the content of corporate and securities law. This article discusses how D&O insurers evaluate risk in order to arrive at that premium number. It found that, in addition to financial analysis of corporations, underwriters focus primarily on the corporate governance of the prospective insured, especially “deep governance” variables such as culture and character.⁷³ In other words, D&O insurers do not offer loss prevention services to their insured corporations, and they do not monitor the corporate governance of their insured corporations.⁷⁴

In addition, moral hazard is a significant concern in liability insurance. D&O insurance may considerably nullify the deterrence effects of litigation against directors, causing directors to be less attentive to their duties to shareholders.⁷⁵ Some countries such as

⁷³ See Tom Baker & Sean J. Griffith, *supra* note 7, at 543.

⁷⁴ See DIR. & OFF. LIAB § 4:27. See also Tom Baker & Sean J. Griffith, *How the Merits Matter: Directors' and Officers' Insurance and Securities Settlements*, 157 U. PA. L. REV. 755, 831 (2009).

⁷⁵ See Clifford G. Holderness, *supra* note 34, at 115.

Germany prohibit D&O insurance because of the problem of moral hazard.⁷⁶ The underwriting cycle also plays an important role⁷⁷. In a difficult market, underwriters become more selective, more interested in higher attachment points, less willing to offer high limits, less willing to negotiate contract terms, and able to command dramatically higher prices for what amounts to less coverage.⁷⁸ Hence, premiums are not always related to litigation risk of insured corporations. This provides a different viewpoint from previous studies.

The similar perspective is further provided by Tom Baker and Sean J. Griffith. They indicate again that in the vast majority of instances, insurers do not provide corporate governance.⁷⁹ Usually insurers might be expected to provide loss prevention functions. For, example, insurers might provide discounts to encourage corporations to improve corporate governance and thus decrease litigation risks. However, according to empirical results, insurers do not do this. Sometimes insurers give advice to corporations, but that is usually ignored by the corporations. In the end, D&O insurers do not provide loss prevention function.⁸⁰

Tom Baker and Sean J. Griffith conducted in-depth interviews with underwriters,

⁷⁶ See María Gutiérrez, *An Economic Analysis of Corporate Directors' Fiduciary Duties*, 34(3) RAND J. ECON.516, 517 (2003).

⁷⁷ See Joshua Dobiac, *I Came, I Saw, I Underwrote: D & O Liability Insurance's Past Underwriting Practices and Potential Future Directions*, 14 CONN. INS. L.J. 487, 495 (2008).

⁷⁸ See Tom Baker & Sean J. Griffith, *supra* note 7, at 507.

⁷⁹ As one of their interviewees stated: "You had asked me on the phone whether companies ... changed their behavior... for the benefit of the D&O insurers. I don't think they are. I think the brokers sometimes can put lipstick on the pig, but that is a marketing feature. And it seems to me that however high D&O premiums climb, they are not going to climb high enough to get the companies to really, really pay attention." Tom Baker & Sean J. Griffith, *supra* note 5, at 1808.

⁸⁰ *Id.*, at 1808-12.

actuaries, brokers, lawyers and corporate risk managers. They found that what underwriters are concerned about are “deep governance” variables such as culture and character, variables which are not confined to the financial analysis of the insured companies.⁸¹ Moreover, the advice given by insurers is usually ignored by insured companies.⁸²

Moreover, Joshua Dobiac evaluates how corporate governance may be a compelling factor in individualized underwriting. In conclusion, he has a similar opinion as Baker and Sean J. Griffith: the governance role of D&O insurance is minor and whatever effect poor governance has on pricing is not adequate to change corporate behavior.⁸³ Boyer and Delvaux-Derome’s conclude that firms with weak governance systems facilitate opportunistic behavior and are consequently to buy D&O insurance.⁸⁴ This implies that the positive relationship between the purchase of D&O insurance and corporate governance of the insured companies is questionable. From this point of view, the purchase of D&O insurance is not necessary for the purposes of corporate governance and risk management. This is also the reason this proposal intends to reexamine the relationship between D&O insurance and corporate governance in Taiwan.

From the analysis of literature above, it could be found that D&O insurance’s impact on corporate governance is highly controversial. There are two main opposing arguments

⁸¹ See Tom Baker & Sean J. Griffith, *supra* note 7, at 543.

⁸² See Tom Baker & Sean J. Griffith, *supra* note 5, at 1808-12.

⁸³ See Joshua Dobiac, *supra* note 77, at 508.

⁸⁴ See M. Martin Boyer & Mathieu Delvaux-Derome, *The Demand for Directors' and Officers' Insurance in Canada* 14 (2002), <http://ideas.repec.org/p/cir/cirwor/2002s-72.html>.

about this issue. One opinion argues that D&O insurance plays an important corporate governance role. This is mainly based on the monitoring hypothesis in which an insurer will thoroughly scrutinize the insured. On the other way, opponents argue that there is no relationship between the purchase of D&O insurance and corporate governance. D&O insurance does not always play an important role in corporate governance. Moreover, moral hazard might cause more negative effects. In the situation that D&O insurance is purchased out of managerial opportunism, it is more impractical to believe D&O insurance's positive impact on corporate governance. The purpose of this research is to examine the monitoring hypothesis in Taiwan. Because of many differences between the United States and Taiwan, there are many problems waiting to be solved. The hypotheses can be developed after the analysis of corporate governance and development of D&O insurance in Taiwan.

1.2.3 Proposal of signal hypothesis

Analysis above demonstrates different argument about monitoring hypothesis and the monitoring function of D&O insurance. Even though they have different argument and reasoning about the monitoring function of S&O insurance, but most of them admit that D&O insurance can convey certain signal. In other words, even though D&O insurance cannot play a role of spur to urge firms optimize their corporate governance, it may be an

important signal to the market.⁸⁵ From the details of insurance package and premiums, insurers' assessment for the insured firms would convey to the investors. If D&O insurance enhances the protection of directors and implies the concern of corporate governance of firms, then D&O insurance shall imply good signal. In contrast, if D&O insurance would induce moral hazard, opportunistic behavior and problem of asymmetric information, this implies damages would happen. As a result, D&O insurance would convey negative signal.

The signal effect of D&O insurance can also be found by the attitude of the insured firms. Jinyoung Park tests D&O insurance and voluntary disclosure of Canadian firms. He finds that an association exists between D&O insurance coverage, disclosure frequency and precision.⁸⁶ The more insurance coverage, the more optimistic information is disclosed. That information would also be more precise and timely.⁸⁷ Then, significantly favorable response to this information will be given by market.⁸⁸ This implies the signal effect of D&O insurance, and the favorable response from market gives firms more intensives to purchase D&O insurance.

Because D&O insurance will emit some signal to the market, the decision of D&O insurance purchase might not be a pure consideration of insurance purchase. If D&O insurance can bring positive effect, firms with good corporate governance might purchase

⁸⁵ See Sean J. Griffith, *Unleashing a Gatekeeper: Why the SEC Should Mandate Disclosure of Details Concerning Directors' & Officers' Liability Insurance Policies* (2005), <http://ssrn.com/abstract=728442>.

⁸⁶ See Jinyoung Park, *The Effect of Directors' and Officers' Liability Insurance and Indemnification on Voluntary Disclosure: Evidence from Canadian Firms 4* (2005), http://som.umflint.edu/research/docs/20052006/200506_JP_I.pdf. (last visited Jan. 15, 2013).

⁸⁷ *Id.*

⁸⁸ *Id.*

D&O insurance to demonstrate their emphasis on corporate governance and attract more investors. For the firms with bad corporate governance, it is also possible for them to purchase D&O insurance to establish their reputation.⁸⁹ In contrast, if D&O insurance can bring negative effect, every firm will avoid purchasing D&O insurance because this may signalize that there are some problems in companies.⁹⁰ In the end, what firms cares is not only the indemnification function of D&O insurance, but also how to create the signal they desired.

Followed by previous literature review, this dissertation proposes the alternative hypothesis to monitoring hypothesis, which is signal hypothesis. This hypothesis argues that D&O insurance has significant effect in signal transmission. In addition to indemnification, the signal effect is another important consideration in insurance purchase. Except signal effect, other additional function of D&O insurance is disputable, especially monitoring function. D&O insurance is not a component of monitoring mechanism for firms, and its monitoring function is limited. In consequence, the argument of monitor hypothesis that the firms with poor corporate governance will have more demand for D&O insurance is not sustainable.

A series of empirical tests will be conducted in this study. The monitoring and signal effect of D&O insurance will be tested. The concerns about asymmetric information and adverse selection will also be tested to make sure the previous results will not be

⁸⁹ See M. Martin Boyer, *supra* note 19, at 8-9.

⁹⁰ *Id.*

influenced.

1.3 D&O Insurance in Taiwan

1.3.1 Demand for D&O insurance

Taiwan has adopted the traditions of civil law countries by adopting a two-tier board system, directors and supervisors, in Taiwanese corporate governance structures.⁹¹ The primary purpose of supervisory boards is to monitor the board of directors, including activities such as reviewing transactions that involve potential conflicts of interest, financial reporting processes and internal controls. In sharp contrast to certain European countries, supervisory boards in Taiwan do not include representatives of labor or other stakeholders.⁹² Taiwanese supervisory boards actually work much like outside directors in common law countries.⁹³

In addition to the existing two-tier board system, Taiwan has also followed common law countries by enacting mandatory board reforms, including independent directors for publicly-traded companies.⁹⁴ In 2007, Taiwan reformed the Securities and Exchange Act and formally adopted the institution of independent director.⁹⁵ However, this confers minority status on independent directors, and requires that there be a clear line of demarcation with respect to potential overlaps of power between supervisors and

⁹¹ See Christopher John Gulinello, *The Revision of Taiwan's Company Law: The Struggle Toward A Shareholder-Oriented Model In One Corner of East Asia*, 28 DEL. J. CORP. L. 75, 95 (2003).

⁹² *Id.*

⁹³ See Nancy L. Wong, *Easing Down the Merit-Disclosure Continuum: A Case Study of Malaysia and Taiwan*, 28 LAW & POL'Y INT'L BUS. 49, 94, FN 209 (1996).

⁹⁴ See Ronald J. Gilson & Curtis J. Milhaupt, *supra* note 15, at 343 (2005).

⁹⁵ Securities and Exchange Act Art. 14-2.

independent directors.⁹⁶ Regarding the factors affecting D&O insurance purchases in Taiwan, these factors may be observed from following perspectives.

1.3.1.1 Statutes

The fundamental statutes which spell out the potential liability of directors and officers are as follows:⁹⁷

- A. Civil Code Art. 544 *The mandatory shall be liable to the principal for any injury resulting from his negligence in the execution of the affairs commissioned or from such acts as are beyond his authority.*
- B. Company Act Art. 23 *The responsible person of a company shall have the loyalty and shall exercise the due care of a good administrator in conducting the business operation of the company; and if he/she has acted contrary to this provision, shall be liable for the damages to be sustained by the company there-from. If the responsible person of a company has, in the course of conducting the business operations, violated any provision of the applicable laws and/or regulations and thus caused damage to any other person, he/she shall be liable, jointly and severally, for the damage to such other person.*
- C. Company Act Art. 28 *Any and all public announcements to be made by*

⁹⁶ See Wallace Wen-Yeu Wang & Carol Yuan-Chi Pang, *Minority Controlling Shareholders: An Analytical Framework and Its Application to Taiwan*, 2 NAT'L TAIWAN U. L. REV. 81, 103 (2007).

⁹⁷ This information can be obtained in Law bank, <http://www.lawbank.com.tw/> (last visited Jan. 15, 2013).

a company shall be published in a conspicuous place on a daily news dissertation circulating in the municipality or county (city) wherein the company is located, except for the public offering companies subject to the provisions otherwise stipulated by the securities and exchange control authority.

- D. Company Act Art. 226 *In case supervisor is liable to compensate the company or a third party and a director is also liable, such supervisor and director shall be joint debtors.*

These statutes are a primary foundation of the liabilities for directors and officers. In order to clarify the duties of directors, Taiwan has decided to follow the framework of common law with respect to fiduciary duties.⁹⁸ In 2009, Taiwan modified the original Article 23 of the Company Act, and further clarified the responsibilities, duties and loyalties of directors. This is believed to have increased the legal risks faced by directors.

1.3.1.2 Collective action

Class action lawsuits are a major source of directors' liabilities. In Taiwan, the Securities and Futures Investors Protection Center (SFIPC) was established to protect investors and

⁹⁸ Fiduciary duty can be divided into two main branches - the duty of loyalty and the duty of care. The duty of loyalty is primarily a negative duty not to harm the principal. The duty of care is positive - a duty to promote the principal. See Arthur B. Laby, *supra* note 38, at 78. For more discussion, see Alan R. Palmiter *supra* note 38, at 1353.

help them file collective action lawsuits.⁹⁹ After the SFIPC has been empowered by a minimum of 20 securities investors or futures traders, the SFIPC can file an arbitration or class action lawsuit as the representative of securities investors or futures traders.¹⁰⁰ From 1998 to 2010, the SFIPC has processed about 80 class action lawsuits. The development of class action lawsuits has increased the legal risks faced by directors and subsequently increased the incentive to purchase D&O insurance.

1.3.1.3 Promotion of D&O insurance

The purchase of D&O insurance is encouraged by government authorities in Taiwan for the purpose of improving risk management and corporate governance. This tendency extends beyond symbolic gestures and includes regulations.¹⁰¹ The purchase of D&O

⁹⁹ In Taiwan, the Securities Investors and Futures Traders Protection Act took effect on January 1, 2003, authorizing the government to establish an institution for the purpose of investor protection. Hence, the Securities and Futures Investors Protection Center was established with court approval in 2003. See <http://www.sfipc.org.tw/english/about/02.asp> (last visited Jan. 15, 2013). Detailed introduction to SFIPC, see Wallace Wen-Yeu Wang & Jian-Lin Chen, *Reforming China's Securities Civil Actions: Lessons from Pslra Reform in the U.S. and Government-Sanctioned Non-Profit Enforcement in Taiwan*, 21 COLUM. J. ASIAN L. 115, 143-8 (2008).

¹⁰⁰ Securities Investor and Futures Trader Protection Act Art.28 Sec.1: "For protection of the public interest, within the scope of this Act and its articles of incorporation, the protection institution may submit a matter to arbitration or institute an action in its own name with respect to a securities or futures matter arising from a single cause that is injurious to multiple securities investors or futures traders, after having been so empowered by not less than 20 securities investors or futures traders. The securities investors or futures traders may withdraw the empowerment to submit a matter to arbitration or institute an action prior to the conclusion of oral arguments or examination of witnesses and shall provide notice to the arbitral tribunal or court." This information can be obtained in <http://eng.selaw.com.tw/FLAWDAT0202.asp> (last visited Jan. 15, 2013). It is believed that this improves the litigation system and gradually benefits the development of D&O liability insurance. See WALLACE WEN-YEU WANG, CORPORATION LAW 548 (3d ed. 2006). Actually, this is affected by the class action in the United States. For more discussion about the effect of class action in the United States on other countries, see Stefano M. Grace, *Strengthening Investor Confidence in Europe: U.S.-Style Securities Class Actions and the Acquis Communautaire*, 15 J. TRANSNAT'L L. & POL'Y 281, 293-99 (2006).

¹⁰¹ Corporate Governance Best-Practice Principles for TWSE/GTSM Listed Companies Art. 39: "According to the articles of incorporation or resolution adopted in the shareholders' meeting, a TWSE/GTSM listed company may take out liability insurance for directors with respect to their liabilities resulting from exercising their duties during their terms of occupancy so as to reduce and spread the risk of

insurance is regarded as a factor in the evaluation of corporate governance according to the government's website.¹⁰² This presumably has increased demand for D&O insurance.

1.3.2 Overview of D&O insurance policies and clauses

In addition to the basic function of indemnification, D&O insurance has some characteristics worth more attention. First, D&O insurance has the function of advancing defense expenses. The reason is that, if defense expenses, such as attorney fees and litigation fees, are paid only after cases are settled, the protection offered by litigation would arrive late and have little meaning. Hence, typical D&O insurance offers to pay defense expenses in advance, prior to the complete settlement of claims. Most D&O insurance policies have such clauses, but the conditions may differ.

Second, in D&O insurance, the insurer usually expands the protection offered to the insured by widening the definition of who is insured. For example, "the insured" may not only include directors, officers, staff members involved in conducting the company's management function in the past, present and future, and their legal spouses, heirs, trustees and legal agents.¹⁰³

material harm to the company and shareholders arising from the wrongdoings or negligence of a director." Art 49: "According to the articles of incorporation or resolution adopted in a shareholders' meeting, a TWSE/GTSM listed company may take out liability insurance for supervisors with respect to their liabilities resulting from exercising their duties during their terms of occupancy so as to reduce and spread the risk of material harm to the company and shareholders arising from the wrongdoings or negligence of a supervisor." This information can be obtained in the website of Taiwan Stock Exchange Corporation (TWSE), http://www.twse.com.tw/ch/listed/governance/cg_02.php (last visited Jan. 15, 2013).

¹⁰² See Market Observation Post System, http://emops.twse.com.tw/emops_all.htm (last visited Jan. 15, 2013).

¹⁰³ See AIG General Insurance Management Liability Protection for You & Your Business: Non-US Securities.

D&O insurance also has special characteristic during the discovery period. In general, there are two bases for liability insurance. The “claims made” basis provides coverage for claims made during the period of insurance, regardless of when the cause occurs. By contrast, “occurrence” basis insurance provides coverage which occurs in the period of insurance, regardless of when the claim is made.¹⁰⁴ The “occurrence” basis means that insurers must provide coverage for events which may have occurred long ago. This creates a long period (“tail”) of exposure for insurers.¹⁰⁵ Hence, D&O insurance is customarily offered on a “claims made” basis rather than on an “occurrence” basis.¹⁰⁶ The problem is that, in a “claims made” basis, if the timing of cause occurs close to the end of the policy period, insured parties might have insufficient time to report losses. In order to solve this problem, the insurer usually provides “discovery periods” or “extended reporting periods” during which insured parties could report losses and obtain compensation. In this manner, a long and free discovery period is beneficial to the insured. In D&O insurance, some insurers provide discovery periods free of charge,¹⁰⁷ but some insurers charge for discovery periods. Some insurers provide free basic discovery periods and charge for extensions.¹⁰⁸

¹⁰⁴ See Michael D. Sousa, *Making Sense of the Bramble-Filled Thicket: The “Insured vs. Insured” Exclusion in the Bankruptcy Context*, 23 EMORY BANKR. DEV. J. 365, 379 (2007).

¹⁰⁵ See Armen Shahinian & Scott D. Baron, *The Notice Defense to Financial Institution Bond Claims Dissected: No Showing of Prejudice from Late Notice Should Be Required*, 2 FIDELITY L. ASS’N J. 1, 13 (1996).

¹⁰⁶ See Michael D. Sousa, *supra* note 104, at 378.

¹⁰⁷ See <http://www.chartisinsurance.com.tw/BusinessContent.aspx?InsID=22501050000> (last visited Jan. 15, 2013).

¹⁰⁸ For example, the South China Insurance Company provides a 90-day discovery period for free, and charges to extend it.

Similarly, the “retrospective date” will solve another issue under the “claim made” basis. Under the “claims made” basis, even though claims are usually made during the policy period, the occurrence sometimes may happen prior to the policy period. This increases the uncertainty of liability for insurers. Hence, D&O insurers usually set up “retrospective dates,” which means that the insured could only obtain the compensation when occurrences take place after the retrospective date.¹⁰⁹ This is done in order to reduce the liability. However, some D&O insurers have no such limitations.¹¹⁰

1.3.3 Relevant regulations and policies

As mentioned above, the operation of the monitoring function may base on the incentives of insurers, for instance, premiums, amounts, type of coverage, and exclusions. There are more regulations about exclusion and misrepresentation in Taiwanese insurance law and the operation of the monitoring function of D&O insurance may be affected.

1.3.3.1 Exclusions

Under the argument of the monitoring hypothesis, exclusions of D&O insurance policies can stimulate the insured to watch out the quality of corporate governance and deter intentional acts. In Taiwan, The general regulation about the exclusion for fraud and intentional behavior is shown in insurance law art.29:

¹⁰⁹ See, e.g., the policy of Taian Insurance Company has such limitation.

¹¹⁰ See, e.g., the policy of Federal Insurance Company.

An insurer is liable to indemnify for damage caused by unforeseeable events or force majeure. However, this requirement is not applicable when limitations are expressly stated in the insurance contract.

An insurer is liable to indemnify for damage caused by the fault of the proposer or insured. However, this rule is not applicable to loss caused by a willful act of the proposer or insured.

Hence, if the damage is caused by the proposer or insured intentionally, apparently this is not unforeseeable for the insurer. In addition, this damage is caused by a willful act of the proposer or insured, and thus the insurer is not liable for this damage. Some examples are making the company be a shareholder of unlimited liability in another company or a partner of a partnership enterprise,¹¹¹ lending the capital of the company to other shareholders or people,¹¹² acting as a guarantor of other people,¹¹³ redeeming or buying back any of its outstanding shares,¹¹⁴ short-swing transacting¹¹⁵ and insider trading.¹¹⁶ These acts all are intentional and D&O insurers are not liable for damages caused by these acts. Almost all D&O insurance policies in Taiwan contain the clauses of exclusions.¹¹⁷ Hence, if the insured directors or officers behave intentionally, then insurers cannot indemnify the damages. By this way, the insured directors or officers will

¹¹¹ Taiwanese Company Act Art. 13 Sec1.

¹¹² Taiwanese Company Act Art. 15.

¹¹³ Taiwanese Company Act Art. 16.

¹¹⁴ Taiwanese Company Act Art. 167 Sec1.

¹¹⁵ Taiwanese Securities and Exchange Act Art. 157 Sec1.

¹¹⁶ Taiwanese Securities and Exchange Act Art. 157-1 Sec1.

¹¹⁷ See, e.g., the Directors, Officers and Company Liability Insurance Policy of Zurich Insurance Taiwan.

have less incentive to cause damages, and the companies will have more incentives to monitor and decrease the intentional behavior of the insured directors or officers.

It is true that if the proposer or the insured want to get indemnification they have to avoid willful behavior. However, is this reasoning always reliable? It may be doubtful. For example, short-swing transacting and insider trading usually bring large benefit for the actors. If the proposer or the insured decide to act something illegal intentionally, knowing that this act may cause the insured to lose D&O insurance compensation, this may mean that the proposer or the insured can get more benefit from these acts than the loss of insurance compensation. In other words, facing the great benefit of intentional behavior, it is not surprise for the proposer and insured not to consider insurance compensation. Hence, more evidence is needed to prove that exclusions are helpful in the monitoring function of D&O insurance to corporate governance.

1.3.3.2 Misrepresentation

In the insurance law in Taiwan, the regulation of misrepresentation of the proposer or insured contains three parts: 1. the obligation of disclosure at the time contract is made; 2. the obligation of disclosure at the time when risk is increasing; and 3. the obligation of notification at the time when accident happens. In the circumstance of D&O insurance, the quality of corporate governance of the insured companies can be monitored by these mechanisms.

A. First, the obligation of disclosure at the time contract is made is shown in Taiwanese insurance law art.64:¹¹⁸

At the time a contract is entered into, the proposer shall make truthful representations in response to the written inquiries of the insurer.

If the proposer has made any willful concealment, nondisclosure through its own fault, or misrepresentation, and such concealment, nondisclosure, or misrepresentation is sufficient to alter or diminish the insurer's estimation of the risk to be undertaken, the insurer may rescind the contract; the same shall apply after the risk has occurred, provided that this provision does not apply where the proposer proves that the occurrence of the risk was not based upon any fact that it did or did not represent.

The right to rescind as stated in the preceding paragraph shall be extinguished if not exercised within one month of the time the insurer knows of the cause for rescission. Once two years have elapsed after the contract is entered into, the contract may not be rescinded even if cause for rescission exists.

In the circumstance of D&O insurance, the insured companies should make truthful representations in response to the written inquiries of the insurer. In order to assess the risk which insured companies may encounter, insurer will endeavor the quality of the

¹¹⁸ This can be obtained in Law Bank, <http://db.lawbank.com.tw/Eng/FLAW/FLAWDAT0201.asp> (last visited Jan. 15, 2013).

insured companies. Thus, the insurers will inquiry important details which may cause potential litigation risk. For example, Federal Insurance Company in Taiwan requests that the insured provide information including:¹¹⁹ ownership structure,¹²⁰ any material changes,¹²¹ accounting practices,¹²² the conduct of business in other jurisdictions, outside directors, employee practices,¹²³ the details of prior insurance and prior knowledge.¹²⁴ Facing the writing inquiry of insurers and insurance law art.64, the insured companies have to make truthful representations, or otherwise the contract may be rescinded by insurers. By doing this, the information about the quality of corporate governance of the insured companies can be conveyed.

B. Similarly, after the insurance is made, if the insured risk has changed, the insured has the duty to notice the insurer and let insurer have a chance to reassess the risk. This is shown in Taiwanese insurance law art.59:¹²⁵

¹¹⁹ See the application of D&O insurance of Federal Insurance Company. This information can be obtained in the database of Taiwan Insurance Institute, <http://insprod.tii.org.tw/database/insurance/index.asp> (last visited Jan. 15, 2013).

¹²⁰ *Id.* “the name and ownership percentage of any shareholder directly or beneficially owning 5% or more of the issued shares of any applicant”.

¹²¹ *Id.* “any acquisitions of, tender offers for or mergers with any other organization”.

¹²² *Id.* “the question that has the applicant changed or is it considering changes to its revenue recognition or other accounting practices?”

¹²³ *Id.* “the question that has the applicant undertaken any staff retrenchments or reductions during the last 6 years or does it anticipate making any staff retrenchments or reductions in the next 12months?”

¹²⁴ *Id.* “the question that has the applicant or any person proposed for coverage given notice under the provisions of any prior or current directors’ & officers’ liability and company reimbursement insurance policy, management liability policy, employment practices liability policy or similar insurance of facts or circumstances which might give rise to a claim being made against any such person?”

¹²⁵ This can be obtained in Law Bank, <http://db.lawbank.com.tw/Eng/FLAW/FLAWDAT0201.asp> (last visited Jan. 15, 2013).

A proposer required to serve notice of circumstances that increase risk as stated in the insurance contract shall notify the insurer upon becoming aware of the circumstances.

If the increase in risk is caused by an act of the proposer or the insured, and the risk is increased to the extent that the premium should be increased or the contract terminated, the proposer or the insured shall serve prior notice to the insurer.

If the increase in risk is not caused by an act of the proposer or the insured, the proposer or the insured shall notify the insurer within 10 days of becoming aware of the increase in risk.

When risk is diminished, the insured may request the insurer to adjust the premium.

If the proposer fails to notice, different regulations will be applied depending on different situations. If the increase in risk is caused by an act of the proposer or the insured, the insurer can reclaim to rescind the contract according to art. 57.¹²⁶ If the increase in risk is not caused by an act of the proposer or the insured, the insurer cannot reclaim to rescind the contract according to art. 57, but can reclaim compensation according to art.63.¹²⁷

When making insurance contract, the insurer will assess the status of the insured companies and their corporate governance, and then decide the premiums, limits,

¹²⁶ Taiwanese insurance law art. 57.

¹²⁷ Taiwanese insurance law art. 63.

retentions and other conditions of the policies. However, if the risk has changed, the insured companies have to notify insurers to avoid the rescinding of contract or compensation. Thus, the change of the quality of corporate governance of the insured companies will be demonstrated. The monitoring or signal function of D&O insurance can thus be exerted. Moreover, if the insured companies fail to do so, the consequence depends on whether the increase of risk is caused by an act of the proposer or the insured or not.

In the circumstance of D&O insurance, the insured companies and insurers may have conflicting interests. From the perspective of the insurers, they will endeavor to prove that the risk is caused by an act of the proposer or the insured. For example, the directors are negligent, not diligent, and not protected by business judgment rule and so on. In contrast, the insured will endeavor to counter this claim, and prove that the proposer or the insured is not blamable. Thus, the insurer will argue that the policy should not be rescinded, but only compensation is sufficient. No matter which side is more persuasive, this dispute itself is helpful to signal the quality of governance of the insured companies and increase the transparency.

C. Third, when the insured accident occurs, proposers, the insured, or beneficiaries should notify the insurers to get indemnification. This is

shown in Taiwanese insurance law art.58:¹²⁸

When a proposer, insured, or beneficiary experiences an event for which the insurer bears insurance liability, such party shall notify the insurer within five days from becoming aware of the occurrence, except where otherwise provided in this Act or stipulated in the contract.

In the circumstance of D&O insurance, when proposers, the insured, or beneficiaries request indemnification, certainly the occurrence of claims, litigations and judgments will be disclosed. If they fail to do so, Taiwanese insurance law art. 63 will be applied here as well. They shall be liable for loss suffered by the insurer as a result. In order to request indemnification and avoid potential compensation, proposers, the insured, or beneficiaries will notify the insurers when accidents happen. Thus, the status of insured companies will be disclosed at this time.

Summing up, the obligations of disclosure of the proposer or insured in Taiwanese insurance law will secure and improve the monitoring function of D&O insurance on corporate governance. Proposers and insured companies should make truthful representations, notify insurers when risks changed and accidents occur. In order to follow these regulations and avoid rescinding of contract, proposers and insured companies have to notify insurers.

¹²⁸ This can be obtained in Law Bank, <http://db.lawbank.com.tw/Eng/FLAW/FLAWDAT0201.asp> (last visited Jan. 15, 2013).

FIGURES AND TABLES

Figure 1.1: A comprehensive chart for issues and methodologies

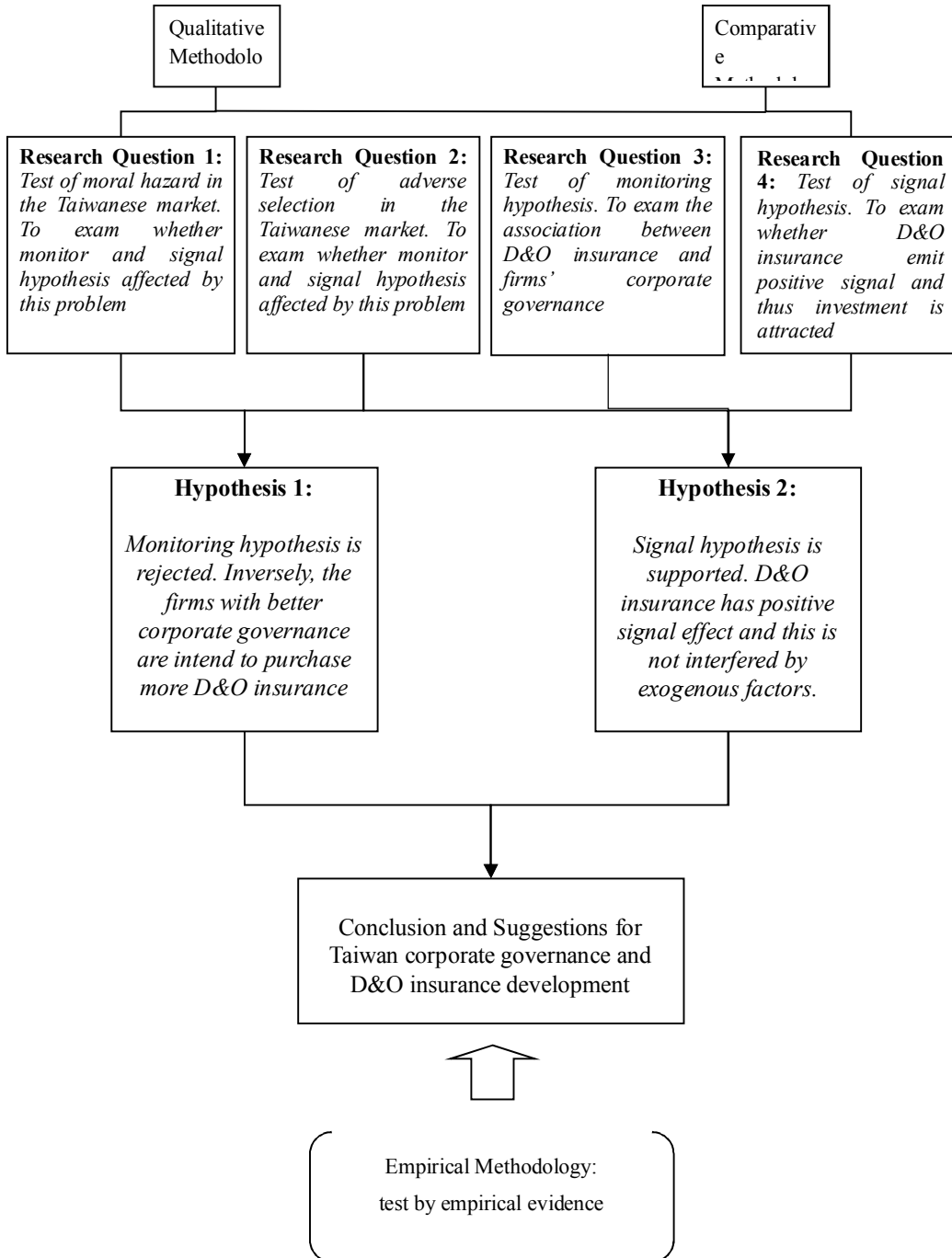


Figure 1.2 Illustrations for issues and methods

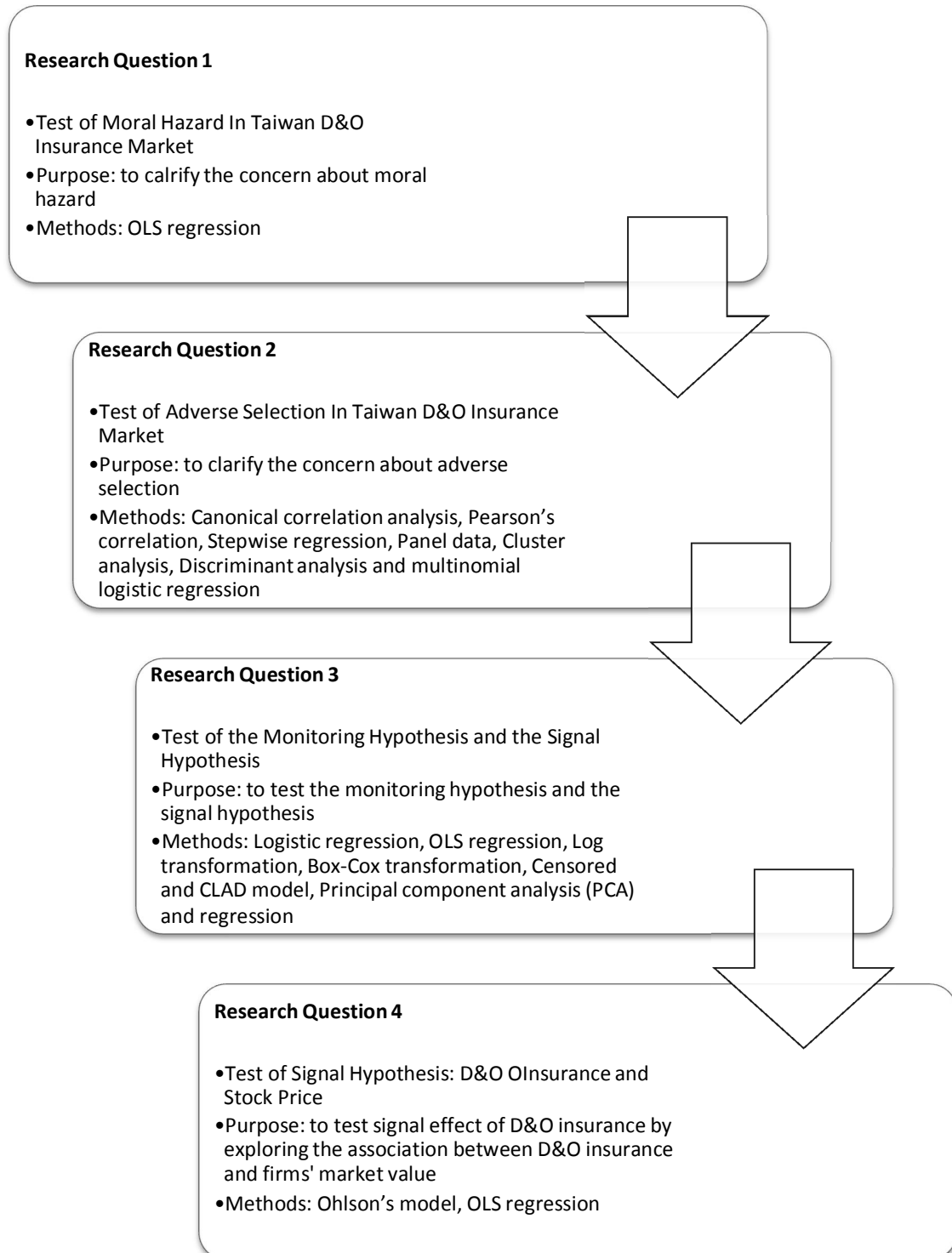
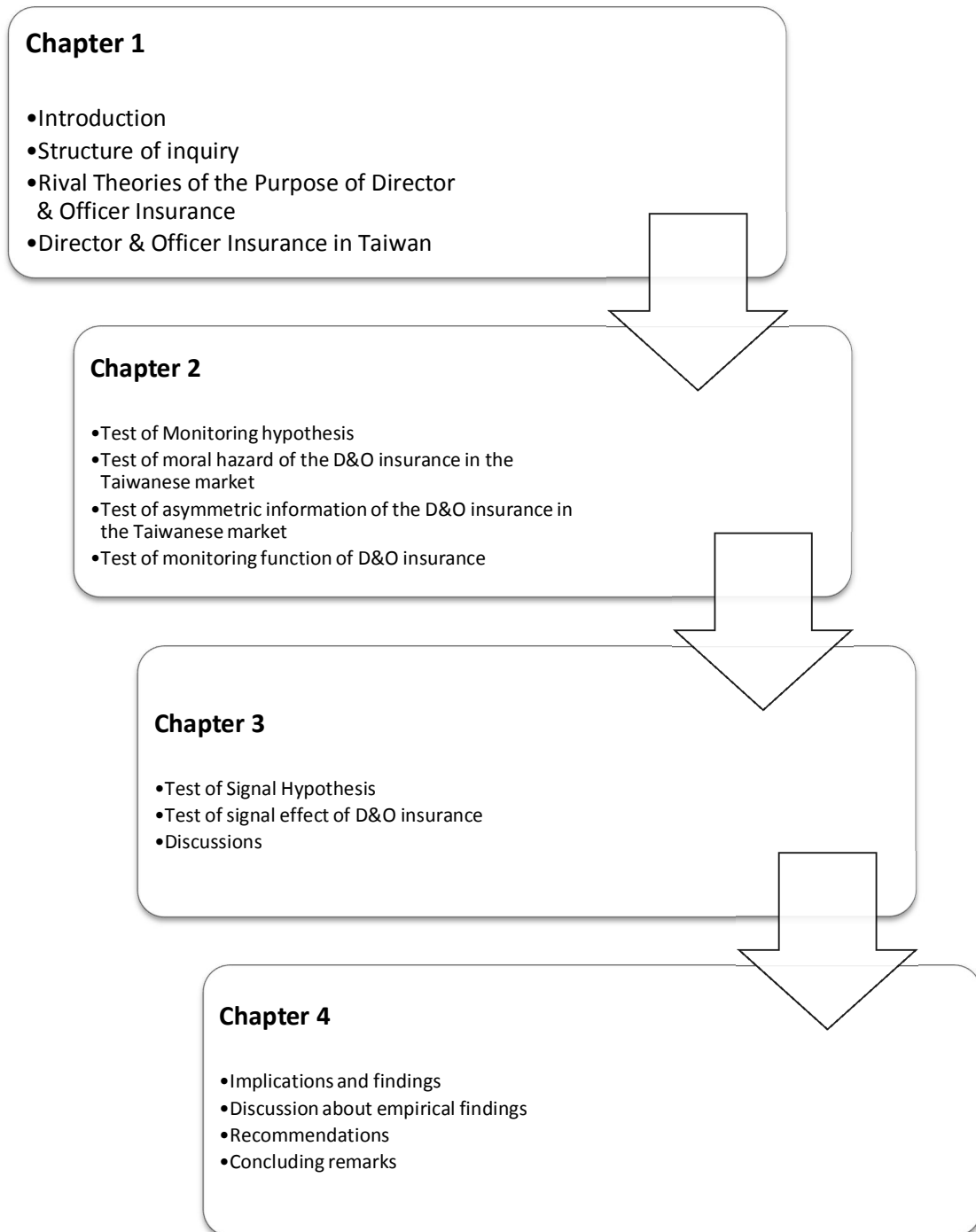


Figure 1.3 Organization of Research



CHAPTER 2

MONITORING HYPOTHESIS

2.1 Introduction

This chapter will test the issues about adverse selection, moral hazard and monitoring functions of D&O insurance in Taiwanese market. Adverse selection and moral hazard are classic problems in insurance.¹²⁹ Adverse selection means a tendency that low risk insureds avoid insurance purchase but high risk insureds stay in insurance pool,¹³⁰ and moral hazard indicates that the incentive of insureds changes because of being offered insurance coverage.¹³¹ Adverse selection and moral hazard are also understood as types of agency costs, when interests of the principal and agent diverge.¹³² In D&O insurance, insurers are in the position of principals, and the insured are in the positions of agents.¹³³ Adverse selection is caused by hidden precontractual information not disclosed in contract, and moral hazard is caused by postcontractual conduct.¹³⁴ Therefore, moral hazard can be realized as an example of asymmetric information.¹³⁵

¹²⁹ See Steven W. Pottier & Robert C. Witt, *On the Demand for Liability Insurance: An Insurance Economics Perspective*, 72 TEX. L. REV. 1681, 1686-87 (1994).

¹³⁰ See Tom Baker, *Containing the Promise of Insurance Adverse Selection and Risk Classification*, 9 CONN. INS. L.J. 371, 378 (2003).

¹³¹ *Id.*

¹³² See Kenneth S. Abraham, *supra* note 57, at 947.

¹³³ *Id.*

¹³⁴ See Jennifer Gerarda Brown & Ian Ayres, *Economic Rationales for Mediation*, 80 VA. L. REV. 323, 327-8 (1994).

¹³⁵ See Kenneth S. Abraham, *supra* note 57, at 946.

Such problems may affect the function of D&O insurance.¹³⁶ Regarding moral hazard, since D&O insurance provides the protection against the financial impact of liability for the insured firms and directors,¹³⁷ then insured firms and their directors may have less incentive to act properly and loss may be caused.¹³⁸

Also, such financial protection may induce directors to conduct more risky investment to procure abnormal return. In contrast, this may also cause abnormal loss. Thus, suppose D&O insurance has monitoring function and thus improve the value of insured firms, this may be canceled out by damage caused by moral hazard. As for the problem about adverse selection, it may affect the monitoring function of D&O insurance, which majorly relies on insurers' assessment. Adverse selection implies insurer cannot evaluate the quality and risk of the insured firms precisely, and this would be less possible for insurer to watch out or even change the act of insured firms but base on such inaccurate information. Hence, if there is a problem of adverse selection exists in the market, then monitoring ability of insurers would be doubtful.

Considering such effects of adverse selection and moral hazard, it could be better to clarify such concerns before the test of the monitoring hypothesis. If there are no such problems in Taiwan, then the test of the monitoring hypothesis and the alternative signaling hypothesis would be more reliable. Thus, this chapter begins with the test of

¹³⁶ *Id.*

¹³⁷ However, insurer does not have effective mechanism to control moral hazard. *See* TOM BAKER & SEAN J. GRIFFITH, ENSURING CORPORATE MISCONDUCT: HOW LIABILITY INSURANCE UNDERMINES SHAREHOLDER LITIGATION 60-2, 220 (2011).

¹³⁸ *Id.*

moral hazard of D&O insurance, then moves on to the test of adverse selection, and finally analyzes the monitoring function of D&O insurance.

2.2 Test of moral hazard of the D&O insurance in the Taiwanese market

2.2.1 Introduction

This section tests if the moral hazard problem happens in Taiwanese D&O insurance market, and thus affects the function of D&O insurance. In literature review, previous researches concerning moral hazard in insurance, especially in D&O insurance, will be introduced and hypotheses will be developed. By hypothesizing that D&O insurance will not increase insured firms' volatility of returns and short term investments, this research will test whether D&O insurance induces more risky behavior of insured firms. In the end, the empirical results and relevant discussion will be presented. This dissertation will conclude whether D&O insurance produces moral hazard and thus affect insurers' monitoring function.

2.2.2 Literature review

Regarding the effect of D&O insurance, there are mainly two opposite arguments. A previous discussion in Chapter 1, monitoring hypothesis propose that insurer can monitor insured firms and even improve their corporate governance. In contrast, opponents argue that D&O insurance weaken managerial control device such as litigation.¹³⁹ Many recent

¹³⁹ See Jinyoung Park, *supra* note 86, at 6.

researches find that managerial opportunism is one factor of D&O insurance purchase.¹⁴⁰ The reason of managerial opportunism might come from the positive signal effect of D&O insurance. Jinyoung Park finds that there is a positive association between insurance coverage and forecast frequency and precision.¹⁴¹ Also, market will give positive response to such information.¹⁴² This implies the positive signal effect of D&O insurance. Because of the positive effect and response from the market, opportunism exists in firms' voluntary disclosure. Thus, managers might intend to report earnings aggressively to increase their compensation.¹⁴³ To response this, auditors intend to charge higher fees to the firms of which the managers have higher opportunistic risk in Canada.¹⁴⁴ On the other hand, M. Martin Boyer and Hanon Amandine have different finding about the impact of accounting discretion on D&O insurance purchase. By testing Canadian market, they find that the positivity of discretionary accruals have no significant impact on D&O insurance purchase.¹⁴⁵ This implies moral hazard does not affect the financial disclosure.¹⁴⁶

In addition to accounting opportunism,¹⁴⁷ firms might carry more opportunistic behavior.

¹⁴⁰ *Id.*, at 6.

¹⁴¹ *Id.*, at 4.

¹⁴² *Id.*

¹⁴³ See Hyeesoo H. Chung & Jinyoung P. Wynn, *Managerial Legal Liability Coverage and Earnings Conservatism*, 46 J. ACCT. & ECON. 135, 135 (2008).

¹⁴⁴ See Hyeesoo H. Chung, Jinyoung P. Wynn & Han Yi, *Managerial Opportunism Legal Liability Rule and Audit Pricing* 28 (2008), <http://aaahq.org/meetings/AUD2009/ManagerialOpportunism.pdf>.

¹⁴⁵ See M. Martin Boyer & Hanon Amandine, *Protecting Directors and Officers from Liability Arising from Aggressive Earnings Management* 11 (2009), <http://ssrn.com/abstract=1504208>.

¹⁴⁶ *Id.*

¹⁴⁷ In addition to D&O insurance, Robert M. Bowen, Shivaram Rajgopal and Mohan Venkatachalam further confirm previous literature and the association between poor corporate governance and accounting discretion. See Robert M. Bowen, Shivaram Rajgopal & Mohan Venkatachalam, *Accounting Discretion, Corporate Governance and Firm Performance* 30 (2005), <http://ssrn.com/abstract=367940>.

Irene Y. Kim tests Canadian market and confirms the hypothesis that opportunism in financial reporting can be predicted by excess D&O insurance coverage.¹⁴⁸ Litigation risk, corporate governance quality, high-tech industry, and leverage are inversely related to D&O insurance coverage.¹⁴⁹ In consequence, opportunistic behavior is implied. Narjess Boubakri and Nabil Ghalleb again test Canadian market and have more negative conclusion. D&O insurance indeed induces opportunistic behavior and has negative impact on firms' performance in the future.¹⁵⁰ In addition, their findings show that insurer cannot distinguish opportunistic risk and mandatory reporting is not so helpful.¹⁵¹ Under such circumstance where asymmetric information and moral hazard are obvious, regulation and limitation are recommended.¹⁵²

Chen Lin, Micah S. Officer, Rui Wang and Hong Zou test Canada D&O insurance market and find that there is an association between D&O insurance coverage and higher as-issue bond yields, higher loan spreads, and higher risk taking. This result demonstrates that debt holder perceps that higher D&O insurance coverage implies higher risk.¹⁵³ The concerns about moral hazard and asymmetric information are also implied. Chen Lin, Micah S. Office and Hong Zou again test the association between D&O insurance and

¹⁴⁸ See Irene Y. Kim, *Directors' and Officers' Insurance and Opportunism in Accounting Choice* 21 (2005), http://www.efmaefm.org/efma2006/papers/764024_full.pdf.

¹⁴⁹ *Id.*

¹⁵⁰ See Narjess Boubakri & Nabil Ghalleb, *Does Mandatory Disclosure of Directors' and Officers' Liability Insurance Curb Managerial Opportunism? Evidence from the Canadian Secondary Market* 29-30 (2008), http://69.175.2.130/~finman/Reno/Papers/Does_Mandatory_Disclosure_Curb_Managerial_Opportunism.pdf.

¹⁵¹ *Id.*, at 30.

¹⁵² *Id.*

¹⁵³ See Chen Lin, Micah S. Officer, Rui Wang & Hong Zou, *Directors' and Officers' Liability Insurance and the Cost of Debt* 20-1 (2011), <http://ssrn.com/abstract=1865679>.

acquirer cumulative abnormal announcement returns (CARs). They find there is an inverse association. This means acquirers with higher D&O insurance coverage have less acquisition synergies and pay more premiums.¹⁵⁴ This implies D&O insurance might induce moral hazard.¹⁵⁵

John M. R. Chalmers, Larry Y. Dann, Jarrad Harford find there is an inverse association between D&O insurance coverage and the performance of 3-year stock price.¹⁵⁶ And managers who have high D&O insurance coverage have poor performance in the future.¹⁵⁷ Narjess Boubakri, Martin Boyer, and Nabil Ghalleb further confirm this result. They find managers purchase D&O insurance for opportunistic earnings, and insurers would charge more premiums for those who have higher opportunistic risk.¹⁵⁸ By testing Canadian market, Boyer finds that there is a moral hazard problem for managers because D&O insurance reduces their ability to increase cash flow.¹⁵⁹ Peter Egger, Doina Radulescu, and Ray Rees find that if senior executives have some incentives to make

¹⁵⁴ See Chen Lin, Micah S. Officer & Hong Zou, *Directors' and Officers' Liability Insurance and Acquisition Outcomes* 26-7 (2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1641645.

¹⁵⁵ *Id.*, at 27. In addition, moral hazard is a significant concern in liability insurance. D&O liability insurance may considerably nullify the deterrence effects of litigation against directors, causing directors to be less attentive to their duties to shareholders. See Clifford G. Holderness, *supra* note 34, at 115.

¹⁵⁶ See John M. R. Chalmers, Larry Y. Dann & Jarrad Harford, *Managerial Opportunism? Evidence from Directors' and Officers' Insurance Purchases*, 57.2 J. FIN. 609, 633 (2002). They provide two interpretations for the use of D&O insurance. First, managers use insurance to solidify their ability to exploit inside information. Secondly, D&O insurance is used to protect the assets of managers and firms from litigations. Even though these two interpretations are not exclusive, their evidence implies that the former is more important. *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ See Narjess Boubakri, Martin Boyer & Nabil Ghalleb, *Managerial Opportunism in Accounting Choice: Evidence from Directors' And Officers' Liability Insurance Purchases* 29-30 (2008), <http://www.efmaefm.org/0EFMAMEETINGS/EFMA%20ANNUAL%20MEETINGS/2008-athens/GHALLEB.pdf>.

¹⁵⁹ See M. Martin Boyer, *supra* note 11, at 103.

short run gains, they must be insured to prevent the adverse consequences.¹⁶⁰

Generally speaking, majority of previous literature support the hypothesis that D&O insurance might induce moral hazard or opportunistic behavior. If this conclusion is also true in the Taiwanese market, then D&O insurance itself is no longer good news. D&O insurance represent not only the cover of litigation risk, but also the trigger of moral hazard and opportunistic behavior.

2.2.3 Hypothesis development

As mentioned above, there is much literature discussing D&O insurance, opportunistic behavior and accounting discretion. Moral hazard is tested in this section. Due to D&O insurance shielding litigation risk, insured firms may engage in more risky behaviors. If the insured directors, managers and firms behave opportunistically for an extended period of time, this is easy to be found by insurers. Insurers will adjust premium or even discontinue contract in response to risky behavior. In addition to long term performance, attention should be paid to short term performance after the purchase of D&O insurance. This study diverges from the previous literature on shareholder wealth and long term performance by focusing on short term performance.

In short term performance, D&O insurance purchase might cause volatility of returns.

The protection of insurance, allows directors and officers assurances to limit concern

¹⁶⁰ See Peter Egger, Doina Radulescu & Ray Rees, *D&O Insurance, Corporate Governance and Managerial Incentives* 22 (2011), http://www.sgvs.ch/congress11/upload/p_115-420219.pdf.

regarding litigation risk, expect intentional behavior. In order to maximize their benefit, rational directors and officers might do a highly volatile investment which has higher risk and higher return, as long as this is not excluded by policy exclusions. They will not do this in the long term, because insurers will discover opportunistic behavior and raise the rates. So after D&O insurance purchase, directors and officers might increase opportunistic investment, but not to the extent that is excluded by policies or in the long term to avoid exposure.

The null hypothesis is developed as follows: in Taiwan, D&O insurance would not increase the firms' volatility of returns and short term investments. In other words, D&O insurance would not cause opportunistic behavior and moral hazard of firms. As a result, the theory regarding the positive signal effect of D&O insurance will not be influenced by these concerns. The hypothesis may be named "neutral hypothesis" and is as follows:

H1: D&O insurance would not increase the firms' volatility of returns and short term investments

This study uses the standard deviation of ROE as dependent variable, and the standard deviation ROA, EPS, debt-asset ratio and short term investment of firms for robustness check. If there is no moral hazard and opportunistic behavior in the Taiwanese market, the purchase of D&O insurance and its coverage shall be not significantly related to these dependent variables. This leads to the following sub-hypotheses:

H1a: The purchase of D&O insurance is not related to the standard deviation of

ROE, ROA, EPS, debt-asset ratio and short term investment of firms.

H1b: The coverage of D&O insurance is not related to the standard deviation of ROE, ROA, EPS, debt-asset ratio and short term investment of firms.

In addition to the proxy variable of D&O insurance, the quality of the corporate governance of firms is used as control variables. In general, firms having better corporate governance might have less volatility in returns.¹⁶¹ Hence, this dissertation hypothesizes that the quality of corporate governance is negatively related to the volatility in returns, which contains the standard deviation of ROE, ROA, EPS, debt-asset ratio and short term investment of firms. This hypothesis may be called “corporate governance hypothesis” and is as follows:

H2: The quality of corporate governance of firms is inversely related to the standard deviation of ROE, ROA, EPS, debt-asset ratio and short term investment of firms.

2.2.4 Data, variables, methods and research design

2.2.4.1 Data

¹⁶¹ Firms with poor corporate governance usually have poor performance, poor profit and higher volatility. See Dr. Laurence J. Stybel & Maryanne Peabody, *A New Balance Of Power Means New Boardroom Opportunity for General Counsel*, 23 NO. 5 OF COUNSEL 9, 9 (2004). In addition, CalPERS' stated goal is also to “join in the dialogue of corporate governance and reduce volatility and increase long-term share values.” See Deborah J. Martin, *The Public Piggy Bank Goes to Market: Public Pension Fund Investment in Common Stock and Fund Trustees' Social Agenda*, 29 SAN DIEGO L. REV. 39, 45 (1992). Moreover, problems of corporate governance would cause market volatility. See Yuwa Wei, *Volatility of China's Securities Markets and Corporate Governance*, 29 SUFFOLK TRANSNAT'L L. REV. 207, 208 (2006). In emerging markets like Brazil, firms satisfying better corporate governance standards are less sensitive to changes in market and have less volatility in stock prices. See Ronald J. Gilson, Henry Hansmann & Mariana Pargendler, *Regulatory Dualism as a Development Strategy: Corporate Reform in Brazil, the United States, and the European Union*, 63 STAN. L. REV. 475, 501 (2011).

The data used in this section is collected from the Taiwan Economic Journal (TEJ)¹⁶² and Market Observation Post System (MOPS).¹⁶³ Most of the listed companies in Taiwan Stock Exchange Corporation (TWSE)¹⁶⁴ and GreTai Securities Market (GTSM)¹⁶⁵ were collected. The dataset excluded some companies for which information was not available from the database. There are 1,217 observations in 2008, 1,286 observations in 2009, and 597 observations in 2010.

2.2.4.2 Variables

Regarding the evaluation of opportunism, the standard deviation of revenues is usually used as proxy variables. When testing managerial opportunism caused by D&O insurance, John M. R. Chalmers, Larry Y. Dann and Jarrad Harford use standard deviation of revenues and operating income as proxy variables.¹⁶⁶ Jens Hagendorff, Ignacio Hernando, Maria J. J. Nieto and Larry D. Wall use the standard deviation of ROE as a proxy variable of riskiness.¹⁶⁷ Michael Bradley and Dong Chen, similarly, use standard deviation of monthly stock returns as a dependent variable in assessing corporate risk-taking.¹⁶⁸ In measuring the volatility of firms' accounting performance, Seunghan Nam uses the

¹⁶² <http://www.tej.com.tw/twsite/> (last visited Jan. 15, 2013).

¹⁶³ http://emops.twse.com.tw/emops_all.htm (last visited Jan. 15, 2013).

¹⁶⁴ <http://www.twse.com.tw/en/> (last visited Jan. 15, 2013).

¹⁶⁵ <http://www.gretai.org.tw/en/> (last visited Jan. 15, 2013). Unless indicated otherwise, empirical works in this paper include firms in both markets.

¹⁶⁶ See John M. R. Chalmers, Larry Y. Dann & Jarrad Harford, *supra* note 156, at 625.

¹⁶⁷ See Jens Hagendorff, Ignacio Hernando, Maria J. Nieto & Larry D. Wall, *What Do Premiums Paid for Bank M&As Reflect? The Case of the European Union* 21 (2010), <http://ssrn.com/abstract=1592887>.

¹⁶⁸ See Michael Bradley & Dong Chen, *Corporate Governance and the Cost of debt: Evidence from Director Limited Liability and Indemnification Provisions*, 17 J. Corp. Fin. 83, 92 (2011).

standard deviation of ROE to test its volatility.¹⁶⁹ The reason is that ROE is a more relevant measure from the viewpoint of shareholder, and other proxy variables such as ROA, EPS and growth of EPS also have similar results. This study follows previous literature and uses the standard deviation of ROE as the proxy variable of opportunistic behavior.¹⁷⁰ They are used as the dependent variables of regressions. For a test of robustness, this dissertation uses standard deviation of ROA, EPS, debt-asset ratio and short term investment as dependent variables in different panels. Regarding independent variables, the dummy variable, purchased insurance or not, and the amount of coverage are used as the proxy variables for D&O insurance. The variables about corporate governance are applied as control variables,¹⁷¹ including capital of firms, remuneration for directors, the number of directors, the number of independent directors, the number of controlled directors, shares owned by director and major shareholder, duality of CEO and COB, internal risk and prior significant litigation. The definitions of variables are presented in Table 2.1.

2.2.4.3 Methods and research design

Ordinary least square (OLS) regression is used in this research. For considering

¹⁶⁹ See Seunghan Nam, *The Impact of Non-audit Services on Capital Markets* 18 (2006), <http://ssrn.com/abstract=693422>.

¹⁷⁰ Similarly, Standard deviation of ROE is also often used as a proxy variable for the risk of insurers. See J. David Cummins & Gregory P. Nini, *Optimal Capital Utilization by Financial Firms: Evidence from the Property-Liability Insurance Industry*, 21. 1-2 J. FIN. SERV. RES. 15, 23 (2002).

¹⁷¹ For detailed descriptions of control variables, please refer to 2.4.3.2.2.

robustness, this research reports the results after White's heteroscedasticity correction¹⁷² and bootstrap.¹⁷³ Regarding the test of opportunistic behavior, the proxy variables of opportunistic behavior are used as dependent variables, and D&O insurance and other control variables are used as independent variables. This research uses standard deviation of ROE, ROA, EPS, debt-asset ratio and short term investment as dependent variables to carry out different regressions. The statistical software packages used are SPSS and STATA.¹⁷⁴

2.2.5 Empirical result and analysis

2.2.5.1 Descriptive analysis

The volatilities of ROE, ROA, EPS, debt-asset ratio and short term investment are represented by their standard deviation respectively. The results show that the insured firms usually have higher average and variation of volatility. In 2008, except ROE, insured firms are higher than uninsured firms in means and variations of ROA, EPS, debt-asset ratio and short term investment. In 2009, insured firms are almost higher than

¹⁷² White's heteroscedasticity correction is helpful in fixing the problem about heteroscedasticity. *See* JANET M. BOX-STEFFENSMEIER, HENRY E. BRADY & DAVID COLLIER, *THE OXFORD HANDBOOK OF POLITICAL METHODOLOGY* 607 (2008).

¹⁷³ Bootstrap, proposed by Efron (1979), is a very useful data resampling procedure when the parameter is unknown. *See* ALLAN D. R. MCQUARRIE & CHIH-LING TSAL, *REGRESSION AND TIME SERIES MODEL SELECTION* 261 (1998). Put simply, bootstrap treats the sample like a true population distribution. Repeatedly resampling the current sample generates a "new" sample to construe a point estimate of parameter. *See* ALAN AGRESTIC & BARBARA FINLAY, *STATISTICAL METHODS FOR SOCIAL SCIENCE* 132 (4th ed. 2008). Bootstrap is not required to follow the assumptions of linear regression, and thus it is useful when the adequacy of regression is uncertain. *See* GEOFF H. GIVENS & JENNIFER ANN HOETING, *COMPUTATIONAL STATISTICS* 418 (2005).

¹⁷⁴ Unless otherwise mentioned, all empirical works in this dissertation are conducted by these two software packages.

uninsured firms in all proxy variables, except the variation of short-term investment is much less. The results in 2010 are more diversified, insured firms have lower means in volatility of ROE and debt-asset ratio, but higher in ROA, EPS and short-term investment. Regarding variation, except EPS, insured firms have less variation in the volatility of ROE, ROA, debt-asset ratio and short-term investment. Generally speaking, it is suspicious that insured firms have more volatility in returns and investments. The result of descriptive analysis is reported in Table 2.2.

For more precision, independent sample tests are carried out to test whether the differences of the means of volatility between insured and uninsured firms are significant. The results are presented in Table 2.3, 2.4 and 2.5. In 2008, volatility of EPS and short-term investment are significant at 5% level. This indicates insured firms indeed have higher volatility than uninsured firms in EPS and short-term investment. In 2009, only short-term investment is significant, and this indicates that insured firms have higher volatility than uninsured firms in short-term investment. The result of 2010 is similar to 2008. Volatility of EPS and short-term investment are significant and insured firms have higher volatility than uninsured firms in these variables.

The result of independent sample test indicates insured firms have significantly higher volatility than uninsured firms in EPS and short-term investment. This implies firms might have more opportunistic behavior in EPS and short-term investment after D&O purchase.

2.2.5.2 Regression analysis

2.2.5.2.1 2008

Binary variable insurance purchase is used in the first panel, and numeric variable nature logarithm of coverage is used in the second panel. Standard deviations of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective regressions. In the first panel, D&O insurance purchase is not significant in these regressions except when dependent variable is standard deviation of short-term investment. This implies no statistically significant evidence proving that the purchase of D&O insurance will increase opportunistic behavior. In the second panel, insurance coverage is positively significant when dependent variable is standard deviation of ROA, but not significant in other specifications. Generally, it does not support the concern that firms with more coverage may have some intention to conduct opportunistic behavior. Also, the test results of corporate governance hypothesis are discrepant. For independent director, it is positively significant when dependent variable is standard deviation of EPS. This implies the firms which have more independent directors may have more opportunistic behavior, especially for EPS. However, the firms which have identical people serving CEO and COB may have less deviation in debt-asset ratio. The bootstrap of previous OLS regressions demonstrates highly similar results.

2.2.5.2.2 2009 and 2010

In 2009, D&O insurance purchase is only positively significant when dependent variable

is standard deviation of short-term investment, and insurance coverage is only positively significant with standard deviation of debt-asset ratio. In 2010, the purchase of D&O insurance is only positively significant when dependent variables are standard deviations of ROE and ROA. However, the coverage of insurance is insignificant in all specifications. All these results demonstrate that the D&O increase purchase and coverage is not generally and significantly correlated to the variance in earnings and investment behavior. In other words, no consistent evidence is found to prove a positive correlation between D&O insurance and the opportunistic behavior and moral hazard of firms. The detailed results are reported from Table 2.6 through 2.17.

2.2.6 Conclusions

In this section, this study empirically tests whether D&O insurance is correlated to opportunistic behavior and moral hazard. Empirical evidence shows that the purchase of D&O insurance and its coverage are not generally significantly and consistently correlated to variances of earnings and investments. In consequence, even though some scholars argue that insurance may cause opportunistic behavior and moral hazard or even damage firms eventually, the empirical work does not find such significant evidence. Hence, the following tests about the monitoring and signal effect of D&O insurance may not be affected by opportunistic behavior and moral hazard in Taiwan.

2.3 Test of adverse selection of the D&O insurance in the Taiwanese market

2.3.1 Introduction

An insurance contract is equilibrium of losses, premiums and coverage qualities. Any distortion about these will unsettle the equilibrium.¹⁷⁵ Needless to say, the assumptions about the monitoring hypothesis will be affected. If there is adverse selection in this market, the equilibrium of demand and supply of D&O insurance will be different from every cluster, and then, the test for the monitoring hypothesis of D&O insurance in the whole market will be affected.

Asymmetric information or even adverse selection demonstrates that insurers have no ability to screen insurance applicants, and then offer proper insurance policy, proper conditions, and proper price. When the underwriting is not based on the quality of the insured firms, or is based on the incomplete information from the insured firms, then the offer of insurance and coverage will have no positive meaning. This is because D&O insurance and coverage are not based on insurers' assessment, but just on the insured firms' incomplete or even untrue information. In this way, the argument of the monitoring function of insurers would be more unreliable.

In contrast, if there is no adverse selection problem in this market, the selection of insurer and insured firms would be close to random with no obvious tendency toward similar firms or qualities matching. For example, firms with bad performance, bad corporate

¹⁷⁵ See James D. Cox, *Private Litigation and the Deterrence of Corporate Misconduct*, 60-AUT LAW & CONTEMP. PROBS. 1, 30 (1997).

governance, and higher risk, get contracts with bad insurers, and firms with good performance, good corporate governance and lower risk, get contracts with good insurers. Or insured firms with good quality more easily get coverage. Therefore, the monitoring function of D&O insurance would not be affected. Before testing the monitoring hypothesis of D&O insurance, the concern about adverse selection should be clarified. In order to analyze the problem of underwriting, asymmetric information, and adverse selection, several empirical tests are conducted in this section. This dissertation will test all D&O insurance contracts in Taiwan in the recent three years, examine if insurers' underwriting work well or not, and whether symmetric information, as well as adverse selection exists in the Taiwanese market or not.

2.3.2 Literature review and hypothesis development

2.3.2.1 Asymmetric information, adverse selection and insurance

Information is a commodity which is different from others. For example, when information exchanged, one loses nothing except the exclusivity.¹⁷⁶ In 1970's, the Nobel Prize winner George Akerlof, A. Michael Spence, and Joseph E. Stiglitz laid the foundation for information economy.¹⁷⁷ Akerlof takes used car market as an illustration in his classic dissertation: *The Market for "Lemons": Quality Uncertainty and the Market*

¹⁷⁶ See Kathleen Taradash, *Preventing a Market for "Lemons": A Voluntary Disclosure Model as an Alternative to the Prohibition of Genetic Discrimination and the Distortion of Allocative Efficiency*, 34 CONN. L. REV. 1353, 1383 (2002).

¹⁷⁷ *Id.*, at 1385.

Mechanism.¹⁷⁸ He assumes there are four types of cars in the market. There are new car and used car, good car and bad car.¹⁷⁹ New car and used car are both possible to be good car or bad car.¹⁸⁰ And the bad car is known as “lemons”.¹⁸¹ The Individuals intend to get good cars instead of lemons, but they as buyers have no information about the qualities of cars.¹⁸² In contrast, the sellers have more information about this. Because of the period of possession, the sellers easily would have more knowledge about the qualities of cars.¹⁸³ The situation of asymmetric information develops. Because the buyers have no information to distinguish the good and bad cars, the prices of them will be the same.¹⁸⁴ Then, Akerlof completes Gresham's Law, arguing that good cars will be driven out of market by lemons.¹⁸⁵ The phrase “adverse selection” originally indicates the process where the insured utilize their private knowledge and then decide to buy or forgo insurance.¹⁸⁶ Thus, adverse selection is a critical problem to insurance and dominates its function.¹⁸⁷ In Akerlof's classic paper, he borrows this term from insurance literature to generalize this concept to other common economic phenomena. Currently, adverse

¹⁷⁸ See George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, Q. J. ECON. 488 (1970). See also George L. Priest, *The Current Insurance Crisis and Modern Tort Law*, 96 YALE L.J. 1521, 1384 (1987).

¹⁷⁹ See George A. Akerlof, *supra* note 178, at 489.

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*

¹⁸⁶ See Peter Siegelman, *Adverse Selection in Insurance Markets: An Exaggerated Threat*, 113 YALE L.J. 1223, 1223 (2004).

¹⁸⁷ See George L. Priest, *supra* note 160, at 1540-1.

selection has become the critical part of information economy, which is not limited to insurance.¹⁸⁸

The deterioration in the quality of goods proposed by Akerlof's Lemons Model can be analogous to insurance market. In other words, the problem of adverse selection potentially exists in all lines of insurance.¹⁸⁹ The insurer in the insurance market is in the position which is similar to the used car buyers in Akerlof's Lemons Model.¹⁹⁰ Insurance applicants have more information than insurers about the risks that they incur.¹⁹¹ Low risk individuals drop out of insurance pools and, as a result, insurance pools contain high percentages of high risk individuals.¹⁹² Adverse selection is even considered as one reason of liability insurance crisis in the mid-1980.¹⁹³ Roberta Romano also uses the reasoning of adverse selection to explain the reason of D&O insurance crisis.¹⁹⁴

Of course, there is different viewpoint about adverse selection in insurance market. Alma Cohen and Peter Siegelman completely review relevant literature in recent years.

¹⁸⁸ See Peter Siegelman, *supra* note 186, at 1223.

¹⁸⁹ See George A. Akerlof, *supra* note 178, at 493.

¹⁹⁰ Similar example, see Michael Pereira, *Risk Management for the age of Information—The New Financial Order: Risk in the 21st Century*, 9 FORDHAM J. CORP. & FIN. L. 715, 754 (2004).

¹⁹¹ See Kenneth S. Abraham, *supra* note 57, at 946.

¹⁹² See Tom Baker, *Containing the Promise of Insurance: Adverse Selection and Risk Classification*, 9 CONN. INS. L.J. 371, 373 (2002/2003).

¹⁹³ The crisis of liability insurance happened in the mid-1980's, and it was essentially a crisis for consumers. In order to avoid loss, insurers hugely increased premiums, and consumer could not afford such skyrocketed premiums. See Philip H. Corboy, *The Not-So-Quiet Revolution: Rebuilding Barriers to Jury Trial in the Proposed Restatement (Third) of Torts: Products Liability*, 61 TENN.L.REV. 1043, 1062 (1994). For more discussion about the cause of the crisis of liability insurance, see Kenneth S. Abraham, *Making Sense of the Liability Insurance Crisis*, 48 OHIO ST. L.J. 399, 399 (1987). See Gregg A. Scoggins, *Legislation without Representation: How Veterinary Medicine Has Slipped through the Cracks of Tort Reform*, 1990 U. Ill. L. Rev. 953, 958 (1990). Regarding tax-based explanation, see Kyle D. Logue, *Toward a Tax-Based Explanation of the Liability Insurance Crisis*, 82 VA. L. REV. 895, 914 (1996). See also George L. Priest, *supra* note 160, at 1583-7.

¹⁹⁴ See Roberta Romano, *What Went Wrong with Directors' and Officers' Liability Insurance?*, 14 DEL. J. CORP. L. 1, 27-8 (1989).

Regarding the assumption that the insured who purchase more coverage tend to be riskier, they argue that this correlation varies in different group of insurance commodities.¹⁹⁵ However, they do not touch the issue of D&O insurance deeply. Narjess Boubakri and Nabil Ghalleb test Canadian market and have more pessimistic conclusion. They find that D&O insurance indeed induces opportunistic behavior and has negative impact on firms' performance in the future.¹⁹⁶ In addition, insurers do not or cannot distinguish opportunistic risk. Moreover, insurers do not charge more premiums to the insured firms who exploit private information or abnormally increase D&O insurance purchase.¹⁹⁷ This implies that moral hazard exists and underwriting does not function well. To sum up, by the analysis of previous literature, the concern of adverse selection of D&O insurance is highly suspect.

2.3.2.2 D&O insurance market, equilibrium and market segment

Concerns about the adverse selection of D&O insurance can be found in the literature. Directors who intend to breach their duties are more likely to purchase D&O insurance, which will lead to more derivative suits.¹⁹⁸ The equilibrium of the supply and demand for D&O insurance will also affected by adverse selection. Under adverse selection circumstances, the insurance pool contains more high risk individuals than low risk

¹⁹⁵ See Alma Cohen & Peter Siegelman, *Testing for Adverse Selection in Insurance Markets* 77:1 J. RISK & INS. 39, 43-4 (2010), available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6975.2009.01337.x/pdf>.

¹⁹⁶ See Narjess Boubakri & Nabil Ghalleb, *supra* note 150, at 29-30.

¹⁹⁷ *Id.*, at 30.

¹⁹⁸ See Mark D. West, *The Pricing of Shareholder Derivative Actions in Japan and the United States*, 88 NW. U. L. REV. 1436, 1502 (1994).

individuals who pay the same premium. This will damage insurers and cause insurers to raise their premiums. The consequence is that the equilibrium will change.¹⁹⁹ The more severe the adverse selection is, the more equilibrium will be affected.²⁰⁰ In addition, another byproduct of asymmetric information is market segments.²⁰¹ If the pool contains large numbers of high-risk individuals charged as low risk ones, this pool tends to become segmented²⁰² or even decayed.²⁰³ If this is true, the previous test regarding the signal effect of D&O insurance is that the entire market will be influenced. As regards the reliability of the previously discussed signal hypothesis, this dissertation will test and determine whether or not adverse selection exists in the Taiwanese D&O insurance market.

Adverse selection may exist in D&O insurance, and may lead to malfunctions of insurance and market segments. All of these factors will influence the hypothesis regarding the signal effect with respect to D&O insurance. The less the adverse selection, the less the signal hypothesis will be affected. This research assumes null hypothesis to the effect that there is no adverse selection in the Taiwanese D&O insurance market.

2.3.2.3 Hypothesis development

¹⁹⁹ More detailed discussion, see Ralph A. Winter, *The Liability Crisis and the Dynamics of Competitive Insurance Markets*, 5 YALE J. ON REG. 455, 488-9 (1988).

²⁰⁰ *Id.*

²⁰¹ See Cassandra Jones Havard, *Democratizing Credit: Examining the Structural Inequities of Subprime Lending*, 56 SYRACUSE L. REV. 233, 262 (2006).

²⁰² This implies that the equilibrium of different segments is different from each other. *Id.*

²⁰³ See Anthony S. Chen & Margaret Weir, *The Long Shadow of the Past: Risk Pooling and the Political Development of Health Care Reform in the States*, 34 J. HEALTH POL. POL'Y & L. 679, 687 (2009).

Adverse selection possibly exists in D&O insurance, and cause malfunction of insurance and market segment. All these will damage the proposal of monitoring effect of D&O insurance. The lesser the adverse selection, the lesser the monitoring hypothesis is affected. Thus, this research assumes the null hypothesis that there is no adverse selection in the Taiwanese D&O insurance market. If the following empirical test does not reject this hypothesis, this assumption will not be rejected. And monitoring hypothesis will not be affected. The first hypothesis is as follows:

H1: There is no adverse selection in the Taiwanese D&O insurance market.

Adverse selection will cause market segmentation and affect the equilibrium of supply and demand. However, if market segments are complementary, the insurance mechanism will not be influenced. For example, insurers can contract with applicants they complementary to work with and vice versa. Under such circumstances, even though market segments exist, different premiums will be charged in accordance with different risk classifications. Therefore the insurance pool will not be harmed.²⁰⁴ Rational insurers will attempt to contract with low risk applicants. Empirical research has shown that scandal-based events directly impact insurer pricing behavior.²⁰⁵ The ability of insurers to distinguish between low risk and high risk applicants is important, or else adverse

²⁰⁴ This is also the reason why sufficient risk classification is often considered as a measure for mitigating adverse risk. See Peter Siegelman, *supra* note 186, at 1279. Amy Monahan & Daniel Schwarcz, *Will Employers Undermine Health Care Reform by Dumping Sick Employees?*, 97 VA. L. REV. 125, 135 (2011).

²⁰⁵ See Stephen G. Fier Fier, Kathleen A. McCullough, Joan T. A. Gabel & Nancy R. Mansfield, *The Directors and Officers Insurance Marketplace: An Empirical Examination of Supply and Demand in Uncertain Times* 31 (2009), <http://ssrn.com/abstract=1524063>.

selection will occur.²⁰⁶ If the process of underwriting works properly, insurers can distinguish between the risks of different applicants and filter out high-risk applicants. This study hypothesizes that D&O insurance underwriting functions properly in the Taiwanese market. In other words, insurers can filter out applicants they do not want.

H2: insurance underwriting functions well in Taiwan D&O insurance market.
Insurers can filter out the applicants they do not desire

Insurance applicants similarly seek to contract with low-risk insurers. In the absence of asymmetric information, applicants should also have complete information regarding insurers and can contract with any insurers they deserve. Just as in case of the reasoning about insurers, this research also hypothesizes that insurance applicants can filter out insurers they do not desire.

H3: Insurance applicants can filter out the insurer they do not desire

2.3.3 Data, variables, methods and research design

2.3.3.1 Data

As stated in previous chapters, the data of insured firms is collected from TEJ and MOPS. The data of insurers is collected from TEJ, Taiwan Insurance Institute,²⁰⁷ and their websites. From 2008 to 2010, there were 2485 D&O insurance transactions. In order to

²⁰⁶ Detailed explanation, see Eric Mills Holmes, *Solving the Insurance/Genetic Fair/Unfair Discrimination Dilemma in Light of the Human Genome Project*, 85 KY. L.J. 503, 544-5 (1996-1997).

²⁰⁷ <http://insprod.tii.org.tw/database/insurance/index.asp> (last visited Jan. 15, 2013).

arrive at reliable estimations of canonical roots, Barcikowski and Stevens (1975) suggest, based on a Monte Carlo study, to include 40 to 60 times as many observations as variables.²⁰⁸ In this research, there are 10 variables for covariates and 8 variables for dependent variables, amounting to 18 variables in total. Then, 2485 observations are around 138 times of variables. Therefore, the data is sufficient to arrive at a reliable result of canonical analysis.

2.3.3.2 Variables

This section is to exam the qualities of insurers and the insured firms, and explore whether insurers' underwriting functions well, and whether asymmetric information and adverse selection exist or not. In addition to using insurance coverage as connecting factor between insurers and the insured firms, several proxy variables will be used to represent the qualities of insured firms.

2.3.3.2.1 Insured firms

Insurance underwriting is the method that insurers use to assess the risk of the insured firms.²⁰⁹ In brief, insurance underwriting "is the process of accepting or rejecting risks."²¹⁰ D&O insurance underwriting usually contains three parts. The first thing is the

²⁰⁸ See THOMAS HILL & PAWEL LEWICKI, STATISTICS: METHODS AND APPLICATIONS: A COMPREHENSIVE REFERENCE FOR SCIENCE, INDUSTRY, AND DATA MINING 75 (2006).

²⁰⁹ See James D. Cox, *supra* note 175, at 31.

²¹⁰ See Joshua Dobiac, *supra* note 77, at 499.

application and questionnaire of the insured firms.²¹¹ Secondly, insurers will investigate all public data of applicants. Third, insurers will also try to acquire private information as much as possible.²¹² However, the ability of D&O insurance underwriting is subjective²¹³ and hard to develop.²¹⁴ It requires a sense and ability of business, finance and management.²¹⁵ In addition to the qualities of insured firms and traditional risks, underwriting considerations also contains risk of bankruptcy and risk of non-indemnifiable actions.²¹⁶ As firms aiming to maximize their wealth, insurers should contract with the insurance applicants that have less risk. This dissertation uses the following proxy variables to represent the qualities of insured firms which are emphasized in underwriting.

First of all, general characteristic such as size is important for underwriting.²¹⁷ The variable *LNcapital* which is the natural logarithm of capital is used to indicate the size of insured firms. Almost all D&O insurance policies contain “personal profit exclusion”, which excludes claims “based upon, arising from, or in consequence of such Insured Person having gained in fact any personal profit, remuneration or advantage to with such Insured Person was not entitled.”²¹⁸ In addition, monitor hypothesis argues that D&O

²¹¹ *Id.*

²¹² *Id.*

²¹³ See Peter R. Taffae, *Applying for D&O Insurance in a Tight Market*, 215, 217 (PLI Commercial Law and Practice Course Handbook Series No. A4-4379, 1992).

²¹⁴ See Anthony J. Falkowski, *Directors' and Officers' Reinsurance*, at 543 (PLI Commercial Law and Practice Course Handbook Series No. A4-4223, 1988).

²¹⁵ *Id.*

²¹⁶ See William A. Cotter, *The D&O Industry in 2003: Insuring the Risks of Being a Director*, SH095 ALI-ABA 325 (2003).

²¹⁷ See James D. Cox, *supra* note 175, at 31.

²¹⁸ *Federal Insurance Company v. Kozlowski*, 792 N.Y.S.2d 397 (1st Dep't 2005)

insurance and remuneration are both in the compensation packages,²¹⁹ and they are substitutes for each other. Thus it is important to test its effect in underwriting. *LNRemu* is used to represent the natural logarithm of remuneration for directors. D&O insurance claims often arise from poor financial performance, and firms' return on equity (ROE) is often used to be a proxy variable of financial performance.²²⁰ Then *ROE* is used to indicate the profiting ability of firms. Enterprise of professional experts is a principal consideration in underwriting.²²¹ Thus this research uses *Director* and *IDirector* to indicate the number of directors and independent directors. *CtrlDirector* means the number of directors who are nominated by controlling firms. Insured firms' ownership structure is also an important consideration in insurance underwriting.²²² *SD* and *SMH* indicate the percentage of shares held by directors and major shareholders, representing the proxy variables for ownership structure. Financial ratio and volatility are important and initial factors of risk assessment for insurance applicants.²²³ In fact, insuring firms which have lower volatility are reasonably safer for insurers.²²⁴ Rational insurers will contract with firms which have financial stability and less volatility. The two variables are used to denote the financial risk and volatility of insured firms. The variable *DARatio* indicates the debt-asset ratio of firms, and *StdDevROA* specifies the standard deviation of

²¹⁹ See M. Martin Boyer & Mathieu Delvaux-Derome, *supra* note 84, at 2.

²²⁰ See John E. Core, *supra* note 45, at 462.

²²¹ See Lawrence A. Rogers, *Protecting Directors and Trustees*, 548 PLI/CORP 863, 870 (1987).

²²² See Tom Baker & Sean J. Griffith, *supra* note 7, at 522.

²²³ *Id.*, at 514-5.

²²⁴ See Joshua Dobiac, *supra* note 77, at 518.

ROA.²²⁵

2.3.3.2.2 Insurers

In contrast, the qualities of insurers are also important to the insured firms. Insured firms rely on the insurances to mitigate risks. Such protection will be damaged if insurers cannot indemnify properly and on time. Risks imply potential damage for firms' value. As firms aiming to maximize their value, insurance applicants would like to find insurers that can mitigate those risks most. The quality of insurers is not only a concern regarding the ability and efficiency of indemnification, but also reputation and signal. Every insurer may have a different reputation and screening function.²²⁶ If insured firms can get insurance offers from some insurers, this may imply these insurers would accept the quality of insured firms and assume their risk. As discussed before, if signal effect of D&O insurance exists, insurance applicants anticipate to contract with good insurers to emit more positive signals. Thus, insurance applicants will try to contract with insurers that have superior quality and reputation.

Several proxy variables will be used here to represent the qualities and reputation of insurers. Generally, this research will follow the criteria of Taiwan insurance institute and other international and local criteria to select variables which can be most representative for insurers' qualities. Taiwan insurance institute is an important institute engaging the

²²⁵ Standard deviation of ROA is often used to as proxy variable assessing financial volatility, *see, e.g.*, Richard D. Gritta, Edward J. Freed & Garland Chow, *Measuring the Degrees of Operating, Financial and Combined Leverage For The Major U.S. Air Carriers: 1979-1995*, 26 *TRANSP. L.J.* 51, 67 (1998).

²²⁶ *See* Sean J. Griffith, *supra* note 51, at 1025.

research of insurance regulation to assist the authority's policy-making.²²⁷ It also manages the largest and most complete dataset about the Taiwanese insurance market.²²⁸ Its "finance and business Index of non-life insurance companies" coordinate statistics of business and the ratings result of insurers given by important local and international rating firms, such as Taiwan Ratings, Standard & Poor's Rating and Moody's.²²⁹ This study also refers the standard of A. M. Best,²³⁰ Insurance Regulatory Information System (IRIS)²³¹ and Financial Analysis and Solvency Tracking System (FAST)²³² of National Association of Insurance Commissioners (NAIC).²³³

Generally, insurers are evaluated through four perspectives, capital structure, profiting ability, potential risk and reputation. This primarily follows the approach of Taiwan Insurance Institutes.²³⁴ First of all, the variable *LNcapital2* which is the natural logarithm of capital is used to indicate the size of insurers. In addition to pay-out rate, insurance

²²⁷ <http://www.tii.org.tw/econtent/about/about01.asp> (last visited Jan. 15, 2013).

²²⁸ <http://www.tii.org.tw/econtent/statistics/statistics01.asp> (last visited Jan. 15, 2013).

²²⁹ http://www.tii.org.tw/fcontent/information/information03_01.asp?P2b_sn=17 (last visited Jan. 15, 2013).

²³⁰ <http://www.ambest.com/ratings/guide.asp> (last visited Jan. 15, 2013).

²³¹ Insurance Regulatory Information System (IRIS) is administrated by NAIC to detect insurers with potential solvency problems. See 1 Reg. of Invest. Mgmt. & Fiduciary Serv. § 7:17. It is an early warning to test insurers regarding the last five years. See Bertil Lundqvist, *Managing and Directing the Legal Due Diligence Process*, 1146 PLI/CORP 29, 50 (1999). It contains two parts. The first one is a statistical test about 11 financial tests. The second part is for those insurers outside acceptable ranges; regulatory attentions ranging from "no action" to "immediate regulatory attention" will be recommended. See Robert D. Haase, Gregory C. Krohm, *The Ailing Health Insurance Industry*, 20-WTR BRIEF 15, 17 (1991). However, the effect of IRIS is suspected. See Broome, Lissa L. & Markham, Jerry W., *Banking and Insurance: Before and after the Gramm-Leach-Bliley Act*, 25 J. CORP. L. 723, 729 (2000). More criticisms against IRIS, see Adam Hodkin, *Insurer Insolvency: Problems & Solutions*, 20 HOFSTRA L.REV. 727, 742 (1992).

²³² More introduction about FAST, see BRADLY J. CONDON, JOYCE C. SADKA & TAPEN SINHA, *INSURANCE REGULATION IN NORTH AMERICA: INTEGRATING AMERICAN, CANADIAN, AND MEXICAN MARKETS* 79 (2003).

²³³ See NAIC, <http://www.naic.org/> (last visited Jan. 15, 2013).

²³⁴ http://www.tii.org.tw/fcontent/information/information03_01.asp?P2b_sn=17 (last visited Jan. 15, 2013).

carriers' profitability also relies on the return of investment.²³⁵ Profiting ability and investment both are critical for insurers. *ROE2* indicates the earning on equities of insurers to represent insurers' overall profiting ability. *Investment* also specifies the return of investment of insurers to indicate their investment ability.²³⁶ When evaluating D&O insurance carriers, their coverage, financial security and reinsurance are all important.²³⁷ The variable *LN_s_coverage* indicates the total D&O insurance coverage offered by specific insurers. Alternatively, the variable *DARatio2* which means the debt-asset ratio indicates financial security of insurers. *Retention* represents the underwriting retention kept by insurance companies instead of pooling to other reinsurers. As discussed in chapter 1, the distributions of all non-life insurance market and D&O insurance market are extremely different. This implies D&O insurance applicants have different a consideration for general non-life insurance products. The variable *Marketshare* indicates the total market share of individual insurer, and *DOMarketshare* means the market share of D&O insurance of individual insurer. The definitions of variables are presented in Table 2.18.

This study ranks insurers by their D&O insurance market share, and code them by that ranking number. From the first skimming, the attribute of qualities of insurers seems fairly scattered. In addition, the overall market share and D&O insurance market share are quite different. For example, Insurer 1 has the largest D&O insurance market share,

²³⁵ See Tom Baker & Sean J. Griffith, *supra* note 74, at 818.

²³⁶ Investment is also critical for the financial power of insurance companies. See Taiwan Ratings, http://www.taiwanratings.com/tw/E/non_life_insure.asp (last visited Jan. 15, 2013).

²³⁷ See Lawrence A. Rogers, *supra* note 205, at 871.

around 34%. It just occupies less than 1% in overall insurance market. The descriptive analyses of data are presented in Table 2.19 and 2.20.

2.3.3.3 Methods and research design

To analyze the possible problem of asymmetric information and adverse selection, this dissertation scrutinizes all available D&O insurance transactions from 2008 to 2010. One complete D&O insurance transaction signifies the mutual consent of insured firms and insurers. Insurers may have known the situation of the insured, such as corporate governance, litigation record and potential risk, and profiting ability, and then decide to give insured firms coverage. Insured firms may understand the insurers' reputation in D&O insurance, capital and ability of indemnification, and then decide to purchase insurance with that insurer. Then the details of D&O insurance agreements, such as coverage, premium, and deductible, are the results of negotiation.

As for those firms without D&O insurance, one explanation is that they do not want insurance at all, but another explanation may be that they cannot get insurance in their condition. Actually, if some insurer would like to offer insurance coverage with a very low premium, a rational person will not reject this. Of course some firm maybe rejects insurance even though it is totally free, but this is not the way a rational person acts. Thus, this research assumes that the reason why some firms have no insurance is that they and insurer cannot reach agreements which are acceptable for both parties.

Accordingly, this dissertation argues that the situation of D&O insurance transactions

among all listed firms in Taiwan reveals the situation of information in the Taiwanese D&O insurance market. Excluding the firms which do not purchase D&O insurance and missing data, there are 2,485 firms which purchase D&O insurance from 2008 to 2010. This means that within these three years there were 2,485 D&O insurance contracts in total. The details of every D&O insurance contract act as a connector between insured firms and insurers. By surveying every transaction, the association between the quality of insured firms and the quality of insurers can be found. Furthermore, multivariate analysis of variance (MANOVA) is applied to assess the association between the characteristics of insurers and the insured firms, and then to analyze whether the problems of asymmetric information and adverse selection exist or not. In terms of software packages, SPSS is used to conduct canonical analysis, Pearson's correlation, cluster analysis and discriminant analysis, and STATA is used to compile data and carry out stepwise regression. Detailed methods and processes are presented in Figure 2.1.

2.3.3.3.1 Canonical correlation analysis

First of all, this study will apply canonical correlation analysis, to find out the association between the characteristics of insurers and insured firms. It is well known that the relationship and magnitude between two variables can be explored by Pearson correlation analysis. The relationship and magnitude between one variable (y) and another set of variables (x) can be explored by regression analysis. As for exploring the association

between two sets of variables, canonical correlation analysis (CCA) can be applied.²³⁸

Canonical correlation analysis is originally developed by Hotelling (1935) to identify possible links between two sets of variables.²³⁹ This method locates a canonical variable, which is a linear combination from each set, meanwhile maximizing the correlation between canonical variables from each set.²⁴⁰

Thus, as mentioned in the previous section, several variables are established to represent the quality of insurers and insured firms. Then, the CCA is carried out to determine canonical variables. This approach demonstrates whether insured firms with certain characteristics intend to contract with insurers with certain characteristics, whether insurers' underwriting functions well enough to mitigate the asymmetric information, and whether adverse selection, where firms with poor quality but contract with good insurers, indeed exists in the Taiwanese market.

2.3.3.3.2 Pearson's correlation

After previous CCA, it is found that some association exists between certain characteristics of insurers and insured firms. Such results will be retested by Pearson's correlation analysis of variables.

²³⁸ See GEORGE A. MARCOULIDES, *MULTIVARIATE STATISTICAL METHODS: A FIRST COURSE* 133 (1997).
See BRUCE THOMPSON, *CANONICAL CORRELATION ANALYSIS: USES AND INTERPRETATION* 14 (1984).

²³⁹ See WOLFGANG HÄRDLE & LÉOPOLD SIMAR, *APPLIED MULTIVARIATE STATISTICAL ANALYSIS* 321-4 (2007).

²⁴⁰ See SAS PUBLISHING, *SAS STAT STUDIO 3.11: USER'S GUIDE* 389 (2009).

2.3.3.3.3 Stepwise regression

In contrast to traditional methods, the variables are entered into the regression one at a time in stepwise regression.²⁴¹ The first independent variable which enters the model is the one which explains the greatest amount of variance in the dependent variable.²⁴² Then, the next variable is the one which can explain the greatest remaining variance in the dependent variable.²⁴³ Stepwise regression is useful for narrowing down many possible variables in a set of variables which are meaningful in explaining the dependent variable.²⁴⁴

In this section, stepwise regression is conducted by using the proxy variables of the qualities of insured firms as independent variables, and the proxy variables of the qualities of insurers as dependent variables. By doing so, this research further tests the possibility to use the qualities of the insured firms to explain and predict the qualities of insurers they contracted. This is helpful to find any tendency in the Taiwanese D&O insurance market or any problems of asymmetric information and adverse selection.

2.3.3.3.4 Cluster analysis

Cluster analysis is the statistical method to group individuals and variables to a limited number of clusters.²⁴⁵ The specific clusters are not decided in advance but found during

²⁴¹ See RONALD M. WEIERS, INTRODUCTION TO BUSINESS STATISTICS, 670 (2010).

²⁴² *Id.*

²⁴³ *Id.*

²⁴⁴ See S. CHRISTIAN ALBRIGHT, WAYNE L. WINSTON & CHRISTOPHER ZAPPE, DATA ANALYSIS AND DECISION MAKING 625 (2008).

²⁴⁵ See STÉPHANE TUFFÉRY, DATA MINING AND STATISTICS FOR DECISION MAKING 235 (2011).

this operation. This is different from following discriminant analysis.²⁴⁶ The clusters are the combinations of objects having similar characteristics, and different from outside objects which have different characteristics.²⁴⁷ All 2,485 D&O insurance contracts are used as samples to conduct cluster analysis. The result demonstrates whether these D&O insurance transactions could be classified into clusters according to the characteristics of insurers and insured firms. If there is some tendency, such as insured firms with poor quality intend to contract with good insurers, then malfunctioning of underwriting and adverse selection are implied. In contrast, if there is no obvious cluster, or insured firms with good quality intend to contract with good insurers, this would imply no adverse selection in the Taiwanese market. With 2,485 observations, this research satisfies the requirement for large samples which are needed for the k-means clustering procedure.²⁴⁸

2.3.3.3.5 Discriminant analysis and multinomial logistic regression

Discriminant analysis is useful for describing major differences among groups in multivariate analysis of variance²⁴⁹ and predicts the affiliation of new elements.²⁵⁰ After previous cluster analysis, 2,485 observations can be classified into three clusters. Then,

²⁴⁶ *Id.*

²⁴⁷ *Id.*

²⁴⁸ See D. Wishart,, K-Means Clustering with Outlier Detection, Mixed Variables and Missing Values, *in* EXPLORATORY DATA ANALYSIS IN EMPIRICAL RESEARCH: PROCEEDINGS OF THE 25TH ANNUAL CONFERENCE OF THE GESELLSCHAFT FÜR KLASSIFIKATION E.V., at 216 (University of Munich, 2001).

²⁴⁹ See JAMES STEVENS, APPLIED MULTIVARIATE STATISTICS FOR THE SOCIAL SCIENCES 285 (2002). For more discussion for design in discriminant analysis, see CARL J. HUBERTY AND STEPHEN OLEJNIK, APPLIED MANOVA AND DISCRIMINANT ANALYSIS 9 (2006).

²⁵⁰ See STEFANIE LEIMEISTER, IT OUTSOURCING GOVERNANCE: CLIENT TYPES AND THEIR MANAGEMENT STRATEGIES 99 (2010).

discriminate analysis is carried out to test the difference between these three clusters. If the result matches with the result of the cluster analysis, these classifications will be more persuasive. Then, the evidence which rejects asymmetric information and adverse selection will be more reliable. For further robustness, multinomial logistic regression will be applied to reexamine the result of discriminant analysis.

2.3.4 Empirical result and analysis

2.3.4.1 Canonical correlation analysis

In canonical correlation analysis, the number of canonical variables should be equivalent to, or less than, the minimum of the number of x variables and the number of y variables.²⁵¹ There are 10 covariates and 8 dependent variables that are used in this research, and thus the number of canonical variables is equal to, or less than, 8.

The figures of path diagram of canonical analysis are presented in Figure 2.2, 2.3, 2.4, and 2.5. The canonical correlations of these eight canonical variables are 0.61543, 0.21424, 0.12490, 0.07047, 0.04318, 0.04079, 0.03414 and 0.02673. Only x_1 and x_2 are significant (p -value < 0.05), but can still explain 96.1616% of all of the variance. It should be noted that the first canonical variable x_1 alone can explain 89.12897% of all of the variance. The following discussion is based on these two canonical variables.

First, the empirical evidence shows that 4.96822% of the variance in the set of x can be

²⁵¹ See ABDELMONEM A. AFIFI, VIRGINIA CLARK, SUSANNE MAY, COMPUTER-AIDED MULTIVARIATE analysis 239 (2004). See W. J. DIXON, BMDP STATISTICAL SOFTWARE MANUAL: TO ACCOMPANY BMDP RELEASE 7, 925 (1992).

explained by the opposite canonical variable η_1 , and 13.11728% of the variance in the set of x can be explained by its canonical variable x_1 . In addition, 0.37423% of the variance in the set of x can be explained by the opposite canonical variable η_2 and 8.15357% of the variance in the set of x can be explained by its canonical variable x_2 . In contrast, 16.22262% of the variance in the set of y can be explained by its canonical variable η_1 , and 6.14438 % of the variance in the set of y can be explained by the opposite canonical variable x_1 . Finally, 11.85339% of the variance in the set of y can be explained by its canonical variable η_2 , and 0.54404% of the variance in the set of y can be explained by the opposite canonical variable x_2 .

When evaluating canonical correlations, the relationship of variables lower than 0.3 is usually is regarded as being insufficient to affect canonical variables.²⁵² This study excludes variables whose canonical loading is less than 0.3. In the first set of canonical variables, ρ^2 is 0.37875, which indicates that x_1 can explain 0.37875% of the variance of η_1 . In addition, the capital of insured firms (-.922651) and remuneration of directors (.66596) affects insurers' debt-asset ratios (.33814), ROE (-.86634), retention (.37841) and overall market shares (-.39758) by x_1 and η_1 . This implies that the capital and remuneration of insured firms, debt-asset ratios, ROE, retention and overall market share of insurers are important concerns when D&O insurance is contracted. In the second set of canonical variables, ρ^2 is .04590, which indicates that x_1 can explain .04590 % of the variance of η_1 . Similarly, the capital (.31435), remuneration (.51005), numbers of

²⁵² See WENDY CURRIE, VALUE CREATION FROM E-BUSINESS MODELS 197 (2004).

independent directors (-.31695) and debt-asset ratios (.36303) of insured firms do indeed affect insurance coverage (.87945) and D&O insurance market share (-.36359) of insurers by x_2 and η_2 .

In addition, the cumulative redundancy indexes are 5.34245% and 6.68842%. This means that the qualities of insurers can be explained or predicted to be around 6% using the qualities of insured firms, and vice versa. This result has two implications. On one hand, it is usually the case (90% plus) that the identities of insurers who offer D&O insurance cannot be predicted using the qualities of insured firms. Neither can the identities of insured firms be predicted using the qualities of insurers. If there are some asymmetric information problems and adverse selection problems in the Taiwanese D&O market, certain symptoms such as market tendencies should be easy to find.

However, the empirical evidence does not provide such proof. It may be reasonable to infer that the Taiwanese market does not have significant market segments. Additional tests are carried out in the following stepwise regression. Under these circumstances, obvious asymmetric information and adverse selection do not exist, and the signal effect with respect to D&O insurance is not influenced.

On the other hand, about 6% of the variance of the qualities of insurers and insured firms can be predicted using the qualities of the insured firms and insurers. This indicates that there exist relationships between certain characteristics of insured firms and certain characteristics of insurer with whom they contract. However, this is not equal to asymmetric information and adverse selection. If insured firms contract with the insurers

which have similar qualities of governance, this result may be fairly reasonable. Accordingly, asymmetric information and adverse selection still do not exist and the signal effect of D&O insurance will not be influenced by adverse selection. The summarized result of canonical analysis is presented in Table 2.21.

2.3.4.2 Pearson's correlation

In order to further test the canonical analysis results, Pearson's correlation analysis is carried out to test covariates and independent variables. It is found that the capital of insured firms is significantly associated with debt-asset ratios, ROE, retention and the overall market share of insurers. This confirms the results of canonical analysis to the effect that these variables are associated with two canonical variables x_1 and η_1 . Similarly, insurance coverage is significantly related to the capital, remuneration of directors, the numbers of independent directors and debt-asset ratios of insured firms. However, the D&O insurance market share of insurers is not significantly related to the number of independent directors and the debt-asset ratios of the insured firms. The results regarding canonical variables x_2 and η_2 is partially supported by Pearson's correlation analysis. In general, the results of canonical analysis can be confirmed using Pearson's correlation analysis, particularly the first set of canonical variables, which explain 89.12897% of the variance, is fully supported by the empirical evidence. The conclusion in the previous test to the effect that there is a relationship between certain characteristics of insurers and insured firms is confirmed. The detailed result can be found in Table 2.22.

2.3.4.3 Stepwise regression

In this section, the proxy variables of qualities of insured firms are used as independent variables, and the proxy variables of qualities of insurers are used as dependent variables in stepwise regression. The results after White's heteroscedasticity correction will be reported. This is done in to explore the qualities of insured firms and the qualities of insurers with whom they contract. Such associations and magnitudes are helpful for assessing the functions and criteria of insurers' underwriting, and whether or not adverse selection exists. The detailed result is presented in Table 2.23.

When the dependent variable is insurance coverage, the insured firms' capital, remuneration and debt-asset ratios are positively significant, whereas the number of independent directors and controlled directors, and the percentage of shares owned by directors, are negatively significant. This indicates that insured firms with more capital, remuneration and better debt-asset ratio intend to purchase more coverage, or obtain more coverage from insurers. In terms of insured firms with more independent directors, controlled directors and greater percentage of shares owned by directors, such companies intend to purchase less coverage, or obtain fewer coverage from insurers. Several inferences can be made from these findings. First, the finding that positive relationships exist between remuneration and insurance coverage rejects the argument that they are substitutes. In addition, firms with smaller percentage of shares being owned by directors and controlled directors have more insurance coverage. This confirms the argument that

Taiwanese firms with better qualities have greater demand for D&O insurance. This also implies that the underwriting of insurers function properly and can avoid offering redundant coverage to firms with higher internal risks. Although the coefficient of debt-asset ratios is positive, its magnitude is comparatively small. The information about debt-asset ratios is also disclosed, and everyone including insurers can access that easily. This is insufficient to prove the malfunction of underwriting or adverse selection. A more reasonable explanation is that firms with higher debt-asset ratios experience greater demand for insurance coverage. When the dependent variable is the insurers' debt-asset ratios, then the insured firms' capital and the percentage of shares owned by directors are negatively significant, and the number of directors is positively significant. This indicates that insured firms with lower capital and fewer shares being owned by directors are companies that intend to contract with insurers who have higher debt-asset ratios, and insured firms with more directors also intend to contract with insurers who have higher debt-asset ratios. When the dependent variable is the insurers' D&O market share, it shows that insured firms with greater numbers of independent directors, and insured firms with less capital, intend to contract with insurers who have large shares of the D&O insurance market.

When the dependent variable is insurers' return on investments, this indicates that insured firms with more capital and insured firms with fewer directors intend to contract with insurers who experience greater returns on their investments. When the dependent variable is insurers' market shares, this shows that insured firms with greater amounts of

capital intend to contract with insurers with greater overall market share. In contrast, insured firms with high debt-asset ratios, numerous directors, and independent directors intend to contract with insurers with less overall market share. Again, insured firms with less capital intend to purchase insurance from insurers with higher retention rates. In contrast, insured firms with low debt-asset ratios intend to contract with insurers with lower retention rates. As regards the ROE of insurers, insured firms with greater amounts of capital and greater percentage of shares being owned by directors intend to contract with insurers with higher ROEs. However, insured firms which offer greater remuneration for directors and which have higher debt-asset ratios intend to contract with insurers with lower ROEs.

Certain associations between the qualities of insured firms and insurers and the attributes of D&O insurance transactions can be found in these results. Still, there is no obvious evidence that shows that there is any form of malfunction of underwriting and adverse selection, such as consistently negative associations between the qualities of insured firms and insurers, or situations where insured firms with poor qualities can obtain contracts from insurers with good reputations or large market shares. Except for the ROE of insurers, the R-square scores of other regressions are around, or less than, 5%. This implies that generally such associations between the qualities of insured firms and insurers are quite weak, and adverse selection occurs where insured firms with poor qualities contract with good insurers.

In addition, significant variables cannot be found using stepwise regression when the

dependent variable is the capital of insurers. This implies that there is a rare relationship between the qualities of insured firms and the capital of insurers. D&O insurance applicants may not be excessively concerned about the capital of insurers. This matches with previous analysis of the Taiwanese D&O insurance market and descriptive analysis. The amounts of capital held by D&O insurers in Taiwan are quite similar among insurance firms and this does not influence D&O insurance sales.

Also, because the data in this research is cross-sectional time-series data, panel data²⁵³ is also conducted to re-exam the previous empirical results. Generally, panel data test demonstrates similar results with the previous OLS regressions. Among the significant results, the qualities of insured firms are generally positively correlated to the qualities of insurers. Thus, the concern about adverse selection is still not supported by the results of panel data. In conclusion, there is some reasonable association between the qualities of insured firms and the qualities of insurers with whom they contract. This confirms the previous results of canonical and Pearson correlation analysis. The detailed result is presented in Table 2.24.

2.3.4.4 Cluster analysis

The proxy variables of qualities of insurers and the insured firms are used as criteria for attempting to classify 2,485 D&O insurance contracts. The purpose of this analysis is to determine whether some clusters of each of the components are similar to each other and

²⁵³ See CHRISTOPHER DOUGHERTY, INTRODUCTION TO ECONOMETRICS 408-9 (2007).

different than other observations of other clusters. If so, some tendencies of D&O markets might be revealed. Given the number of observations in each cluster, the magnitude of such tendencies can be observed. In addition, the association between the qualities of insurers and insured firms is also helpful for examining concerns about adverse selection.

As regards clarification and convenience, the default number of clusters is set as 3.²⁵⁴ As regards the results, regardless of which variable is used as criteria, the result of classification and the centers of clusters are identical. There are 86 observations in cluster 1, 2,393 observations in cluster 2, and 6 observations in cluster 3. These empirical results can be interpreted from two perspectives. On one hand, if the majority of observations were classified into one group, then it can be inferred that most transactions are similar and no adverse selection exists.

On the other hand, given that all of the observations can be classified into several groups, this is not equivalent to that market being problematic. If good insured firms are matched with good insurers by means of insurance contracts, or bad insured firms are match with bad insurers, then it can be inferred that underwriting functions properly, insured firms and insurers can filter the proper counterparties, and no asymmetric information and adverse selection exist. The result is reported in Table 2.25.

As regards the previous results of canonical analysis, Pearson analysis and stepwise

²⁵⁴ This study attempts to classified all observations into more than 3 clusters, but the results are quite similar. For example, the tendencies of these tests are similar, and cluster 2 in them always contains more than 90% of the observations.

regression will also be confirmed. First, empirical results show that there are 3 clusters for which the observations have significant differences. In cluster 1, insured firms have the highest amount of capital, larger ROE, numbers of directors and independent directors. They also have the smallest numbers of controlled directors, the smallest percentage of shares owned by directors, the smallest percentage of shares owned by major shareholders, and highest debt-asset ratio. The comparatively low standard deviations of ROA show that these firms are less opportunistic. In comparison with other groups, insured firms in cluster 1 have the best qualities among the three groups. Insurers in cluster 1 have the smallest amounts of capital, investment returns and D&O market shares, medium retention rates, and the highest levels of ROE. In comparison with other groups, the insurers in cluster 1 are small scale and have high profitability. This result implies that insured firms and insurers in this cluster both have better qualities. Transaction negotiation and insurance underwriting should function properly, and consequently better-insured firms obtain offers from better insurers. This is quite reasonable and fair, and no clue about information asymmetries and adverse selections are revealed.

Cluster 2 contains 2,393 observations, about 96% of all 2,485 observations. Even though different proxy variables of qualities of insurers and insured firms are used as criteria, the number of observations and the centers of the clusters are the same. The observations in cluster 2 should be similar to each other and different than observations for other groups. Because 96% of the observations are classified into an identical group where the

components are similar, the entire Taiwanese D&O insurance market is almost homogeneous and market segmentation is limited. This result is further confirmed by the robustness check. Even when using different variables as criteria, the result remains consistent. Even though this study attempts to classify all of the observations into more than 3 groups, cluster 2 consistently contains more than 90% of all of the observations. The majority of insurance transactions are homogeneous, and there is no evidence of asymmetric information and adverse selection.

On the other hand, if the focus moves to the qualities of the firms that are in cluster 2, the concerns about asymmetric information and adverse selection are still rejected. In comparison, the insured firms in cluster 2 have intermediate qualities. They have medium amounts of capital, ROEs, shares of directors, standard deviations of ROA and remuneration for directors. Their insurers also have medium amounts capital, ROEs and D&O insurance market shares. Insured firms and insurers find and contract counterparties they deserve. The same result emerged: no evidence of asymmetric information and adverse selection was found.

Cluster 3 contains bad insured firms and insurers. As regards insured firms, they have the lowest amounts of capital and ROEs. In addition, they also have highest percentage of shares that are owned by directors and major directors, and high debt-asset ratios. They have the highest standard deviation of ROAs, which implies that these firms intend to engage in opportunistic behavior. Insurers in cluster 3 have the highest retention rates and the lowest ROEs. Although these insured firms get the greatest amounts of coverage, the

qualities of the insurers are comparatively low. This implies that bad insured firms cannot obtain large amount of coverage from good insurers. This result is reasonable and the problem of asymmetric information and adverse selection does not appear. One possible explanation for high coverage is they require more insurance, because they actually do have poor qualities and experience the highest possible level of risk. This is also why they cannot obtain offers from better insurers, and they must purchase insurance from other insurers.

In conclusion, there cluster analysis above leads to two important findings. First, the majority of the observations can be classified into a single group whose components should be similar. Most of the market is homogenous. Second, given the 3 clusters in the results, insurers contract with insured firms according to their status. This shows that no party obtained any advantages in negotiation or insurance underwriting, and that asymmetric information and adverse selection did not exist. Hence, the equilibrium of the Taiwanese D&O insurance market is close to being homogenous and asymmetric information and adverse selection did not occur. Thus, the following tests about the effect of D&O insurance may not be influenced by adverse selection. Final cluster centers of cluster analysis are reported in Table 2.26.

2.3.4.5 Discriminant analysis and multinomial logistic regression

According to previous cluster analyses, all D&O insurance contracts can be classified into three categories. Discriminant analysis is used to determine whether such

classifications are proper or not. The result shows that 99.9% of original grouped cases are correctly classified. As regards the figure of canonical discriminant functions, it is found that the three clusters are separately scattered. The result is that the classification of cluster analysis is confirmed. The result of discriminant analysis is demonstrated in Figure 2.6.

Among the two canonical Discriminant Functions here, the first can explain 97.8% of all of the variance, and the second one can explain about 2.2% of the variance. Both of their Wilks' Lambdas are significant. Two sets of Standardized Canonical Discriminant Function Coefficients are presented below:

$$y_1 = .001LN_s_coverage - .027LNcapital2 + .000DAratio2 + .059ROE2 - .017investment + .036retention + .026marketshare + .035DOmarketshare - .065LNcapital - .072ROE - .021LNRemu + .020Director + .037IDirector + .045Ctrldirector - .063SD - .075SMH + 1.011DAratio + .060StdDevROA \dots \dots \dots (1)$$

$$y_2 = .033LN_s_coverage + .065LNcapital2 - .100DAratio2 - .039ROE2 - .051investment + .096retention - .133marketshare - .101DOmarketshare + .327LNcapital + .778ROE - .045LNRemu + .406Director + .132IDirector - .242Ctrldirector - .086SD - .044SMH + .001DAratio - .225StdDevROA \dots \dots \dots (2)$$

It should be noted that discriminant analysis assumes that the variance of discriminant

variables are homogenous across groups.²⁵⁵ This is done to ensure that the groups from the same parameter.²⁵⁶ The test score of Box's test is 0.000, which is less than 0.05. The null hypothesis of equal population covariance matrices is rejected. This nevertheless does not mean this result is not reliable. First, Box's test is quite sensitive to the sample size.²⁵⁷ The larger the sample size, the more easily the covariance assumption is violated. Given a large sample, a violation of this assumption is not significant.²⁵⁸ Moreover, discriminant analysis is robust with respect to violations of the assumption of covariance.²⁵⁹ All of the observations come from the Taiwanese public market and thus are certainly from the same parameter. Given the large sample of 2,485 observations in this study, and the similarities of the result of cluster analysis, this violation should not be critical.

Furthermore, logistic regression is usually applied when the assumptions of discriminant analysis are violated.²⁶⁰ As regards the robustness check, multinomial logistic regression is conducted with the second cluster as base group. The result shows that the model is significant and exhibits goodness-of-fit. This indicates that the classification based on cluster analysis is confirmed. The qualities of insurers and insured firms may lead to some different characteristics in D&O insurance contracts, but such characteristics are

²⁵⁵ See NEIL J. SALKIND, *ENCYCLOPEDIA OF RESEARCH DESIGN* 350 (2010).

²⁵⁶ *Id.*

²⁵⁷ *Id.*

²⁵⁸ See DENNIS R. JONES, *THE RELATIONSHIP BETWEEN WORKING CONDITIONS AND MUSCULOSKELETAL DISORDERS IN AN ASSEMBLY FACILITY* 179 (2006).

²⁵⁹ See Neil J. Salkind, *supra* note 255, at 350. See also LAWRENCE S. MEYERS & GLENN GAMST, A. J. GUARINO, *APPLIED MULTIVARIATE RESEARCH: DESIGN AND INTERPRETATION* 270 (2006).

²⁶⁰ See Neil J. Salkind, *Id.*, at 350.

quite limited. Most of the observations are in cluster 2, which implies that the Taiwan D&O market is close to being homogenous. The differences between the three clusters are significant and the characteristics provide no evidence of adverse selection. The result of multinomial logistic regression is reported in Table 2.27.

2.3.5 Conclusions

The problems of adverse selection and insurance underwriting are tested in this section. If these problems occur, the equilibrium of demand and supply may be influenced, insurers would not be able to screen the insured firms sufficiently and thus the signal effect of D&O insurance will not be reliable. The results of canonical analysis, Pearson analysis, stepwise regression, cluster analysis, discriminant analysis and multinomial logistic regression lead to three important findings. First of all, there is some association between the qualities of insurers and insured firms. This implies that certain characteristic of insured firms and insurers are emphasized in negotiations and underwriting. Second, when using different methods of classification, the majority of D&O insurance contracts are still belong in a single group. This implies that the Taiwanese D&O insurance market is close to being homogenous. Third, there was no evidence that proved that there was unfairness in the associations between the qualities of insured firms and the insurers with whom they contracted. Insured firms with poor qualities intend to contract with insurers whose qualities are not very good, and vice versa. This shows that the majority of the

market is homogenous, and the risk classification in the Taiwan D&O insurance market is also good and sufficient. No significant evidence of asymmetric information and adverse selection can be found. This dissertation concludes that insurance underwriting, the homogeneity of the Taiwanese market, and the following tests about the effect of D&O insurance will not be affected.

2.4 Test of monitoring function of D&O insurance

2.4.1 Introduction

In the previous two sections, this dissertation has clarified that there is no moral hazard or adverse selection problem in the Taiwanese D&O insurance market. Under this circumstance, the test of monitoring hypothesis should be more reliable. From this section, a series of empirical work will be conducted to test the monitoring hypothesis and the alternative hypothesis in the background of Taiwan. This will begin with the demand of D&O insurance on which previous researches focus. The traditional literature typically uses the purchase status of D&O insurance as a dependent variable and proxies of corporate governance as independent variables to conduct regression analysis.²⁶¹ By following this approach, the monitoring hypothesis and the relationship between the demand of D&O insurance and corporate governance in Taiwan can be tested. Also, this research will add more proxy variables into regression to test the signal hypothesis. The discussion of empirical findings about signal hypothesis will be provided in Chapter 3. In short, this chapter not only explores issues mentioned above, but also lays the foundation for further analysis in following chapters.

2.4.2 Literature review and hypothesis development

As mentioned in Chapter 1, under the assumption of the monitoring hypothesis, D&O

²⁶¹ For example, Core uses insurance premium as the dependent variable and governance structure quality as well as business risk as independent variables in regression. *See* Core, John E., *supra* note 45, at 456.

insurance should be in a negative relationship with corporate governance mechanisms. Firms with better governance structure, more returns, and fewer losses intend to purchase less D&O insurance. In contrast, firms with worse governance structure, fewer returns and more losses intend to purchase more D&O insurance. For example, Lea H. Stern and M. Martin Boyer find that D&O insurance can provide an unbiased signal of firm's risk.²⁶² Based on following and previous literature reviews, the hypotheses about D&O insurance purchase will be developed.

2.4.2.1 Business structure

Business structure is the factor which affects both corporate governance and the demand for D&O insurance. Core proposed that the size of companies affects their demand for D&O insurance.²⁶³ Larger firms are expected to face greater litigation risks.²⁶⁴ However, larger firms generally have less demand for insurance coverage.²⁶⁵ Hence, the net effect of size on the demand of D&O insurance is expected to be ambiguous.²⁶⁶ However, David Mayers and Clifford W. Smith believe that larger companies are better able to self-insure themselves and thus have less need for real insurance.²⁶⁷ This dissertation will test the influence of this factor in D&O insurance purchase in Taiwan. The factor of the size of the insured companies will be represented by *Ln_Capital* which is the logarithm

²⁶² See Lea H. Stern & M. Martin Boyer, *supra* note 47, at 1.

²⁶³ See John E. Core, *supra* note 44, at 73.

²⁶⁴ *Id.*

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ See David Mayers & Clifford W. Smith, Jr., *On the Corporate Demand for Insurance*, 55:2 THE J. BUS. 281, 294 (1982), available at <http://www.jstor.org/stable/2352704>.

of their capital.

The industries within which companies operate might face different levels of risk which would affect the level of demand for D&O insurance. Irene Y. Kim tests the relationship between high-technology industry and D&O insurance in the United States market.²⁶⁸

The development of the D&O insurance industry in Taiwan increases, but the insurance industry is not as well developed as is the case in the United States. As mentioned above, approximately 50% of companies in Taiwan purchased D&O insurance. It is usually argued that the industries that face higher potential risks, such as high technology,²⁶⁹ biotechnology, the semiconductor industry and so on, have more incentives to purchase D&O insurance.²⁷⁰ In other words, various industries might have different risks. The dummy variable *Industry* is used to examine the relationship between the industries within which companies operate and their level of demand for D&O insurance. It equals 1 if companies are high technology industry and 0 otherwise.

2.4.2.2 Financial performance

It is often the case that better financial structure is an indicator of better corporate governance and low level of need to purchase insurance. In the discussion of D&O insurance and corporate governance, return on equity (ROE) is often used as a proxy for

²⁶⁸ See Irene Y. Kim, *supra* note 148, at 21.

²⁶⁹ See Shareholder Deriv. Actions L. & Prac. § 6:49 (2010).

²⁷⁰ See Tsai-Jyh Chen & Chia-Hui Pang, *supra* note 16, at 178.

financial performance.²⁷¹ Thus, following this approach, ROE is used as a proxy variable for financial performance. In addition, Core indicates that ROE is negatively related to litigation risk.²⁷² Under this reasoning, ROE shall also be in inverse association with the demand for D&O insurance. In this research, financial performance is examined to determine whether or not this factor is negatively related to the demand of insured companies in Taiwan.

2.4.2.3 Corporate governance

Following the monitoring hypothesis, insurers are an outside monitoring mechanism with respect to corporate governance. Given the purpose of monitoring, D&O insurance is a substitute for other monitoring mechanisms, such as ownership and external and internal shareholders.²⁷³ This reasoning leads to two possible assumptions. First, corporate governance is negatively related to the demand for D&O insurance. In other words, companies with better corporate governance have less demand for D&O insurance. Second, D&O insurance is negatively related to other mechanisms. Companies with more and better other monitoring mechanisms have less need for D&O insurance. However, it is possible to argue that because such companies emphasize corporate governance, they are more willing to purchase D&O insurance, either to improve their monitoring functions or their reputations. The aims of this dissertation are to clarify these issues.

²⁷¹ See Christine Kang, *Directors' and Officers' Insurance: Ordinary Corporate Expense or Valuable* 44 (2011), http://economics.stanford.edu/files/Kang_HThesis2011.pdf.

²⁷² See John E. Core, *supra* note 45, at 466.

²⁷³ See Noel O'Sullivan, *supra* note 43, at 547-8.

2.4.2.3.1 Ownership structure and internal risk

Better ownership structure²⁷⁴ and less internal risk²⁷⁵ are usually indicators of better corporate governance. The latter results in less demand for D&O insurance. It can be hypothesized that D&O insurance is negatively related to ownership structure and internal risk. Hence, the shares of directors and shares of major shareholder are negatively related to the demand for D&O insurance. Having directors who are controlled by parent companies or controlling companies are also bad for corporate governance and increase the demand for D&O insurance. In terms of internal risk, the hypothesis is that the more directors and officers who are appointed by parent companies or controlling groups, the more likely it is that D&O insurance will be needed.

In addition, whether the chief executive officer and chairman of the board are identical or not is important in the issues concerning D&O liability and corporate governance.²⁷⁶ The situation where one person holds both titles may reduce the board's independence and the decisions of CEOs will be less monitored.²⁷⁷ Thus, the litigation risk will increase. In other words, the corporate governance is expected to be stronger when the board of

²⁷⁴ Regarding how ownership structure affects corporate governance in the viewpoint of path dependence, see Lucian A. Bebchuk, *A Theory of Path Dependence in Corporate Ownership and Governance*, 52 STAN. L. REV. 127, 141-2 (1999).

²⁷⁵ Internal corporate governance aims to find optimal allocation of power. See Arthur R. Pinto, *An Overview of United States Corporate Governance in Publicly Traded Corporations*, 58 AM. J. COMP. L. 257, 264 (2010).

²⁷⁶ See M. Martin Boyer & Mathieu Delvaux-Derome, *supra* note 84, at 10-1.

²⁷⁷ *Id.*

directors is independent of CEOs.²⁷⁸ Whether the chief executive officer and chairman of the board are identical may be in positive relationship with litigation and the demand of D&O insurance. It is assumed that the chairman of the board of directors who also serves as CEO will increase risks and the demand for D&O insurance.

2.4.2.3.2 The structure of boards of directors

The structure of the board of directors is usually regarded as an important factor in corporate governance.²⁷⁹ For instance, the number of directors may be critical in determining the effectiveness of corporate governance.²⁸⁰ In order to consider such factors in this empirical research, the number of internal and external directors will be considered in the models in this section.

2.4.2.3.3 Remuneration

Core proposes that remuneration packages and D&O insurance are both parts of offers made to directors.²⁸¹ They will not serve on board until the package meets the reservation utility.²⁸² In fact, compensation packages and D&O insurance are substitutes for each other.²⁸³ Reduced levels of D&O insurance leads to higher levels of compensation being

²⁷⁸ See John E. Core, *supra* note 45, at 460.

²⁷⁹ See Paul Rose, *The Corporate Governance Industry*, 32 J. CORP. L. 887, 910-911 (2007).

²⁸⁰ *Id.*

²⁸¹ See Jinyoung Park, *supra* note 86, at 3.

²⁸² See John E. Core, *supra* note 44, at 66.

²⁸³ *Id.* Some literature proposes that D&O insurance is helpful for controlling executive compensation and thus benefits corporate governance. See Sharie-Ann J Campbell, *Controlling Executive Compensation Directors' and Officers' Liability Insurance: A Proposed Solution to Inflated Pay* 3 (2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1595091.

required in order to compensate directors for taking additional risks.²⁸⁴ Therefore, compensation is negatively related to the demand for D&O insurance. However, in contrast to personal coverage for directors, excessive compensation to directors might bring about the deterioration of a company's financial structure and corporate governance. In that event, the demand for D&O insurance might increase. The variable *Ln_Remuneration* is logarithm of compensation package offered to directors which examines the relationship between compensation and the demand for D&O insurance.

2.4.2.3.4 Litigation risk

The number of shareholders is one indicator of the size of companies. Shareholder litigation is an important source of the litigation risk faced by directors; therefore, the number of shareholders is one indicator of the legal risk faced by the insured companies. The data were collected about all of the litigations, claims, and administrative penalties made against companies 2008 through 2010. When companies faced more disputes than during the previous year, the companies had an incentive to purchase D&O insurance. It is hypothesized that the number of litigations is positively related to the demand for D&O insurance. To test this, the variable *litigation* which is the number of disclosed significant litigation was used. Moreover, debt-asset ratio also indicates the risk of litigation and bankruptcy. Facing a high risk of litigation and bankruptcy may increase the demand for D&O insurance. The variable *DAratio* denotes the debt-asset ratio of firms.

²⁸⁴ *Id.* at 67.

2.4.2.4 Test for signal hypothesis: foreign investors

Foreign investors are usually believed to care about the corporate governance of firms in which they invest. Although emerging markets are usually characterized by weak corporate governance, foreign investors still must deal with the criteria that control corporate governance in their home country.²⁸⁵ They will maintain their stricter criteria even in emerging markets, and avoid involvement with local firms that are riddled with scandals.²⁸⁶ In emerging markets, corporate governance has additional importance in terms of its role in attracting foreign investment.²⁸⁷ In addition to investment, foreign investors often bring in foreign expertise and monitoring, and improve the quality of corporate governance.²⁸⁸ Firms sometimes even improve their corporate governance in order to attract more foreign investors.²⁸⁹ Foreign investment is critical for the role it plays in stimulating the economies of developing countries.²⁹⁰ In addition, foreign investors are usually not familiar with local corporation laws, securities laws, and the

²⁸⁵ See Julien Chaisse, *Corporate Governance and Financial Reform in China: Jing Leng*, 40 HONG KONG L. J. 239, 239 (2010).

²⁸⁶ *Id.*

²⁸⁷ See Varun Bhat, *Corporate Governance in India: Past, Present, and Suggestions for the Future*, 92 IOWA L. REV. 1429, 1431 (2007).

²⁸⁸ See Terry E. Chang, *The Gold Rush in the East: Recent Developments in Foreign Participation within China's Securities Markets as Compared to the Taiwanese Model*, 44 COLUM. J. TRANSNAT'L L. 279, 310 (2005).

²⁸⁹ Such as the Hyundai Heavy Industry in South Korea, see Craig Ehrlich Dae-Seob Kang, *U.S. Style Corporate Governance in Korea's Largest Companies*, 18 UCLA PAC. BASIN L.J. 1, 56 (2000). Caslav Pejovic also proposes that Japanese corporate governance should be further adjusted to attract more foreign investors. Caslav Pejovic, *Japanese Corporate Governance: Behind Legal Norms*, 29 PENN ST. INT'L L. REV. 483, 519 (2011).

²⁹⁰ See Cheryl W. Gray & William W. Jarosz, *Law and the Regulation of Foreign Direct Investment: The Experience from Central And Eastern Europe*, 33 COLUM. J. TRANSNAT'L L. 1, 1 (1995).

local corporate governance regime.²⁹¹ This implies that they will tend to rely on signals conveyed by firms when they decide their investment strategies. If the corporate governance of firms is good, more foreign investors are attracted. This is emphasized in Taiwan. It is possible that the improvement of corporate governance in Taiwan in recent years is a result of influence exerted by foreign investors.²⁹²

The literature emphasizes the positive effects of foreign investments on corporate governance. One result is that the shares held by foreign investors is used as the proxy variable for signal hypothesis in this research. If the percentage of shares held by foreign investors is positively correlated with the purchase of D&O insurance, this indicates that foreign investors really do care about D&O insurance. This also implies that D&O insurance does have a positive effect and foreign investors will be attracted, which supports the signal hypothesis about D&O insurance. On the other hand, if the relationship is not statistically significant or negative, this implies that foreign investors do not care D&O insurance to a significant degree. This implies that D&O insurance has no significant signal effect, and foreign investors will not be attracted. There is no evidence to support the signal hypothesis regarding D&O insurance in Taiwan. In order to thoroughly examine foreign investors, the shares held by foreign natural persons, foreign juristic persons and foreign financial juristic persons²⁹³ will be considered in this

²⁹¹ See Ali Adnan Ibrahim, *Developing Governance and Regulation for Emerging Capital and Securities Markets*, 39 RUTGERS L.J. 154 (2007).

²⁹² See Terry E. Chang, *supra* note 288, at 310. However, the author provides another argument against this. *Id.*, at 311.

²⁹³ Institutional investors are also believed to have positive effect on corporate governance. See David P. Porter, *Institutional Investors and Their Role in Corporate Governance: Reflections By a "Recovering"*

empirical analysis. They are represented by *FNP*, *FJP* and *FFJP* respectively.

Framework of hypotheses is presented in Figure 2.7.

2.4.3 Research design

2.4.3.1 Data

The data on D&O insurance purchases made by listed companies in Taiwan was obtained from TEJ and MOPS. In addition to the websites of listed companies, basic information and financial data regarding them were obtained from the TEJ and Taiwan Stock Exchange Corporation (TSCE).²⁹⁴ This study proposes that the corporate governance of the insured companies affects their purchases of D&O insurance during the following year. Because of its availability, the data from 2008-2010 was used in this study. Total observations over the course of three years are 4,130. Following the assumption that the corporate governance of the previous year will affect the purchase of D&O insurance in the next year, this dissertation will use the data about corporate governance of listed firms in 2008 as the independent variables and the data about the purchase of D&O insurance in 2009 as the dependent variable, and so on.

Corporate Governance Lawyer, 59 CASE W. RES. L. REV. 627, 653-4 (2009). For more arguments about the role of institutional investors in corporate governance, see Edward S. Adams, *Corporate Governance after Enron and Global Crossing: Comparative Lessons for Cross-National Improvement*, 78 IND. L.J. 723, 740 (2003). They usually have more interest in, and the ability to influence the behavior of companies. See David P. Porter, *Id.*, at 654-81. In Taiwan, the majority of companies are owned by families and individual shareholders, and the role of institutional investors is more important. See Yin-Hua Yeh, Tsun-siou Lee & Tracie Woidtke, *Family Control and Corporate Governance: Evidence from Taiwan*, 2 INT'L REV FIN. 21 (2001). Individual investors account for 70% of stock market transactions in Taiwan. See Yu-Hsin Lin, *Modeling Securities Class Actions outside the United States: The Role of Nonprofits In The Case of Taiwan*, 4 N.Y.U. J. L. & BUS. 143 (2007).

²⁹⁴ http://www.twse.com.tw/ch/listed/governance/cg_02.php (last visited Jan. 15, 2013).

2.4.3.2 Variables

2.4.3.2.1 Dependent variables

The purpose of this research is to test whether or not there is a relationship between purchases of D&O insurance and the corporate governance of the insured companies. In this model, the dependent variable is whether or not the listed companies purchased D&O insurance. The variable *Purchase* is a dummy variable which denotes whether or not companies purchased D&O insurance. This equals 1 if companies purchased D&O insurance and 0 if they did not.

The amount of D&O insurance coverage is the dependent variable for other panels. Insurance coverage indicates how much insurers must indemnify insured companies when losses take place. The variable *Coverage* denotes how much coverage a company purchased. Individual coverage of every firm is calculated respectively. If a company had more than one policy, the sum of all of that company's coverage was calculated. If a company simultaneously purchased insurance for individual directors and the entire board of directors, all of that coverage was combined as well.

2.4.3.2.2 Independent variables

2.4.3.2.2.1 Business structure

A company's size and industry are important considerations in assessing its corporate

governance.²⁹⁵ As mentioned above, larger companies are expected to have higher litigation risk.²⁹⁶ Size is usually considered an important factor for a company in determining the need for insurance.²⁹⁷ In the issue of D&O insurance, capital or asset is usually used to indicate the size of a company and as a proxy of corporate governance.²⁹⁸ The size of a firm is usually believed to have a positive impact on D&O insurance coverage.²⁹⁹ Here, this dissertation follows this approach and lets the variable *Capital* denote the capital of the listed companies. The industry of a company may affect its tentative litigation risk. Especially in Taiwan, it is believed that high-technology companies have more litigation risk³⁰⁰ and have more demand for D&O insurance. Hence, the variable *Industry* is used to denote the industry group to which the companies belong. The Taiwan Stock Exchange Corporation (TWSE) sector groups can be found in Table 2.28.

Among these groups, this study defines “24.Semiconductor Industry,” “25.Computer and Peripheral Equipment Industry,” “26.Optoelectronic Industry,” “27.Communications and Internet Industry,” and “28.Electronic Parts/Components Industry” as high-technology companies and grant them the value “1.” Other groups, which are not high-technology companies, are defined with the value “0.” The variable *Industry* is a dummy variable. Moreover, in addition to classifying all industries into high-technology companies or not,

²⁹⁵ 1849 PLI/CORP 453.

²⁹⁶ See Core, John E., *supra* note 44, at 73. Core, John E., *supra* note 45, at 462.

²⁹⁷ See M. Martin Boyer & Mathieu Delvaux-Derome, *supra* note 84, at 8.

²⁹⁸ See Tsai-Jyh Chen & Chia-Hui Pang, *supra* note 16, at 179.

²⁹⁹ See Peter Egger, Doina Radulescu & Ray Rees, *supra* note 160, at 18.

³⁰⁰ *Id.*, at 178.

this study also fixes the effect of industry and just uses separate dummy variables to denote all industries in Taiwan. In conclusion, this research uses the amount of capital and type of industry of the companies studied to represent their business structures.

2.4.3.2.2.2 Financial performance

Litigation risk of firms may be related to their financial performance. The firms with poor financial performance may have more demand for D&O insurance. Regarding this, a firm's return of equity is usually used as proxy of financial performance.³⁰¹ It is expected that this will be negatively related to the demand of D&O insurance.³⁰² *ROE* is used in this dissertation to indicate the financial performance of the listed companies during 2008 to 2010 in Taiwan. All of this information was obtained from the Taiwan Economic Journal (TEJ).³⁰³

2.4.3.2.2.3 Corporate governance

There are several variables used to indicate the quality of corporate governance. The importance of the shareholder in corporate governance cannot be emphasized any more. Regarding litigation risk, a shareholder is usually a major source of litigation against directors and officers.³⁰⁴ More shareholders imply more litigation risk, especially under

³⁰¹ See Core, John E., *supra* note 45, 462.

³⁰² *Id.*

³⁰³ <http://www.tej.com.tw/twsite/> (last visited Jan. 15, 2013).

³⁰⁴ In the United States, one half of D&O claims are brought by shareholders. See Core, John E. *supra* note 45, at 452. See also Clifford G. Holderness, *supra* note 34, at 120.

the duty of corporate officers and directors to manage firms for the purpose of maximizing the benefit of shareholders.³⁰⁵ This means that the number of shareholders is positively related to the demand of D&O insurance. As such, the variable *SH* is used to indicate the total number of shareholders and to evaluate its relations to the demand for D&O.

Ownership structure and internal risk are important issues regarding corporate governance. When insiders' control over firms increases, the preference of outside shareholders may be ignored and the demand for insurance may increase.³⁰⁶ Actually, D&O insurance applicants are typically asked to disclose the information about insider ownership and significant outside blockholdings.³⁰⁷ So four variables are set up to test this factor. The variables *Sdirector* and *SMH* indicate the percentage of shares held by directors and major shareholders. The variable *Ctrldirector* indicates the number of directors nominated or controlled by the parent company or the largest controlling group within the company, such as family members, relatives, or the parent company. Similarly, the variable *Intrlrisk* indicates the number of directors and officers appointed by a parent company or the controlling group. Again, if the chairman of the board, the CEO, the financial manager, or supervisory director is appointed by the parent company or the controlling group, the value will be 1; otherwise, it will be 0. The total ranges from 0 to 4.

Also, this research considers another coding – just use four separate dummy variables to

³⁰⁵ See Jonathan R. Macey, *A Close Read of an Excellent Commentary on Dodge v. Ford*, 3 VA. L. & BUS. REV. 177, 178 (2008).

³⁰⁶ See John E. Core, *supra* note 44, at 68.

³⁰⁷ See Tom Baker & Sean J. Griffith, *supra* note 7, at 522.

denote whether the previous mentioned people are appointed by the parent company or the controlling group or not. Both results will be compared. Institutional investors usually play important roles and lead the revolution of corporate governance, especially as they are major shareholders.³⁰⁸ Therefore, the number of institutional investors and foreign investors may positively contribute to corporate governance, and the need for insurance might decrease in such cases. In order to evaluate this factor, the variable *Institution* is used to indicate the number of total institutions and foreign shareholders from the list company in Taiwan.

As mentioned above, D&O insurance may be considered an important part of compensation packages for managers³⁰⁹ and directors, especially for outside directors, as they often will not serve unless the package meets their reservation utility.³¹⁰ By this reasoning, the compensation for directors and officers and D&O insurance are substitutes and are negatively related. However, there is an opposite argument, which proposes that the evidence to support this reasoning cannot be found.³¹¹ A different possible reasoning is that more compensation implies more liability for directors and officers, and thus there is more demand for D&O insurance.³¹² By this reasoning, compensation and D&O insurance are positively related. In order to clarify this problem, the variable *Remuneration* is set to indicate the compensation package offered to the directors of

³⁰⁸ See Edward S. Adams, *Bridging the Gap between Ownership and Control*, 34 J. CORP. L. 409, 424 (2009).

³⁰⁹ See M. Martin Boyer & Mathieu Delvaux-Derome, *supra* note 84, at 10.

³¹⁰ See John E. Core, *supra* note 44, at 73.

³¹¹ *Id.*, at 84.

³¹² See Tsai-Jyh Chen & Chia-Hui Pang, *supra* note 16, at 179.

each listed company during 2008-2010.

An independent or outside director is usually viewed as an important mechanism for corporate governance. The more independent directors, the more closely the firms are overseen.³¹³ Possible mistakes may be prevented via this mechanism. In this way, litigation risk will be decreased and thus the demand for D&O insurance will also decrease.³¹⁴ The monitoring hypothesis can also suggest this reasoning. For the purpose of improving corporate governance, D&O insurance and other mechanisms, such as an independent director, are substitutes and therefore they are negatively related. However, M. Martin Boyer proposes a different argument, which is the risk aversion hypothesis. Compared to inside directors, independent directors receive less compensation and fewer benefits from firms, and, as such, they usually request more D&O insurance coverage.³¹⁵ The number of independent directors is positively associated with D&O insurance. In order to evaluate this factor, the variable *Indpdtdirector* is used to indicate the number of independent directors each listed company had during 2008-2010.

Additionally, the numbers of directors does not only imply the size of firms but also the tentative D&O claims. The variable *Directors* indicates the number of directors each listed company had during 2008. The dummy variable *Dual* equals 1 if the chairman of the board of directors is also the CEO, and is otherwise 0.

³¹³ See M. Martin Boyer & Mathieu Delvaux-Derome, *supra* note 84, at 10. However, the function of independent director is also arguable, cf. Victor Brudney, *The Independent Director – Heavenly City or Potemkin Village?*, 95 HARV. L. REV. 597, 611 (1982).

³¹⁴ *Id.*

³¹⁵ See M. Martin Boyer, *supra* note 6, at 10.

2.4.3.2.2.4 Litigation risk

The main purpose of D&O insurance is to cancel out litigation risk. A high number of prior litigations may indicate bad corporate governance of firms. Under this reasoning, prior litigation may cause D&O claim or negative reputational effect. This may be positively related with the demand for D&O insurance.³¹⁶ The variable *Litigation* is to indicate the number of litigations that are significant and are disclosed by law.³¹⁷ If the number of litigations is in a positive relationship with the demand of D&O insurance, then monitoring the hypothesis is supported; otherwise, it is not.

Similarly, debt-asset ratio indicates firms' tentative financial problems. Firms with higher debt-asset ratios are usually in worse financial situations and thus have more risk of litigation.³¹⁸ Therefore, the variable *DARatio* indicates the debt-asset ratio of each listed company during 2008-2010. In sum, all of the variables and their descriptions are provided in Table 2.29.

2.4.3.3 Method

2.4.3.3.1 Descriptive analysis

This dissertation follows Clifford G. Holderness' approach in descriptive statistics.³¹⁹

This type of analysis is helpful in understanding the attributes of the types of companies

³¹⁶ See John E. Core, *supra* note 45, at 462.

³¹⁷ Securities and Exchange Act (Amended 24. Sept. 2010) Article 36 section 2.

³¹⁸ See Chen, Tsai-Jyh and Pang, Chia-Hui, *supra* note 16, at 178.

³¹⁹ See Clifford G. Holderness, *supra* note 34, at 123-4.

that purchase D&O insurance and the companies that do not. Correlation analysis will be provided, as well.

2.4.3.3.2 Logistic regression

In recent literature about D&O insurance, the empirical methods frequently used are ordinary least square regression (OLS) and logistic regression. Many scholars such as O’Sullivan³²⁰, M. Martin Boyer³²¹ and Core³²² all adopt such approaches.³²³ They use OLS regressions when the dependent variable, which is numeric value, is the limit of policy, and use logistic, which is binary, when the dependent variable is whether D&O insurance was purchased or not. This approach is primarily followed in this research, and more econometrics are developed to examine the hypotheses regarding Taiwan. The general regression model used in this section is as follows:

$$\begin{aligned}
 D\&O_t = \alpha + \beta_1 \ln capital_{t-1} + \beta_2 Industry + \beta_3 ROE_{t-1} + \beta_4 \ln remuneration_{t-1} + \\
 &+ \beta_5 director_{t-1} + \beta_6 idirector_{t-1} + \beta_7 sdirector_{t-1} + \beta_8 SMH_{t-1} + \\
 &\beta_9 ctrldirector_{t-1} + \beta_{10} dual_{t-1} + \beta_{11} intrlrisk_{t-1} + \beta_{12} daratio_{t-1} + \beta_{13} fnp_{t-1} + \\
 &\beta_{14} fjp_{t-1} + \beta_{15} ffjp_{t-1} + \beta_{16} litigation_{t-1} + \varepsilon \dots\dots\dots(1)
 \end{aligned}$$

³²⁰ See Noel O’Sullivan, *supra* note 43, at 554.

³²¹ See M. Martin Boyer, *Is the Demand for Corporate Insurance a Habit? Evidence of Organizational Inertia from Directors' and Officers' Insurance* (2004), <http://ideas.repec.org/p/cir/cirwor/2004s-33.html>.

³²² See John E. Core, *supra* note 44, at 77.

³²³ This approach is also used to test the association between D&O insurance and the enactment of Sarbanes-Oxley Act, and whether this act influences D&O insurance transactions. See Anna Oh, *supra* note 12, at 1.

In this section, a binominal variable D&O insurance purchase is used as the proxy variable of D&O insurance. This model is to test how D&O insurance purchase behavior relates to firms' governance and whether D&O insurance purchase behavior is a signal for corporate governance and thus whether monitoring function can be exerted. Considering the dependent variable is binary, logistic regression is applied in this test.³²⁴ Another problem is that many numerical variables are far from normally distributed. From the descriptive analysis below, it is found that these all are skewed to the right. For example, the variables capital, the total number of shareholders, shares held by directors, and shares held by major shareholders create the tendency for fewer firms to have larger values. Therefore, this study does logarithms for these variables to improve the distributions and get them closer to normal.³²⁵

2.4.3.3.3 OLS and censored regression

In the OLS regression model, insurance coverage, which is numerical variable, is used as the proxy variable of D&O insurance. Due to skew of insurance coverage, several approaches, including log transformation, Box-Cox transformation, and Tobit regression will be attempted to correct this problem. Then, this research will compare the results of different transformation and then find an optimal explanation.

³²⁴ See DAVID W. HOSMER & STANLEY LEMESHOW, APPLIED LOGISTIC REGRESSION 1 (2000).

³²⁵ See A. COLIN CAMERON & PRAVIN K. TRIVEDI, REGRESSION ANALYSIS OF COUNT DATA 89-90 (1998).

2.4.3.3.4 Log transformation

Considering insurance coverage is positive and skew to right, logarithm transformation is applied here to improve its distribution.³²⁶ In contrast to the previous OLS model where insurance coverage used as dependent variable without any transformation, this model is expected to provide more precise estimation.

2.4.3.3.5 Box-cox transformation

In addition to log transformation, Box-cox transformation is also useful and frequently used in regression analysis.³²⁷ The purpose of transformation is to simplify the relation, eliminate heteroscedasticity and normalize residuals. This is helpful to find the function form of the dependent variable with the largest likelihood of fitting a linear relationship between dependent and independent variables.³²⁸ This is not only beneficial for linearization of relationship but also to fit the assumption of linear regression. If the data is heteroscedastic, standard errors are biased, and residuals are not normally distributed, the linear regression would be less precise in prediction.³²⁹

In model 1.2.2, Box-Cox transformation will be applied to decide the optimal function form of dependent variable Y . After applying the Box-Cox transformation, it could be

³²⁶ See DAVID G. KLEINBAUM, APPLIED REGRESSION ANALYSIS AND OTHER MULTIVARIABLE METHODS 303 (2007).

³²⁷ See LUC ANSELIN, R. J. G. M. FLORAX, SERGIO & J. REY, ADVANCES IN SPATIAL ECONOMETRICS: METHODOLOGY, TOOLS AND APPLICATIONS 198 (2004).

³²⁸ More introduction about Box-Cox transformation, *see*

http://www.stat.uconn.edu/~studentjournal/index_files/pengfi_s05.pdf (last visited Jan. 15, 2013).

³²⁹ See JACOB COHEN, APPLIED MULTIPLE REGRESSION/CORRELATION ANALYSIS FOR THE BEHAVIORAL SCIENCES 221 (2003).

found that the suitable exponent for Y in regression is λ . By such transformation, regression can fit closer to linear relation. All panels from 2008-2010 will be transformed individually, and λ for every year may be slightly different. Similarly, in order to loosen the assumptions for classical linear regression, bootstrapping³³⁰ is carried out to construe the true situation in parameter. The results of Box-Cox transformation regression and bootstrap will be compared to get optimal explanation.

2.4.3.3.6 Censored and CLAD model

2.4.3.3.6.1 Tobit model

Analyzing the demands of D&O insurance, insurance coverage may only reflect partial parameter. Higher insurance coverage purchased reflects higher demand of insurance. But insurance coverage will not be less than 0. In other words, the variable coverage is censored at left and thus cannot reflect the parameter that is less than 0. Thus insurance coverage is a censored data and the estimation of OLS is inconsistent.³³¹ In contrast, the Tobit model or censored regression is proper for censored data.³³² This model is proposed

³³⁰ For more introductions about bootstrap, see N. Eugene Savin & Allan Wurtz, *Testing the Semiparametric Box-cox Model with the Bootstrap* 1 (2002), <http://ssrn.com/abstract=325981>.

³³¹ See Martin Falk, *Diffusion of Information Technology, Internet Use and the Demand for Heterogeneous Labor* 7 (2001), <http://ssrn.com/abstract=372104>.

³³² Censored data is the values of data clustered around some threshold, such as lower (left censored) or higher (right-censored) thresholds. See JEFFERY T. WALKER & SEAN MADDAN, *STATISTICS IN CRIMINOLOGY AND CRIMINAL JUSTICE: ANALYSIS AND INTERPRETATION* 231 (2008). For example, Nalinaksha Bhattacharyya, Cameron K.J. Morrill and Amin Mawani employ Tobit regression in the analysis of dividend payout. Obviously, dividend payout is never less than 0. See Nalinaksha Bhattacharyya, Cameron K.J. Morrill & Amin Mawani, *Dividend Payout and Executive Compensation: Theory and Evidence* (2003), <http://ssrn.com/abstract=326801>. Again, Minoru Nakazato, J. Mark Ramseyer and Eric Bennett Rasmusen use Tobit because they do not observe all levels of taxes paid if they are below 10 million yen. See Minoru Nakazato, J. Mark Ramseyer & Eric Bennett Rasmusen, *Executive Compensation in Japan: Estimating*

by James Tobin³³³ to describe the relationship between restricted dependent variable and independent variable. It uses maximum likelihood to estimate regression for all cases.³³⁴ The Tobit model is often applied in literature concerning D&O insurance. For example, M. Martin Boyer and Hanon Amandine use the Tobit model to assess the association between D&O insurance limit and aggressive earning measure.³³⁵ Thus, this dissertation employs Tobit regression and compares these results to the results of OLS regression. The Tobit model is as follows:

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}$$

$$y_i^* = \beta x_i + \varepsilon, \varepsilon \sim N(0, \sigma^2)$$

(4)

2.4.3.3.6.2 Censored Least Absolute Deviations (CLAD)

Classical Tobit model assumes a normal distribution for dependent variable with certain censoring point. Thus, even though Tobit model is useful for data which is censored, this method is subject to the assumptions of a normal error distribution and homoscedasticity.³³⁶ In order to avoid such assumptions, Powell (1984) proposed the Censored Least Absolute Deviations (CLAD). Different from Tobit model, errors of

Levels and Determinants from Tax Records 6 (2006), <http://ssrn.com/abstract=950365>.

³³³ See James Tobin, *Estimation of Relationships for Limited Dependent Variables*, 26:1 *ECONOMETRICA* 24, 24 (1958).

³³⁴ *Id.*

³³⁵ See M. Martin Boyer & Hanon Amandine, *supra* note 145, at 11.

³³⁶ Discussion about testing normality of Tobit model, see B. Caudilla & F. G. Mixon Jr.b, *More on Testing the Normality Assumption in the Tobit Model*, 36:12 *J. APPLIED STATISTICS*, 1345-52 (2009).

CLAD are not necessary to be homoskedastic or normally distributed,³³⁷ and thus CLAD is widely employed.³³⁸ For more robustness to heteroscedasticity and other misspecification, this research will also carry out CLAD and compare its result with that of classical Tobit model.

2.4.4 Descriptive statistics

The result of descriptive analysis is reported in Table 2.30. In 2008, excluding 107 of the 1,346 total observations due to missing data, 613 firms (49.4%) purchased D&O insurance and 626 (50.5%) did not. In 2009, excluding 68 of the 1,395 total observations due to missing data, 674 firms (50.8%) purchased D&O insurance and 653 (49.2%) did not. In 2010, excluding 86 of the 1,327 total observations due to missing data, 705 firms (56.8%) purchased D&O insurance and 536 (43.1%) did not. The insured rate increased gradually. This indicates that more and more listed firms in Taiwan began to purchase D&O insurance. For testing the significance of the difference between firms that purchased D&O insurance and firms without D&O insurance, an independent samples test is carried out in this section. The results of independent samples test are presented in Table 2.31, 2.32 and 2.33.

For 2008, it is found that insured companies have better performance, corporate governance and larger scale than uninsured companies. Regarding size scale, insured

³³⁷ See James L. Powell, *Symmetrically Trimmed Least Squares Estimation for Tobit Models*, 54:6 *ECONOMETRICA* 1435, 1435 (1986).

³³⁸ See also Dirk Czarnitzki & Kornelius Kraft, *Management Control and Innovative Activity*, 24:1 *REV. INDUS. ORG.* 1, 1-24 (2006), available at <http://ssrn.com/abstract=639133>.

companies are larger in size in terms of capital. Intuitively, companies with larger size have more tentative litigation risk. This satisfies the hypothesis that larger companies experience greater demand for D&O insurance. Similarly, regarding the number of directors, which may imply the scale of a company, companies with insurance also have more directors than companies without insurance. These differences are significant at 1%. Even though the prior litigation of insured companies is greater than that of uninsured companies, this may not mean that insured companies have more problems, because tentative litigation may be caused by large business scale rather than by bad performance. Moreover, the difference regarding the number of prior litigations is not significant. Therefore, more analysis concerning the difference of corporate governance between insured and uninsured companies is needed.

Regarding profiting ability, companies that purchase D&O insurance have better ROEs as part of their financial performance. This does not support the hypothesis that the companies that have better financial performance have less need for D&O insurance. However, this is not significant at 5%. The percentage of remuneration all paid to directors of companies with D&O insurance is also higher than among companies that do not purchase D&O insurance. This means that companies that pay out more remuneration to company directors have greater demand for D&O insurance. This does not support the hypothesis that remuneration and D&O insurance are substitutes for each other and are negatively related. In addition, companies that purchase D&O insurance also have better performance in corporate governance proxies. They have more independent directors,

smaller percentages of company stock being held by major shareholders, fewer controlled directors, and fewer managers and officers who have been appointed by the controlling company or parent group. This means that companies with better corporate governance and monitoring mechanisms purchase more D&O insurance. This is contrary to the previous monitoring hypothesis that monitoring mechanisms and D&O insurance are substitutes and are negatively related.

Similar situations also happened in 2009 and 2010. Companies with larger capital and more directors purchase D&O insurance. Regarding prior significant litigation, it is not statistically significant either for 2009 or 2010. Insured companies have more independent directors, fewer shares held by directors and major shareholders, fewer directors who are controlled, and fewer internal risks. This rejects the theory of monitoring hypothesis, which states that companies with poor corporate governance have more demand for D&O insurance and vice versa. No matter whether in 2009 or 2010, the same companies with insurance have higher remuneration for directors, and this is very significant (<0.001). The theory that D&O insurance and remuneration are substitutes is not supported. As for proxies of signal hypothesis, shares of foreign natural persons are slightly higher for uninsured companies than those that are insured, but this is not statistically significant. In contrast, firms with D&O insurance have more shares held by foreign juristic persons and financial persons than firms without D&O insurance, and this is very significant statistically (<0.001). This shows that foreign juristic person and financial person who care about corporate governance and signal also care about the

purchase of D&O insurance. This implies that signal hypothesis is supported.

2.4.5 Model 1: logistic regression: The demand of D&O insurance and its relationship with corporate governance

2.4.5.1 Panel A: 2008

The variable concerning whether or not listed companies purchased D&O insurance is used as the dependent variable. The result is shown below. Regarding the Hosmer and Lemeshow Test, Chi-square is 7.624 and p-value is 0.471. The null hypothesis that the model is a good fit is not rejected. The Omnibus Test is also significant and thus explaining the ability of this model is significant. The results of logistic regression approximately match the results of descriptive statistics. The variables *industry*, *lnremu*, *director*, *idirector*, *ctrldirector*, *intrlrisk*, *fjp* and *ffjp* are significant at 5%. The variable *industry*³³⁹ of the companies is positively related to their demand for D&O insurance. This supports the hypothesis developed from a review of the previous literature in that high technology industry in Taiwan has a greater need for D&O insurance. Additionally, *lnremu*, *director* and *idirector* are positively related to the purchase of D&O insurance. *Ctrldirector* and *intrlrisk*³⁴⁰ are negatively related to the purchase of D&O insurance.

³³⁹ If the effect of all industries is fixed by using separate dummy variables, the results are similar. Generally, the coefficient of companies which are not high-tech industries are negatively significant, like textile industry, electric machinery industry, paper and pulp industry, automobile industry, building material and construction industry, tourism industry, chemical industry, composite oil, gas and electricity industry. Similar results also happen in 2009, 2010 and the following tests in 2.4.

³⁴⁰ If the internal risk is coded as four dummy variables respectively denoting whether chairman of the board, CEO, financial manager and supervisory director is appointed by a parent or controlling group, the internalization of supervisory director is negatively significant.

These results are quite similar to the results of previous descriptive analyses, implying that the companies with better corporate governance have more demand for D&O insurance. In other words, the purchase of D&O insurance in Taiwan is related to the quality of corporate governance, but how corporate governance affects purchases of D&O insurance in Taiwan is contrary to the assumption of the monitoring hypothesis. The variable *litigation* is not significant, and, therefore, no evidence could support the assumption that prior litigation will cause the demand for insurance. As a result, the theory of monitoring hypothesis cannot be supported. The result can be found in Table 2.34.

2.4.5.2 Panel B: 2009

The result of 2009 below is similar to that of the previous year. Chi-square of the Hosmer and Lemeshow Test is 5.840 and p-value is 0.665, which means goodness-of-fit of this model is qualified. Omnibus Tests of Model Coefficients is significant as well. The variables *industry*, *lnremu*, *director*, *idirector*, *ctrldirector*, *sd*, *smh*, *intrlrisk* and *fjp* are significant at 5%. The variables *lnremu* and *Indptdirector* are positively related to the purchase of D&O insurance. *Ctrlldirector* and *intrlrisk*³⁴¹ are negatively related to the purchase of D&O insurance. These results are quite similar to the results of 2008, implying that the companies with better corporate governance have more demand for

³⁴¹ Similarly, if internal risk is coded as four separate dummy variables, the internalization of chairman of the board is negatively significant.

D&O insurance.

Different from 2008, *sd* and *smh* are significant for 2009 and negatively related to D&O insurance. Under reasoning of literature and intuition, more shares held by directors and major shareholders may cause more conflict of interest, weaker governance and more litigation risk. As a consequence, more demand of D&O insurance is expected. The empirical result indicates that more shares held by directors and major shareholders will lead to less demand for D&O insurance. This result does not support the theory of monitoring hypothesis that states that firms with more risk and poor governance have more demand for insurance. Instead, the proposal of this research is supported. The result can be found in Table 2.35.

2.4.5.3 Panel C: 2010

There are similar results from 2010. The Chi-square of the Hosmer and Lemeshow Test is 6.481 and p-value is 0.593, which indicates that goodness-of-fit of this model is qualified. Omnibus Tests is also significant. *Litigation* is not significant. *Lnremu* and *idirector* are positively and significantly related to the purchase of D&O insurance. *Ctrldirector*, *sd*, *smh*, and *intrlrisk*³⁴² are negatively related to insurance purchase. Again, this implies that the companies with better corporate governance usually have more demand for D&O insurance. All these results imply that the monitoring hypothesis is not supported in this

³⁴² If internal risk is coded as four separate dummy variables, the internalizations of chairman of the board and supervisory director are negatively significant.

research. The result is presented in Table 2.36.

2.4.6 Model 2: OLS and censored regression

For the robustness test, which is different from the previous model for which the dependent variable is whether a company is insured or not, the amount of coverage is used as the dependent variable. Because the amount of coverage is numeric and skewed to the right, a variety of econometrics will be employed for more accuracy.

2.4.6.1 Log transformation

In 2008, the adjust R^2 score of regression is around 25%. *Capital* and *daratio* are significant. The variable *Capital*, which indicates the size of a company, is positively related to the coverage provided by D&O insurance. This supports the hypothesis that larger companies have greater demand for D&O insurance. Debt-asset ratio is negatively significant, and this indicates that firms with higher debt-asset ratios have less D&O insurance. The monitoring hypothesis is rejected. However, the proxies of signal hypothesis, the percentage of shares of foreign natural persons, juristic persons and financial juristic persons, all are not significant. Therefore, the signal hypothesis cannot be supported, either. The result of bootstrap is very similar, but *lnremu* becomes positively significant. This further rejects the monitoring hypothesis.

In 2009, the adjust R^2 score is much higher at 30%. The monitoring hypothesis is not

supported. *Lnremu* is positively significant, and this indicates that remuneration and D&O insurance for directors are not substitutes. Moreover, the variable shares held by foreign financial juristic persons is positively significant. An increase in shares held by foreign financial juristic persons will also increase the demand for D&O insurance. Therefore signal hypothesis is implied. This result is also supported by bootstrap. The result of 2010 is similar to that 2009, rejecting monitoring hypothesis and supporting signal hypothesis significantly. In addition to variables significant in 2009, *ctrldirector* and *daratio* are also negatively significant. This indicates more debt-asset ratio and that controlled directors will lead to less demand of D&O insurance. This is different from the argument of monitoring hypothesis. In conclusion, the monitoring hypothesis suggests that companies with weak corporate governance have a greater incentive to purchase D&O insurance, and monitoring functions and D&O insurance are substitutes for each other. However, there is no evidence supporting this hypothesis in this section. The result of log transformed regression and bootstrap can be found in Table 2.37.

2.4.6.2 Box-Cox transformation

Box-Cox transformation is powerful to place regression closer to linearity by computing a suitable power of the dependent variable. For further robustness testing, Box-Cox transformation is employed to test the monitoring hypothesis and the signal hypothesis among firms with D&O insurance. It can be found that the result is very similar to that of the log transformed model. Litigation is insignificant and firms with more internal risk

and debt-asset ratios have less demand for D&O insurance. The detailed result is presented in Table 2.38.

2.4.6.3 Censored regression and CLAD

The monitoring hypothesis stipulates that firms that have poor qualities should exhibit greater demand for D&O insurance. However, the result of Tobit model shows that the number of controlled directors and debt-asset ratio variables are inversely related to D&O insurance coverage. This implies that more controlled directors and debt-asset ratios may result in less demand for insurance, different from the theory of monitoring hypothesis. The result is presented in Table 2.39.

Again, Censored Least Absolute Deviations (CLAD) is carried out to confirm the previous Tobit model and the result is even more obvious. The results show that firms with greater returns will have less demand for D&O insurance. On the contrary, greater remuneration still results in increased demand for insurance, which differs from the monitoring hypothesis. In a similar manner, independent director, shares held by directors, shares held by major shareholders, controlled directors, internal risks and debt-asset ratios are all negatively correlated to the demand for insurance. The result here once again confirms the previous tests and do not support the monitoring hypothesis. The final result is presented in Table 2.40.

2.4.7 Conclusions

This chapter discusses the monitoring hypothesis and tests it in the context of Taiwan. It is found that the monitoring hypothesis is not supported. Firms with good corporate governance and less risk tend to purchase more D&O insurance. In contrast, firms with bad corporate governance and more risk tend to purchase less D&O insurance. This result implies that the indemnification function or monitoring function is not sufficient to explain the reason to purchase D&O insurance. In the next chapter, this dissertation will provide a possible alternative hypothesis, signal hypothesis, to explain why firms purchase D&O insurance in Taiwan.

FIGURES AND TABLES

Figure 2.1 Framework of Research

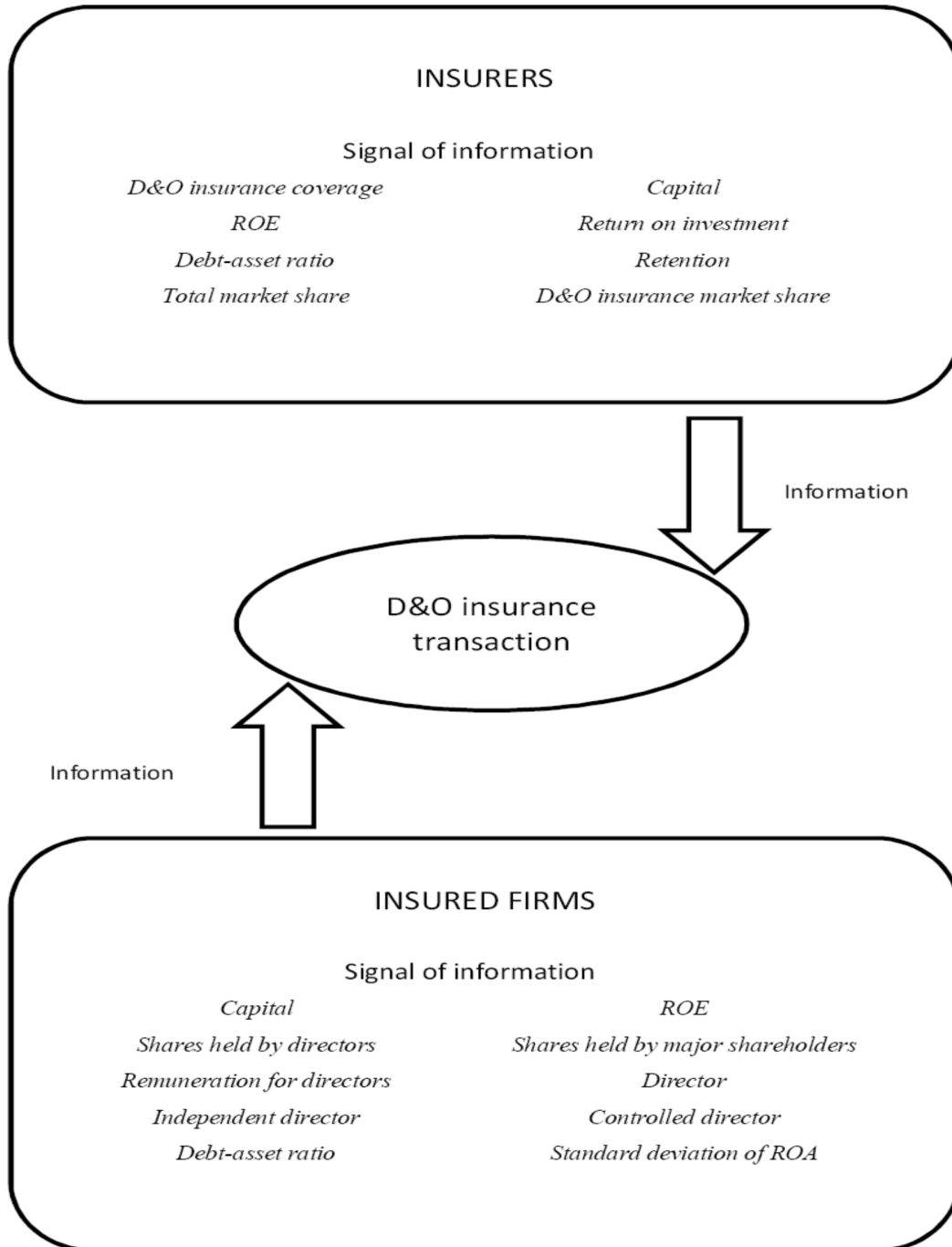


Figure 2.2 Path diagram of canonical analysis (1)

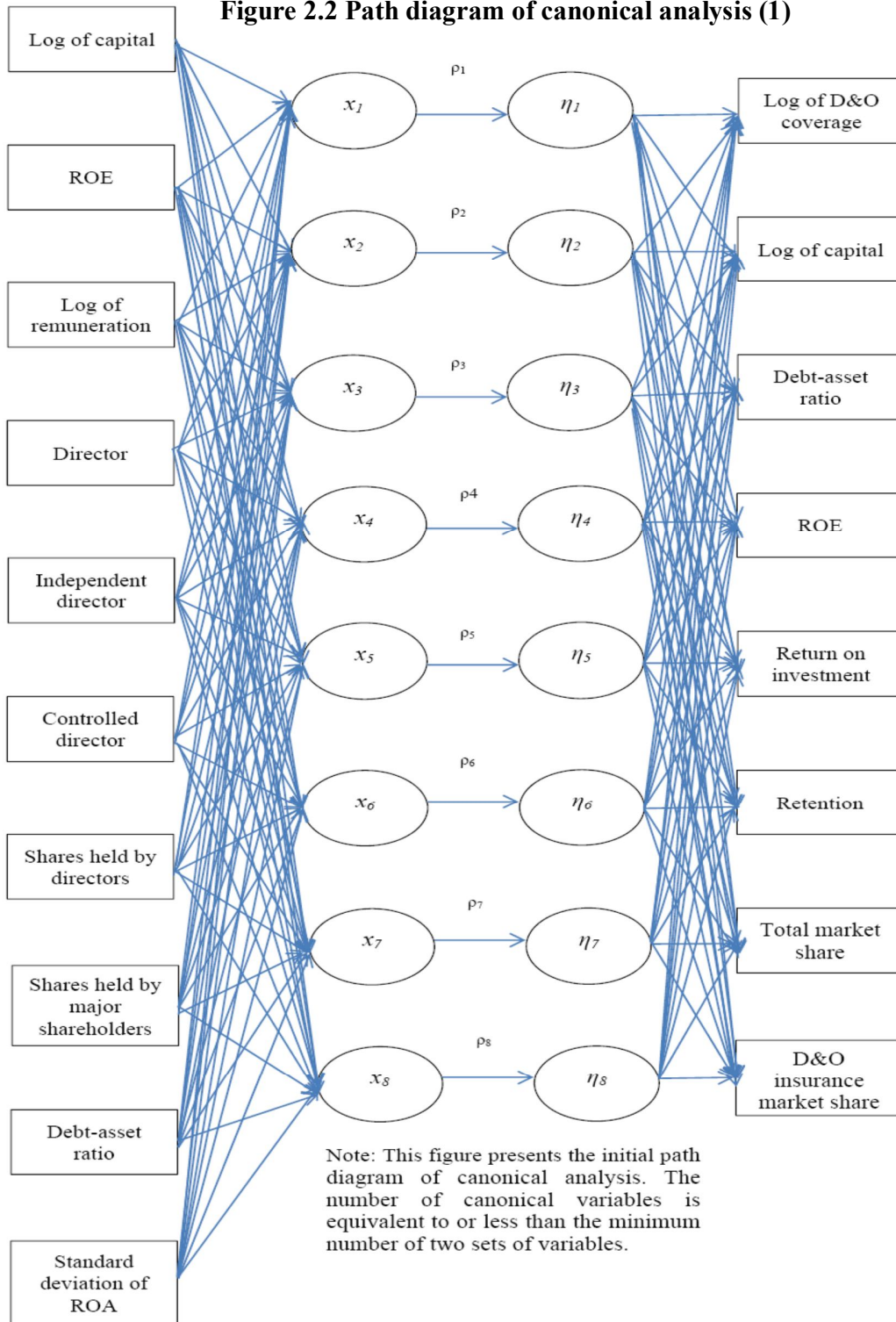


Figure 2.3 Path diagram of canonical analysis (2)

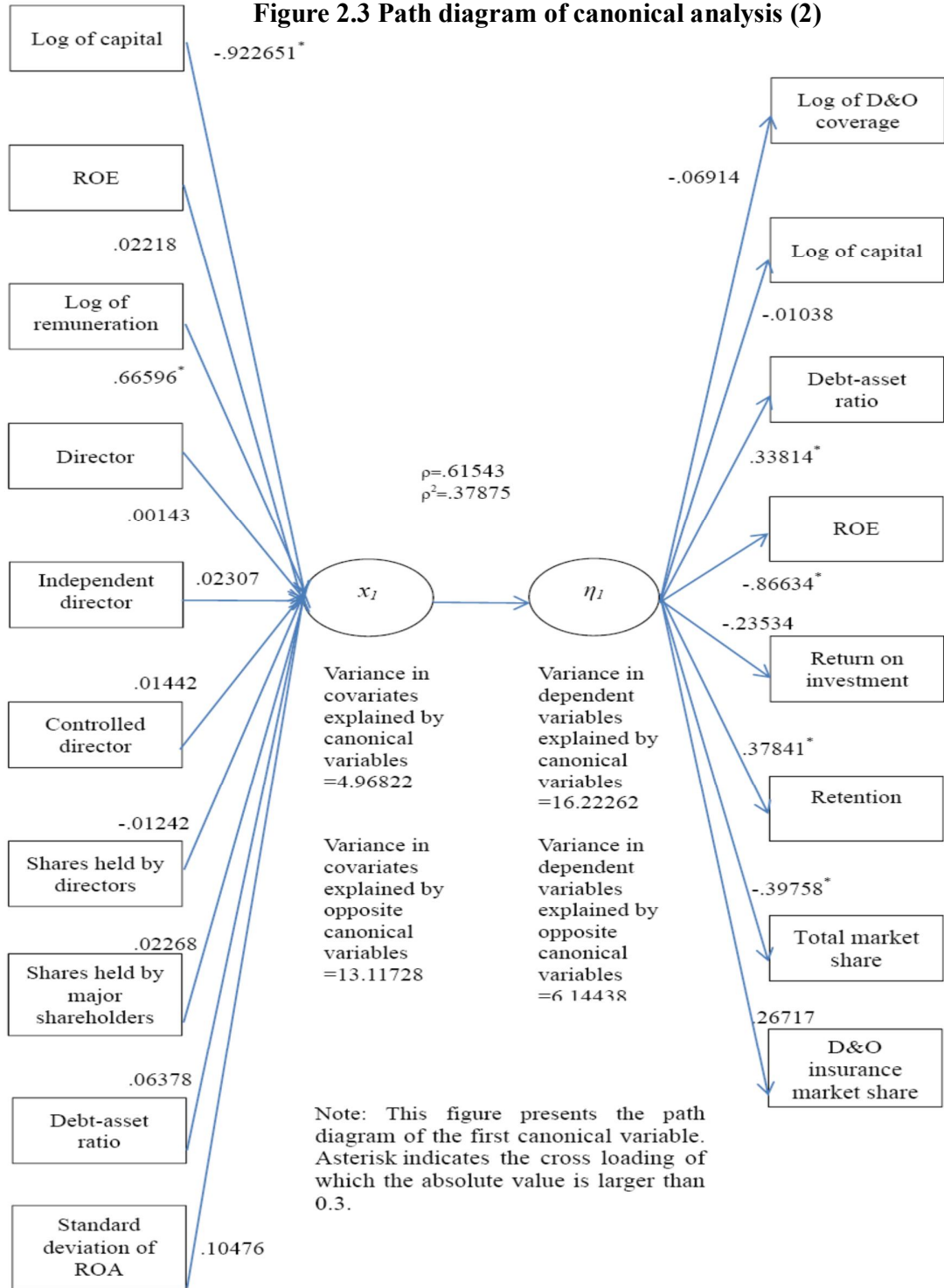


Figure 2.4 Path diagram of canonical analysis (3)

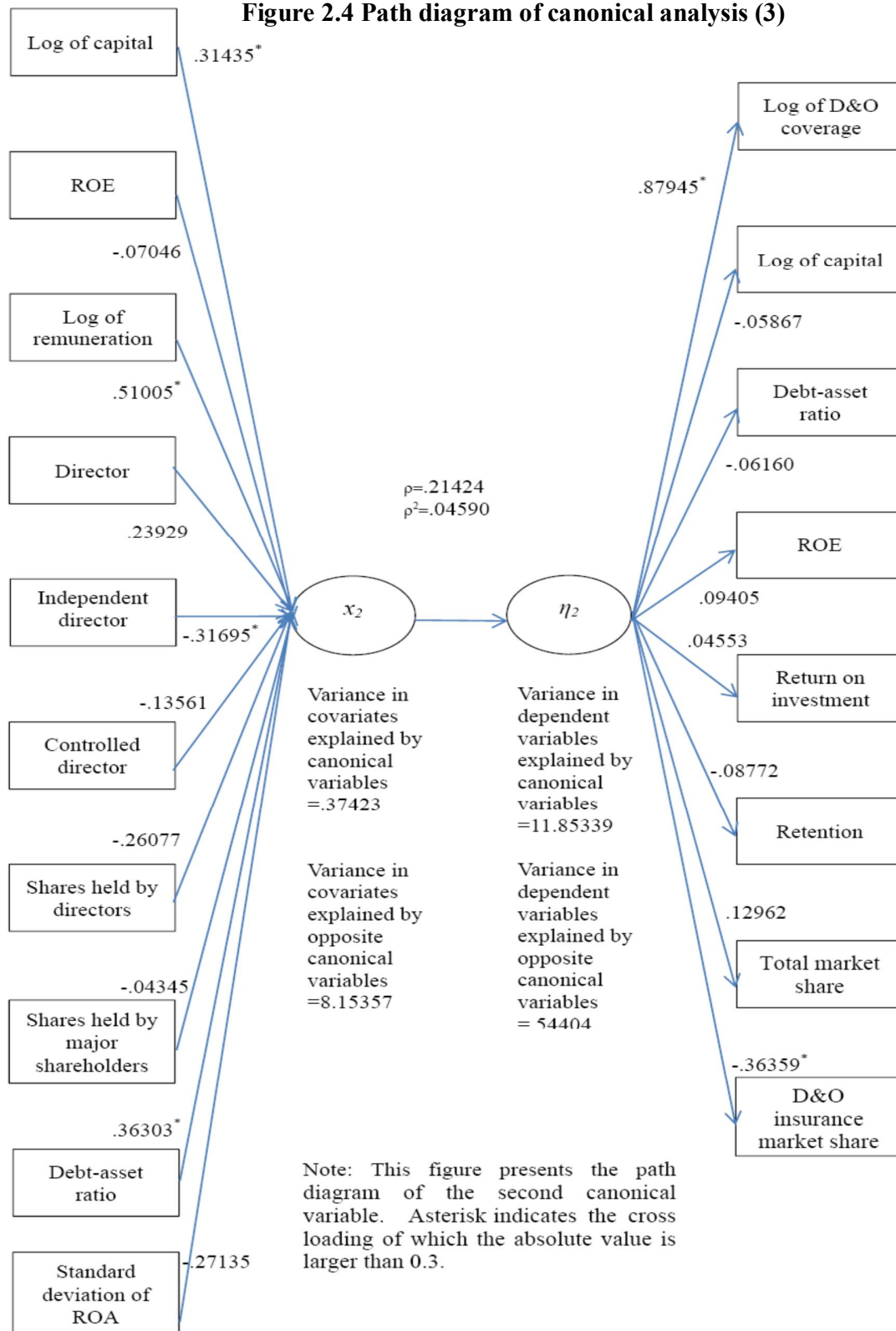
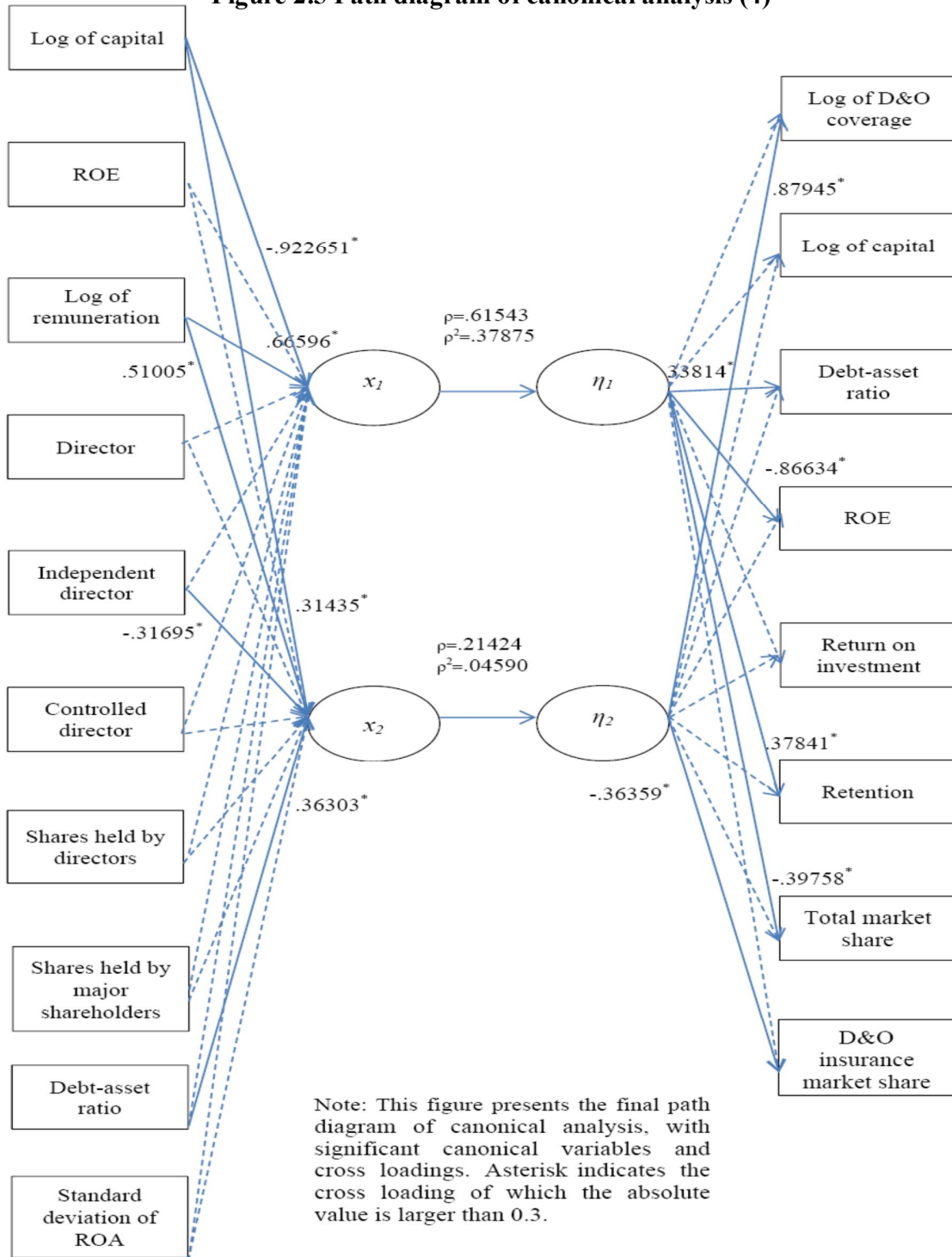


Figure 2.5 Path diagram of canonical analysis (4)



Note: This figure presents the final path diagram of canonical analysis, with significant canonical variables and cross loadings. Asterisk indicates the cross loading of which the absolute value is larger than 0.3.

Figure 2.6 Canonical discriminant functions

This figure demonstrates the result of discriminant analysis. It is shown that three clusters are separately scattered. Thus, this matches with the previous result of cluster analysis.

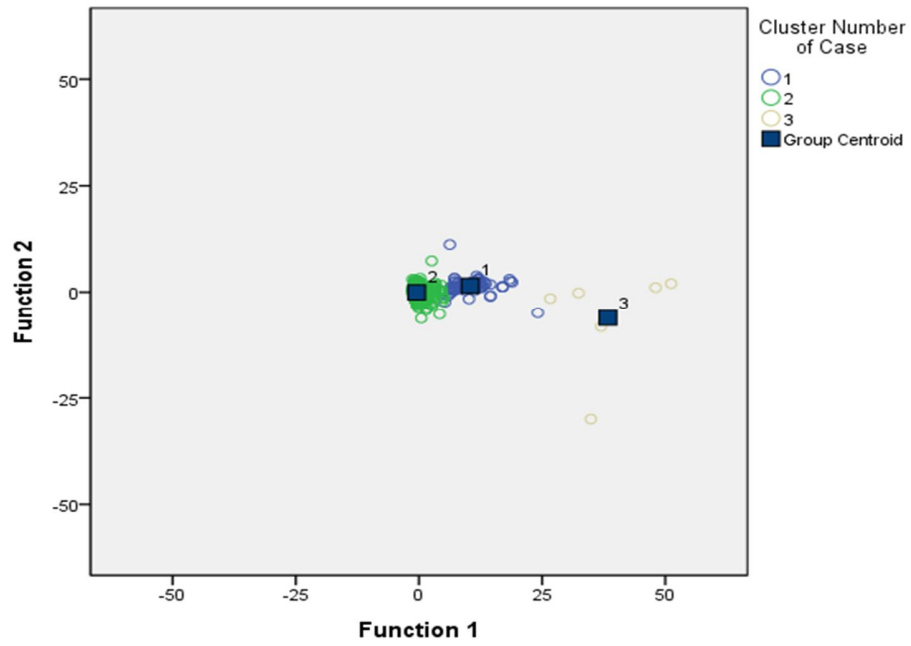


Figure 2.7 Framework of hypotheses

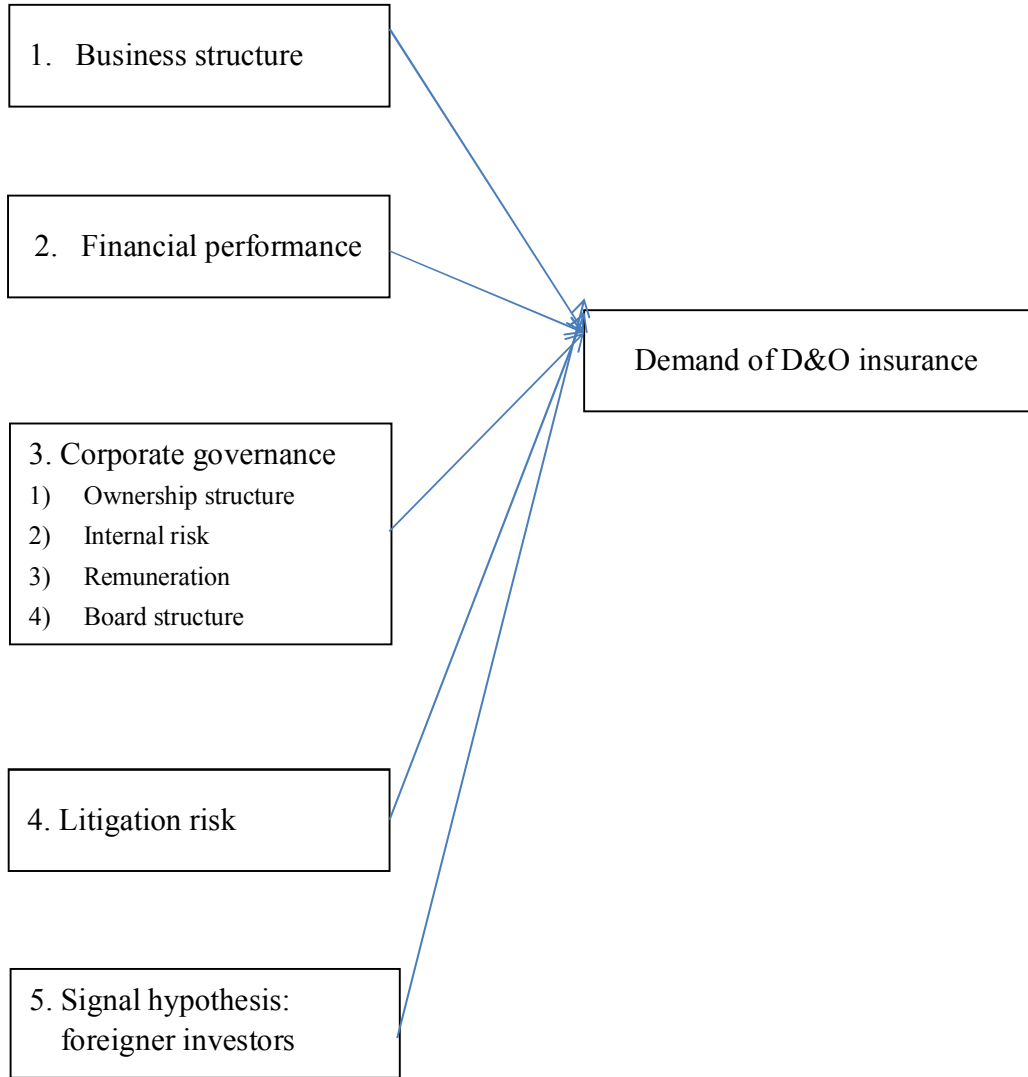


Table 2.1 Table of variables (1)

	Hypothesis	Variables	Definition	Expected sign
Dependent variables		Standard deviation of ROE	Standard deviation of return on equity	N/A
		Standard deviation of ROA	Standard deviation of return on assets	N/A
		Standard deviation of EPS	Standard deviation of earnings per share of firms	N/A
		Standard deviation of debt-asset ratio	Standard deviation of debt-asset ratio	N/A
		Standard deviation of short-term investment	Standard deviation of short term investment	N/A
Independent variables	Neutral hypothesis	D&O purchase	The dummy variable equals 1 when firms with insurance and 0 otherwise	?
		D&O coverage	Natural logarithm of D&O insurance coverage	?
	Corporate governance hypothesis	Capital	Natural logarithm of total capital of firms	?
		Remuneration	Natural logarithm of total compensation package offered to directors	?
		Director	The total number of directors	?
		Independent director	The number of independent directors	?
		Controlled director	Controlled directors. This indicates the number of directors who are nominated or controlled by the largest controlling group of the company, such as family, relatives, or	+

Table 2.1 (cont.)

	parent company.	
Shares held by director	The percentage of shares held by directors (%)	+
Shares held by major shareholder	The percentage of shares held by major shareholders (%)	+
Duality of CEO and COB	The dummy variable equals 1 if chairman of board of directors is identical to CEO and 0 otherwise.	+
Controlled COB	If the chairman of board is appointed by parent or controlling group, the value will be granted 1. Otherwise, the value would be 0.	+
Controlled CEO	If the CEO is appointed by parent or controlling group, the value will be granted 1. Otherwise, the value would be 0.	
Controlled financial manager	If financial manager is appointed by parent or controlling group, the value will be granted 1. Otherwise, the value would be 0.	
Controlled supervisory director	If supervisory director is appointed by parent or controlling group, the value will be granted 1. Otherwise, the value would be 0.	
Debt-asset ratio	Debt-asset ratio of firms	+
Litigation	The number of disclosed significant litigation	

Table 2.2 Descriptive analysis

This table contains the descriptive statistics of variables, comparing the firms with D&O insurance and the firms without D&O insurance from 2008-2010. In general, firms with D&O insurance have higher volatility than firms without D&O insurance.

Variable	2008				2009				2010			
	Uninsured		Insured		Uninsured		Insured		Uninsured		Insured	
	mean	stdev	mean	stdev	mean	stdev	mean	stdev	mean	stdev	mean	stdev
Standard deviation of ROE	4.639	8.826	4.508	10.81	3.150	6.386	3.395	8.897	3.272	11.79	3.026	5.196
Standard deviation of ROA	1.923	2.780	2.045	4.123	1.428	1.484	1.472	1.507	1.311	1.848	1.426	1.779
Standard deviation of EPS	0.614	0.647	0.793	0.856	0.670	1.587	0.820	1.829	0.508	0.517	0.712	1.037
Standard deviation of debt-asset ratio	32.35	217.5	34.62	181.6	41.85	513.5	51.55	650.3	53.14	808.3	32.04	404.5
Standard deviation of short-term investment	2266	1545	4923	2898	1486	8627	4433	3168	1130	7663	4157	3981
D&O purchase	-	-	1	0	-	-	1	0	-	-	1	0
D&O coverage	-	-	18.92	1.219	-	-	18.90	1.197	-	-	18.86	1.090
Log of capital	15.05	1.427	15.37	1.856	15.00	1.416	15.43	1.896	21.90	1.366	22.33	1.826
industry	0.306	0.461	0.561	0.498	0.326	0.469	0.555	0.498	0.317	0.465	0.594	0.491
ROE	1.550	4.065	2.182	15.14	1.581	9.721	-0.04	24.23	1.729	12.16	0.413	8.684
Log of remuneration	16.04	0.960	16.36	1.003	15.99	1.604	16.33	1.526	16.08	1.067	16.5	1.187
Director	9.501	2.829	9.642	2.440	9.075	3.239	9.468	2.528	9.343	2.501	9.642	2.442

Table 2.2 (cont.)

Independent director	0.868	1.272	1.642	1.392	0.826	1.154	1.497	1.257	0.792	1.099	1.531	1.218
Controlled director	2.061	1.886	1.423	1.360	1.859	1.814	1.369	1.339	1.932	1.763	1.377	1.350
Shares held by director	25.23	14.65	22.03	14.83	25.23	15.08	22.04	14.81	25.16	13.81	21.76	14.69
Shares held by major shareholder	20.33	11.28	18.61	11.35	21.76	12.03	18.56	10.37	21.46	11.68	18.36	10.31
Duality of CEO and COB	0.303	0.460	0.265	0.424	0.283	0.450	0.286	0.441	0.294	0.461	0.283	0.443
Internal risk	2.105	0.904	1.756	0.881	2.030	0.947	1.719	0.905	2.063	0.924	1.670	0.936
Debt-asset ratio	146.1	554.0	147.9	545.3	124.3	565.4	134.7	513.6	97.04	214.6	124.0	354.5
Prior significant litigation	0.135	0.823	0.182	0.659	0.150	1.268	0.209	0.712	0.134	1.020	0.191	0.773

Table 2.3 Independent samples test of 2008

This table contains independent sample test of 2008. This is to test if the difference between firms with D&O insurance and without D&O insurance is statistically significant or not. Except standard deviation of EPS and standard deviation of short-term investment, other differences in volatility between firms with D&O insurance and firms without D&O insurance are not significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Standard deviation of ROE	assumed	.057	.811	-.240	1236	.810	-.13126	.54596	-1.20236	.93985
	not assumed			-.240	1197.531	.810	-.13126	.54693	-1.20430	.94178
Standard deviation of ROA	assumed	.712	.399	.644	1237	.520	.12118	.18811	-.24788	.49024
	not assumed			.642	1124.219	.521	.12118	.18870	-.24907	.49143
Standard deviation of EPS	assumed	12.088	.001	4.213	1237	.000***	.17924	.04254	.09577	.26271
	not assumed			4.202	1150.398	.000***	.17924	.04266	.09554	.26294
Standard deviation of debt-asset ratio	assumed	.020	.887	.200	1237	.842	2.27416	11.38622	-20.06428	24.61260
	not assumed			.200	1205.942	.841	2.27416	11.36458	-20.02239	24.57071
Standard deviation of short-term investment	assumed	14.864	.000	2.287	1237	.022*	265705.39	116174.582	37784.390	493626.405
	not assumed			2.277	1028.362	.023*	265705.39	116702.046	36704.063	494706.731

Table 2.4 Independent samples test of 2009

This table contains independent sample test of 2009. This is to test if the difference between firms with D&O insurance and without D&O insurance is statistically significant or not. Except standard deviation of short-term investment, other differences in volatility between firms with D&O insurance and firms without D&O insurance are not significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Standard deviation of ROE	assumed	.640	.424	.621	1325	.535	.24693	.39764	-.53315	1.02700
	not assumed			.623	1277.365	.533	.24693	.39638	-.53071	1.02456
Standard deviation of ROA	assumed	.321	.571	.487	1325	.626	.04438	.09103	-.13421	.22296
	not assumed			.489	1288.011	.625	.04438	.09077	-.13371	.22246
Standard deviation of EPS	assumed	.520	.471	1.687	1325	.092	.15048	.08921	-.02453	.32550
	not assumed			1.688	1324.578	.092	.15048	.08916	-.02442	.32538
Standard deviation of debt-asset ratio	assumed	.313	.576	.331	1325	.741	9.73759	29.42683	-47.99067	67.46585
	not assumed			.331	1321.221	.740	9.73759	29.39225	-47.92299	67.39817
Standard deviation of short-term investment	assumed	21.216	.000	2.637	1325	.008**	294170.38	111535.400	75365.143	512975.623
	not assumed			2.669	808.985	.008**	294170.38	110236.129	77787.806	510552.960

Table 2.5 Independent samples test of 2010

This table contains independent sample test of 2010. This is to test if the difference between firms with D&O insurance and without D&O insurance is statistically significant or not. Except standard deviation of EPS and standard deviation of short-term investment, other differences in volatility between firms with D&O insurance and firms without D&O insurance are not significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Standard deviation of ROE	assumed	2.24	.135	-.566	1238	.572	-.24601	.43498	-1.09939	.60737
	not assumed			-.525	769.158	.600	-.24601	.46872	-1.16612	.67411
Standard deviation of ROA	assumed	.486	.486	1.109	1239	.267	.11487	.10354	-.08826	.31800
	not assumed			1.109	1150.816	.268	.11487	.10356	-.08832	.31806
Standard deviation of EPS	assumed	24.344	.000	4.274	1239	.000***	.20419	.04778	.11045	.29792
	not assumed			4.571	1166.695	.000***	.20419	.04467	.11655	.29182
Standard deviation of debt-asset ratio	assumed	2.031	.154	-.704	1239	.481	-21.09555	29.95663	-79.86687	37.67578
	not assumed			-.650	744.272	.516	-21.09555	32.46606	-84.83151	42.64041
Standard deviation of short-term investment	assumed	12.498	.000	2.008	1239	.045*	302732.75	150780.024	6920.3624	598545.138
	not assumed			2.280	771.783	.023*	302732.75	132765.953	42107.542	563357.958

Table 2.6 OLS regression of 2008: D&O purchase as proxy variable

This table contains the result of regression of 2008 where D&O purchase is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O purchase and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1 % level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.0366 (0.68)	0.0440 (0.78)	0.0423 (0.78)	0.0688 (1.74)	0.429*** (4.51)
Capital	0.00335 (0.12)	-0.0465 (-1.55)	0.118*** (4.40)	-0.0744*** (-4.21)	0.139*** (3.54)
Industry1	-0.193 (-0.87)	-0.595* (-2.19)	-0.432 (-1.44)	-0.623* (-2.16)	-0.664 (-1.47)
Industry2	-0.0842 (-0.38)	-0.109 (-0.46)	-0.354 (-1.47)	-0.250 (-1.91)	-0.309 (-1.00)
Industry3	0.374 (1.49)	0.526* (2.19)	0.0415 (0.20)	-0.204 (-1.68)	0.0694 (0.25)
Industry4	-0.0332 (-0.15)	-0.00384 (-0.02)	-0.120 (-0.61)	-0.372* (-2.46)	-0.379 (-1.44)
Industry5	-0.0350 (-0.23)	-0.327* (-2.26)	-0.270 (-1.92)	-0.273* (-2.41)	-0.108 (-0.43)
Industry6	0.384 (1.33)	0.546 (1.67)	0.350 (1.04)	-0.150 (-1.02)	-0.903* (-2.26)
Industry7	-0.636 (-1.31)	-0.325 (-0.80)	-0.345 (-1.20)	-0.912* (-2.29)	-0.254 (-0.63)
Industry8	0.674** (2.90)	0.594** (2.65)	0.0577 (0.40)	-0.316* (-2.36)	0.181 (0.37)
Industry9	0.824*** (4.29)	0.706*** (3.32)	0.542** (3.01)	0.0104 (0.08)	0.0853 (0.29)
Industry10	0.143	0.206	0.242	-0.200	-0.0683

Table 2.6 (cont.)

	(0.50)	(0.81)	(1.09)	(-1.14)	(-0.19)
Industry11	-0.0733 (-0.26)	-0.0822 (-0.33)	0.474 (1.73)	-0.438 (-1.67)	0.612 (1.06)
Industry12	0.115 (0.75)	-0.208 (-1.36)	-0.285 (-1.75)	-0.0438 (-0.39)	-0.519 (-1.82)
Industry13	-0.259 (-0.80)	-0.258 (-0.84)	-0.197 (-0.75)	-0.0360 (-0.22)	-0.105 (-0.35)
Industry14	-0.510* (-1.99)	-0.599* (-2.38)	-0.710* (-2.14)	-0.518* (-2.35)	0.311 (0.51)
Industry15	0.336 (1.32)	-1.414*** (-4.69)	-0.347 (-1.47)	-0.0581 (-0.39)	-0.964** (-2.70)
Industry16	-0.105 (-0.39)	-0.606* (-2.28)	-0.588* (-2.35)	-0.213 (-1.10)	-0.260 (-0.68)
Industry17	0.000975 (0.01)	-0.256 (-1.56)	-0.258 (-1.63)	-0.296* (-2.35)	-0.479 (-1.71)
Industry18	0.0134 (0.09)	-0.138 (-0.84)	-0.278 (-1.78)	-0.161 (-1.42)	-0.142 (-0.49)
Industry19	-0.422* (-2.24)	-0.523** (-3.03)	-0.573*** (-3.46)	-0.217 (-1.78)	-0.371 (-1.14)
Industry20	-0.168 (-0.50)	-0.684 (-1.88)	-0.445 (-1.90)	-0.498** (-2.66)	-0.856 (-1.78)
Industry21	0.0970 (0.83)	0.0729 (0.58)	-0.00812 (-0.07)	0.137 (1.39)	-0.291 (-1.20)
Industry22	-0.143 (-1.22)	-0.139 (-1.10)	-0.286* (-2.28)	0.0165 (0.17)	-0.0579 (-0.24)
Industry23	0.130 (0.98)	0.157 (1.22)	0.117 (1.01)	-0.0903 (-0.87)	-0.0233 (-0.10)
Industry24	-0.223 (-1.62)	-0.245 (-1.69)	-0.167 (-1.27)	-0.0666 (-0.62)	-0.194 (-0.83)
Industry25	0.0810 (0.73)	0.0367 (0.33)	-0.268* (-2.45)	-0.158 (-1.73)	-0.137 (-0.63)
Industry26	0.0337 (0.21)	-0.176 (-1.25)	-0.270 (-1.82)	0.0445 (0.40)	-0.00200 (-0.01)
Industry27	0.0407 (0.22)	0.0161 (0.08)	-0.131 (-0.74)	0.0139 (0.10)	-0.00992 (-0.03)

Table 2.6 (cont.)

ROE	0.128*** (4.71)				
Remuneration	-0.0804* (-2.10)	-0.0351 (-1.07)	-0.145*** (-4.22)	0.0848*** (4.07)	0.0356 (0.66)
Director	-0.0223 (-0.88)	-0.00789 (-0.41)	-0.0150 (-0.98)	0.00206 (0.19)	-0.00474 (-0.26)
Independent director	0.0226 (1.04)	0.0172 (0.76)	0.0670** (3.28)	0.0302* (2.08)	0.0172 (0.52)
Controlled director	-0.000288 (-0.01)	0.00289 (0.16)	-0.0170 (-1.00)	-0.00691 (-0.58)	-0.00377 (-0.14)
Shares held by director	-0.00382 (-1.80)	-0.000451 (-0.21)	-0.00496* (-2.37)	0.00239 (1.67)	-0.00213 (-0.65)
Shares held by major shareholder	0.00342 (1.34)	0.00433 (1.78)	-0.00299 (-1.11)	0.00265 (1.50)	0.00394 (0.77)
Duality of CEO and COB	0.0812 (1.24)	0.0445 (0.72)	-0.0397 (-0.60)	-0.0633 (-1.23)	0.159 (1.53)
Controlled COB	0.0831 (1.10)	0.0369 (0.49)	0.0850 (1.10)	-0.119 [^] (-2.37)	-0.0991 (-0.88)
Controlled CEO	-0.0576 (-0.88)	-0.0670 (-1.08)	0.0297 (0.46)	-0.00967 (-0.21)	-0.0935 (-0.87)
Controlled financial manager	-0.223 (-1.56)	-0.235 (-1.86)	-0.0576 (-0.51)	0.0268 (0.33)	0.0783 (0.42)
Controlled supervisory director	-0.0266 (-0.49)	-0.0884 (-1.65)	-0.0370 (-0.68)	-0.0300 (-0.75)	-0.0512 (-0.54)
Litigation	-0.0130 (-0.38)	-0.0180 (-0.56)	0.0303 (0.98)	0.0533 (1.95)	0.0526 (1.33)
ROA		0.103* (2.54)			
EPS			0.293*** (11.03)		
Debt-asset ratio				1.248*** (24.70)	
Short-term investment					0.976*** (89.09)
Constant	1.737** (3.07)	1.220* (2.25)	-0.161 (-0.31)	-2.126*** (-6.62)	-2.090* (-2.55)

Table 2.6 (cont.)

<i>N</i>	842	920	911	1217	931
<i>R</i> ²	0.1511	0.2657	0.3265	0.5647	0.9273

Table 2.7 Bootstrapping of 2008: D&O purchase as proxy variable

This table reports the result of bootstrap of previous OLS regression in 2.2.6.1. Generally, they conclude similar results and D&O insurance purchase is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1 % level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.0366 (0.68)	0.0440 (0.78)	0.0423 (0.78)	0.0688 (1.74)	0.429*** (4.51)
Capital	0.00335 (0.12)	-0.0465 (-1.55)	0.118*** (4.40)	-0.0744*** (-4.18)	0.139*** (3.54)
Industry1	-0.193 (-0.81)	-0.595* (-2.05)	-0.432 (-1.33)	-0.623* (-1.97)	-0.664 (-1.38)
Industry2	-0.0842 (-0.38)	-0.109 (-0.46)	-0.354 (-1.46)	-0.250 (-1.88)	-0.309 (-0.98)
Industry3	0.374 (1.46)	0.526* (2.18)	0.0415 (0.19)	-0.204 (-1.66)	0.0694 (0.25)
Industry4	-0.0332 (-0.15)	-0.00384 (-0.02)	-0.120 (-0.60)	-0.372* (-2.44)	-0.379 (-1.46)
Industry5	-0.0350 (-0.24)	-0.327* (-2.28)	-0.270 (-1.95)	-0.273* (-2.40)	-0.108 (-0.43)
Industry6	0.384 (1.22)	0.546 (1.57)	0.350 (0.99)	-0.150 (-1.01)	-0.903* (-2.23)
Industry7	-0.636 (-1.14)	-0.325 (-0.70)	-0.345 (-1.07)	-0.912* (-1.98)	-0.254 (-0.57)
Industry8	0.674** (2.67)	0.594* (2.42)	0.0577 (0.36)	-0.316* (-2.18)	0.181 (0.33)
Industry9	0.824*** (4.30)	0.706*** (3.34)	0.542** (2.99)	0.0104 (0.08)	0.0853 (0.28)
Industry10	0.143 (0.47)	0.206 (0.77)	0.242 (1.02)	-0.200 (-1.10)	-0.0683 (-0.18)
Industry11	-0.0733 (-0.23)	-0.0822 (-0.29)	0.474 (1.56)	-0.438 (-1.50)	0.612 (0.97)
Industry12	0.115 (0.76)	-0.208 (-1.36)	-0.285 (-1.74)	-0.0438 (-0.39)	-0.519 (-1.83)

Table 2.7 (cont.)

Industry13	-0.259 (-0.79)	-0.258 (-0.85)	-0.197 (-0.73)	-0.0360 (-0.22)	-0.105 (-0.35)
Industry14	-0.510 (-1.88)	-0.599* (-2.28)	-0.710* (-1.99)	-0.518* (-2.27)	0.311 (0.48)
Industry15	0.336 (1.32)	-1.414*** (-4.67)	-0.347 (-1.46)	-0.0581 (-0.39)	-0.964** (-2.74)
Industry16	-0.105 (-0.38)	-0.606* (-2.19)	-0.588* (-2.29)	-0.213 (-1.08)	-0.260 (-0.65)
Industry17	0.000975 (0.01)	-0.256 (-1.58)	-0.258 (-1.65)	-0.296* (-2.33)	-0.479 (-1.70)
Industry18	0.0134 (0.09)	-0.138 (-0.85)	-0.278 (-1.78)	-0.161 (-1.42)	-0.142 (-0.48)
Industry19	-0.422* (-2.26)	-0.523** (-3.03)	-0.573*** (-3.48)	-0.217 (-1.78)	-0.371 (-1.14)
Industry20	-0.168 (-0.49)	-0.684 (-1.82)	-0.445 (-1.84)	-0.498** (-2.59)	-0.856 (-1.69)
Industry21	0.0970 (0.85)	0.0729 (0.59)	-0.00812 (-0.07)	0.137 (1.39)	-0.291 (-1.21)
Industry22	-0.143 (-1.24)	-0.139 (-1.12)	-0.286* (-2.31)	0.0165 (0.18)	-0.0579 (-0.24)
Industry23	0.130 (1.00)	0.157 (1.22)	0.117 (1.00)	-0.0903 (-0.87)	-0.0233 (-0.10)
Industry24	-0.223 (-1.66)	-0.245 (-1.72)	-0.167 (-1.27)	-0.0666 (-0.62)	-0.194 (-0.84)
Industry25	0.0810 (0.74)	0.0367 (0.33)	-0.268* (-2.47)	-0.158 (-1.74)	-0.137 (-0.64)
Industry26	0.0337 (0.21)	-0.176 (-1.24)	-0.270 (-1.83)	0.0445 (0.41)	-0.00200 (-0.01)
Industry27	0.0407 (0.22)	0.0161 (0.08)	-0.131 (-0.75)	0.0139 (0.10)	-0.00992 (-0.03)
ROE	0.128*** (4.68)				
Remuneration	-0.0804* (-2.08)	-0.0351 (-1.06)	-0.145*** (-4.22)	0.0848*** (4.03)	0.0356 (0.66)
Director	-0.0223 (-0.90)	-0.00789 (-0.41)	-0.0150 (-0.98)	0.00206 (0.20)	-0.00474 (-0.26)

Table 2.7 (cont.)

Independent director	0.0226 (1.03)	0.0172 (0.77)	0.0670** (3.24)	0.0302* (2.09)	0.0172 (0.51)
Controlled director	-0.000288 (-0.01)	0.00289 (0.16)	-0.0170 (-0.96)	-0.00691 (-0.56)	-0.00377 (-0.13)
Shares held by director	-0.00382 (-1.81)	-0.000451 (-0.22)	-0.00496* (-2.37)	0.00239 (1.65)	-0.00213 (-0.64)
Shares held by major shareholder	0.00342 (1.35)	0.00433 (1.76)	-0.00299 (-1.10)	0.00265 (1.49)	0.00394 (0.77)
Duality of CEO and COB	0.0812 (1.22)	0.0445 (0.71)	-0.0397 (-0.61)	-0.0633 (-1.22)	0.159 (1.51)
Controlled COB	0.0831 (1.09)	0.0369 (0.49)	0.0850 (1.12)	-0.119* (-2.36)	-0.0991 (-0.88)
Controlled CEO	-0.0576 (-0.87)	-0.0670 (-1.09)	0.0297 (0.46)	-0.00967 (-0.21)	-0.0935 (-0.87)
Controlled financial manager	-0.223 (-1.54)	-0.235 (-1.80)	-0.0576 (-0.50)	0.0268 (0.32)	0.0783 (0.41)
Controlled supervisory director	-0.0266 (-0.49)	-0.0884 (-1.64)	-0.0370 (-0.67)	-0.0300 (-0.75)	-0.0512 (-0.54)
Litigation	-0.0130 (-0.30)	-0.0180 (-0.45)	0.0303 (0.77)	0.0533 (1.91)	0.0526 (1.04)
ROA		0.103* (2.57)			
EPS			0.293*** (11.07)		
Debt-asset ratio				1.248*** (24.63)	
Short-term investment					0.976*** (89.93)
Constant	1.737** (3.05)	1.220* (2.26)	-0.161 (-0.31)	-2.126*** (-6.59)	-2.090* (-2.56)
<i>N</i>	842	920	911	1217	931
<i>R</i> ²	0.1511	0.2657	0.3265	0.5647	0.9273
<i>Adj-R</i> ²	0.1065	0.2305	0.2940	0.5492	0.9239

Table 2.8 OLS regression of 2008: D&O coverage as proxy variable

This table contains the result of regression of 2008 where log of D&O coverage is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O coverage and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0136 (0.42)	0.0872* (2.36)	0.0546 (1.55)	0.0115 (0.48)	0.0608 (1.11)
Capital	-0.0783* (-2.46)	-0.139*** (-3.66)	0.0584 (1.62)	-0.0771** (-3.08)	0.0716 (1.35)
Industry1	-0.515* (-2.22)	-1.015* (-2.11)	-1.068** (-3.30)	-0.575** (-2.69)	-0.626 (-1.55)
Industry2	0.331 (1.52)	0.0722 (0.23)	-0.384 (-0.72)	0.0849 (0.45)	0.392 (1.04)
Industry3	0.371 (0.74)	0.921* (2.03)	0.363 (1.44)	-0.255 (-1.51)	0.0675 (0.16)
Industry4	0.871*** (5.64)	0.787*** (5.27)	0.927*** (6.23)	0.637*** (4.12)	0.569* (2.10)
Industry5	0.0243 (0.10)	-0.375 (-1.34)	-0.274 (-1.39)	-0.212 (-1.17)	-0.105 (-0.27)
Industry6	0.627 (1.11)	0.652 (1.16)	-0.0245 (-0.11)	0.423* (2.34)	-0.617 (-0.79)
Industry7		-0.0512 (-0.22)		-2.345*** (-14.40)	0.554 (1.45)
Industry8	0.151 (0.57)	0.00935 (0.04)	-0.170 (-0.75)	-0.242 (-1.11)	0.704** (2.82)
Industry9	0.682 (1.72)	0.440 (0.90)	0.145 (0.50)	0.0903 (0.46)	0.402 (0.72)
Industry10	0.336 (0.95)	0.427 (1.22)	0.285 (1.43)	-0.218 (-0.76)	0.0721 (0.07)

Table 2.8 (cont.)

Industry11	0.276 (1.35)	-0.179 (-1.10)	0.202 (1.21)	-1.127*** (-8.05)	
Industry12	0.151 (0.73)	-0.168 (-0.65)	-0.433 (-1.05)	-0.0249 (-0.11)	-0.521 (-0.88)
Industry13	0.318 (0.90)	-0.143 (-0.32)	0.284 (0.77)	0.0481 (0.20)	-0.0817 (-0.17)
Industry14		-1.295*** (-7.79)		-1.116*** (-8.06)	
Industry15	0.600* (2.00)	-1.280*** (-3.61)	-0.162 (-0.55)	0.0774 (0.38)	-0.879 (-1.90)
Industry16	-0.104 (-0.39)	-0.677* (-2.42)	-0.815 (-1.96)	-0.196 (-0.55)	-0.272 (-0.33)
Industry17	0.00295 (0.02)	-0.290 (-1.28)	-0.299 (-1.51)	-0.387* (-2.30)	-0.410 (-1.20)
Industry18	0.102 (0.50)	-0.335 (-1.08)	-0.0466 (-0.15)	-0.269 (-1.50)	-0.537 (-1.13)
Industry19	-0.401 (-1.75)	-0.580* (-2.40)	-0.663** (-2.67)	-0.200 (-1.29)	-0.301 (-0.79)
Industry20	0.0505 (0.09)	-0.550 (-0.96)	-0.594 (-1.84)	-0.211 (-0.62)	-0.988** (-2.92)
Industry21	0.138 (0.95)	0.0496 (0.30)	-0.134 (-1.00)	0.205 (1.65)	-0.229 (-0.81)
Industry22	-0.0147 (-0.10)	-0.183 (-1.11)	-0.310* (-2.10)	-0.0123 (-0.10)	0.0162 (0.06)
Industry23	0.207 (1.24)	0.187 (1.14)	0.0353 (0.25)	-0.168 (-1.28)	-0.216 (-0.81)
Industry24	-0.143 (-0.81)	-0.234 (-1.27)	-0.303 (-1.94)	-0.181 (-1.35)	-0.373 (-1.37)
Industry25	0.137 (0.91)	0.0516 (0.35)	-0.416** (-3.04)	-0.146 (-1.23)	-0.182 (-0.72)
Industry26	0.0432 (0.21)	-0.188 (-1.09)	-0.325 (-1.89)	0.103 (0.72)	-0.00238 (-0.01)
Industry27	-0.177 (-0.80)	-0.176 (-0.63)	-0.314 (-1.41)	-0.0504 (-0.31)	-0.00802 (-0.02)
ROE	0.0623 (1.93)				

Table 2.8 (cont.)

Remuneration	-0.0139 (-0.33)	-0.00677 (-0.16)	-0.159*** (-3.32)	0.104*** (3.56)	0.0376 (0.50)
Director	-0.00939 (-0.58)	0.00143 (0.08)	-0.0154 (-0.78)	-0.0119 (-0.97)	-0.0204 (-0.67)
Independent director	0.00953 (0.36)	0.0109 (0.35)	0.0743* (2.59)	0.0335 (1.77)	0.0523 (1.20)
Controlled director	0.0266 (0.90)	0.0217 (0.66)	0.00844 (0.29)	0.0240 (1.15)	0.0272 (0.56)
Shares held by director	0.00142 (0.54)	0.00241 (0.84)	-0.00397 (-1.28)	0.00359 (1.80)	-0.00266 (-0.56)
Shares held by major shareholder	0.00464 (1.34)	0.00439 (1.22)	-0.00429 (-1.07)	0.00174 (0.74)	0.00323 (0.35)
Duality of CEO and COB	0.0546 (0.61)	-0.0112 (-0.13)	-0.0853 (-0.91)	0.0523 (0.80)	0.268 (1.77)
Controlled COB	0.0740 (0.79)	-0.0551 (-0.56)	-0.0343 (-0.32)	-0.222** (-3.20)	-0.263 (-1.72)
Controlled CEO	-0.0490 (-0.55)	-0.0259 (-0.31)	0.0827 (0.88)	-0.0421 (-0.65)	-0.134 (-0.79)
Controlled financial manager	-0.179 (-0.94)	-0.135 (-0.68)	0.0385 (0.20)	0.0648 (0.58)	0.0675 (0.22)
Controlled supervisory director	-0.0745 (-1.04)	-0.0921 (-1.26)	-0.0333 (-0.43)	0.0418 (0.81)	-0.0465 (-0.37)
Litigation	-0.0127 (-0.22)	-0.0228 (-0.39)	0.0438 (0.73)	0.0403 (1.03)	0.0305 (0.37)
ROA		0.0768 (1.27)			
EPS			0.315*** (8.71)		
Debt-asset ratio				1.163*** (16.74)	
Short-term investment					0.976*** (68.00)
Constant	1.426 (1.80)	0.499 (0.53)	0.0695 (0.08)	-2.202*** (-4.22)	-1.611 (-1.07)
<i>N</i>	438	476	467	603	474
<i>R</i> ²	0.1130	0.3316	0.3526	0.5938	0.9333

Table 2.9 Bootstrap of 2008: D&O coverage as proxy variable

This table reports the result of bootstrap of previous OLS regression. Generally, they conclude similar results and D&O insurance coverage is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0136 (0.41)	0.0872* (2.35)	0.0546 (1.54)	0.0115 (0.48)	0.0608 (1.06)
Capital	-0.0783* (-2.34)	-0.139*** (-3.65)	0.0584 (1.64)	-0.0771** (-3.07)	0.0716 (1.31)
Industry1	-0.515* (-2.23)	-1.015* (-2.00)	-1.068** (-3.04)	-0.575* (-2.52)	-0.626 (-1.31)
Industry2	0.331 (1.38)	0.0722 (0.22)	-0.384 (-0.65)	0.0849 (0.42)	0.392 (0.97)
Industry3	0.371 (0.68)	0.921 (1.86)	0.363 (1.36)	-0.255 (-1.45)	0.0675 (0.16)
Industry4	0.871*** (5.69)	0.787*** (5.33)	0.927*** (6.40)	0.637*** (3.89)	0.569 (1.87)
Industry5	0.0243 (0.10)	-0.375 (-1.33)	-0.274 (-1.35)	-0.212 (-1.14)	-0.105 (-0.26)
Industry6	0.627 (0.94)	0.652 (1.06)	-0.0245 (-0.09)	0.423* (2.11)	-0.617 (-0.67)
Industry7		-0.0512 (-0.21)		-2.345*** (-13.68)	0.554 (1.36)
Industry8	0.151 (0.55)	0.00935 (0.04)	-0.170 (-0.74)	-0.242 (-1.06)	0.704** (2.66)
Industry9	0.682 (1.63)	0.440 (0.85)	0.145 (0.47)	0.0903 (0.43)	0.402 (0.67)
Industry10	0.336 (0.92)	0.427 (1.13)	0.285 (1.31)	-0.218 (-0.71)	0.0721 (0.07)
Industry11	0.276 (1.38)	-0.179 (-1.11)	0.202 (1.25)	-1.127*** (-8.25)	
Industry12	0.151 (0.69)	-0.168 (-0.62)	-0.433 (-0.94)	-0.0249 (-0.11)	-0.521 (-0.80)

Table 2.9 (cont.)

Industry13	0.318 (0.83)	-0.143 (-0.30)	0.284 (0.70)	0.0481 (0.18)	-0.0817 (-0.16)
Industry14		-1.295*** (-7.73)		-1.116*** (-8.16)	
Industry15	0.600* (1.98)	-1.280*** (-3.53)	-0.162 (-0.55)	0.0774 (0.39)	-0.879 (-1.89)
Industry16	-0.104 (-0.35)	-0.677* (-2.19)	-0.815 (-1.71)	-0.196 (-0.49)	-0.272 (-0.30)
Industry17	0.00295 (0.01)	-0.290 (-1.30)	-0.299 (-1.49)	-0.387* (-2.36)	-0.410 (-1.17)
Industry18	0.102 (0.46)	-0.335 (-0.99)	-0.0466 (-0.14)	-0.269 (-1.39)	-0.537 (-1.10)
Industry19	-0.401 (-1.72)	-0.580* (-2.42)	-0.663** (-2.67)	-0.200 (-1.29)	-0.301 (-0.78)
Industry20	0.0505 (0.08)	-0.550 (-0.92)	-0.594 (-1.78)	-0.211 (-0.59)	-0.988** (-2.93)
Industry21	0.138 (0.98)	0.0496 (0.31)	-0.134 (-1.04)	0.205 (1.62)	-0.229 (-0.80)
Industry22	-0.0147 (-0.10)	-0.183 (-1.11)	-0.310* (-2.21)	-0.0123 (-0.10)	0.0162 (0.06)
Industry23	0.207 (1.27)	0.187 (1.19)	0.0353 (0.26)	-0.168 (-1.30)	-0.216 (-0.81)
Industry24	-0.143 (-0.80)	-0.234 (-1.28)	-0.303* (-2.03)	-0.181 (-1.38)	-0.373 (-1.35)
Industry25	0.137 (0.95)	0.0516 (0.34)	-0.416** (-3.10)	-0.146 (-1.25)	-0.182 (-0.71)
Industry26	0.0432 (0.22)	-0.188 (-1.11)	-0.325 (-1.89)	0.103 (0.73)	-0.00238 (-0.01)
Industry27	-0.177 (-0.81)	-0.176 (-0.64)	-0.314 (-1.46)	-0.0504 (-0.32)	-0.00802 (-0.02)
ROE	0.0623 (1.91)				
Remuneration	-0.0139 (-0.31)	-0.00677 (-0.16)	-0.159** (-3.26)	0.104*** (3.52)	0.0376 (0.50)
Director	-0.00939 (-0.55)	0.00143 (0.08)	-0.0154 (-0.75)	-0.0119 (-0.96)	-0.0204 (-0.64)

Table 2.9 (cont.)

Independent director	0.00953 (0.36)	0.0109 (0.36)	0.0743* (2.54)	0.0335 (1.75)	0.0523 (1.17)
Controlled director	0.0266 (0.88)	0.0217 (0.68)	0.00844 (0.29)	0.0240 (1.13)	0.0272 (0.53)
Shares held by director	0.00142 (0.52)	0.00241 (0.85)	-0.00397 (-1.27)	0.00359 (1.77)	-0.00266 (-0.55)
Shares held by major shareholder	0.00464 (1.33)	0.00439 (1.22)	-0.00429 (-1.07)	0.00174 (0.72)	0.00323 (0.36)
Duality of CEO and COB	0.0546 (0.61)	-0.0112 (-0.13)	-0.0853 (-0.90)	0.0523 (0.80)	0.268 (1.72)
Controlled COB	0.0740 (0.75)	-0.0551 (-0.56)	-0.0343 (-0.32)	-0.222** (-3.26)	-0.263 (-1.74)
Controlled CEO	-0.0490 (-0.54)	-0.0259 (-0.30)	0.0827 (0.88)	-0.0421 (-0.64)	-0.134 (-0.78)
Controlled financial manager	-0.179 (-0.91)	-0.135 (-0.63)	0.0385 (0.19)	0.0648 (0.55)	0.0675 (0.20)
Controlled supervisory director	-0.0745 (-1.07)	-0.0921 (-1.31)	-0.0333 (-0.42)	0.0418 (0.82)	-0.0465 (-0.36)
Litigation	-0.0127 (-0.22)	-0.0228 (-0.37)	0.0438 (0.68)	0.0403 (1.01)	0.0305 (0.35)
ROA		0.0768 (1.26)			
EPS			0.315*** (8.66)		
Debt-asset ratio				1.163*** (16.80)	
Short-term investment					0.976*** (66.53)
Constant	1.426 (1.79)	0.499 (0.54)	0.0695 (0.08)	-2.202*** (-4.09)	-1.611 (-1.06)
<i>N</i>	438	476	467	603	474
<i>R</i> ²	0.1130	0.3316	0.3526	0.5938	0.9333
<i>Adj-R</i> ²	0.0236	0.2668	0.2918	0.5634	0.9271

Table 2.10 OLS regression of 2009: D&O purchase as proxy variable

This table contains the result of regression of 2009 where D&O purchase is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O purchase and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1 % level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.0552 (0.95)	0.0818 (1.61)	0.0110 (0.16)	0.0349 (0.88)	0.236* (2.23)
Capital	-0.0485* (-2.24)	-0.0826*** (-4.10)	0.0781** (2.77)	-0.0738*** (-4.56)	0.101* (2.50)
Industry1	-0.460 (-1.41)	-0.498 (-1.59)	-1.138** (-2.92)	-0.239 (-1.90)	-0.775 (-1.27)
Industry2	-0.191 (-0.80)	-0.0909 (-0.50)	-0.355 (-1.82)	-0.114 (-0.84)	0.451 (1.08)
Industry3	0.241 (1.62)	0.265 (1.88)	-0.0133 (-0.05)	-0.229 (-1.63)	0.0170 (0.05)
Industry4	-0.287 (-1.77)	-0.191 (-1.31)	-0.656** (-3.13)	-0.285 (-1.83)	-0.0413 (-0.15)
Industry5	-0.00370 (-0.03)	0.0198 (0.15)	-0.0540 (-0.31)	-0.108 (-0.97)	0.309 (1.12)
Industry6	0.162 (0.87)	0.259 (1.41)	-0.192 (-0.72)	0.00925 (0.05)	0.294 (0.71)
Industry7	0.629*** (3.66)	0.864*** (4.38)	0.120 (0.66)	-1.297** (-3.25)	0.144 (0.62)
Industry8	-0.0630 (-0.11)	-0.0258 (-0.06)	0.0632 (0.28)	-0.483 (-1.69)	0.852 (1.65)
Industry9	0.849*** (3.72)	0.673*** (3.34)	0.485 (1.67)	0.0343 (0.27)	0.766** (2.60)
Industry10	0.0212 (0.09)	0.200 (0.91)	0.110 (0.31)	-0.149 (-0.55)	0.655 (1.53)

Table 2.10 (cont.)

Industry11	-0.168 (-0.40)	-0.0237 (-0.08)	0.305 (1.35)	-0.391 (-1.02)	1.198** (2.78)
Industry12	0.228 (1.56)	0.0771 (0.58)	-0.224 (-1.29)	0.160 (1.37)	0.541 (1.87)
Industry13	-0.130 (-0.42)	0.0170 (0.08)	-0.224 (-0.66)	-0.0702 (-0.35)	0.467 (1.30)
Industry14	-0.0924 (-0.40)	0.0372 (0.17)	-1.035*** (-4.07)	-0.488 (-1.67)	-1.304 (-0.93)
Industry15	0.203 (1.02)	-0.686*** (-3.49)	-0.282 (-1.15)	0.00244 (0.02)	0.281 (0.87)
Industry16	-0.140 (-0.57)	-0.0785 (-0.30)	-0.952** (-3.04)	-0.164 (-1.01)	0.422 (1.15)
Industry17	-0.277 (-1.71)	-0.214 (-1.40)	-0.671*** (-3.56)	-0.166 (-1.13)	0.267 (0.89)
Industry18	-0.376** (-2.62)	-0.244 (-1.82)	-0.396* (-2.51)	-0.488*** (-3.42)	0.265 (0.86)
Industry19	-0.416* (-2.50)	-0.297 (-1.81)	-0.752*** (-4.17)	0.148 (1.17)	0.226 (0.64)
Industry20	-0.396 (-1.14)	-0.473 (-1.37)	-1.080** (-2.92)	-0.326 (-1.92)	0.435 (0.95)
Industry21	0.179 (1.40)	0.260* (2.28)	-0.200 (-1.34)	0.192 (1.84)	0.450 (1.79)
Industry22	-0.126 (-1.07)	-0.00511 (-0.05)	-0.311* (-2.24)	0.168 (1.61)	0.198 (0.81)
Industry23	0.206 (1.55)	0.303** (2.60)	0.214 (1.22)	0.226* (2.17)	0.817*** (3.47)
Industry24	-0.164 (-1.13)	-0.0940 (-0.68)	-0.308 (-1.93)	0.0867 (0.76)	-0.196 (-0.57)
Industry25	-0.0212 (-0.19)	0.0307 (0.30)	-0.207 (-1.62)	-0.0729 (-0.75)	0.254 (1.10)
Industry26	-0.243 (-1.45)	-0.322* (-2.10)	-0.492** (-2.83)	0.132 (1.21)	0.540 (1.86)
Industry27	-0.120 (-0.56)	0.0189 (0.09)	-0.401 (-1.58)	0.267* (2.18)	0.370 (0.93)
ROE	0.187*** (6.68)				

Table 2.10 (cont.)

Remuneration	-0.0481** (-2.91)	-0.0335* (-2.40)	-0.00352 (-0.19)	0.0294 (1.74)	0.0622 (1.24)
Director	-0.0190 (-1.13)	-0.00743 (-0.51)	-0.0183 (-0.99)	-0.00159 (-0.16)	0.00737 (0.38)
Independent director	-0.0171 (-0.72)	-0.0154 (-0.70)	0.0749* (2.38)	0.0327 (1.89)	0.0493 (1.12)
Controlled director	-0.0408* (-2.03)	-0.0260 (-1.49)	-0.0121 (-0.54)	-0.0384** (-2.70)	-0.0125 (-0.40)
Shares held by director	0.00172 (0.90)	0.00183 (1.13)	0.00297 (1.19)	0.00303* (2.27)	-0.00310 (-0.91)
Shares held by major shareholder	0.00427 (1.58)	0.00505* (2.26)	0.00395 (1.33)	0.00194 (1.09)	0.00167 (0.35)
Duality of CEO and COB	0.0281 (0.42)	0.0464 (0.81)	0.0396 (0.54)	0.0310 (0.64)	0.0101 (0.08)
Controlled COB	0.0202 (0.29)	0.0231 (0.39)	0.212** (2.61)	-0.0308 (-0.58)	-0.0703 (-0.54)
Controlled CEO	0.104 (1.64)	0.0870 (1.60)	0.0297 (0.40)	-0.0523 (-1.11)	-0.156 (-1.25)
Controlled financial manager	-0.0607 (-0.45)	0.0467 (0.40)	-0.262 (-1.63)	0.0638 (0.72)	-0.0216 (-0.11)
Controlled supervisory director	0.000485 (0.01)	-0.0230 (-0.45)	-0.0554 (-0.83)	-0.0785 (-1.93)	-0.0905 (-0.86)
Litigation	-0.0116 (-0.19)	-0.00916 (-0.25)	-0.00262 (-0.04)	0.0272* (1.96)	0.107 (1.60)
ROA		0.208*** (7.17)			
EPS			0.257*** (7.58)		
Debt-asset ratio				1.305*** (27.44)	
Short-term investment					0.839*** (70.84)
Constant	1.681*** (4.03)	1.334*** (3.53)	-2.190*** (-4.10)	-1.611*** (-5.06)	-1.736* (-2.31)
<i>N</i>	971	1033	845	1286	940
<i>R</i> ²	0.1890	0.3003	0.2699	0.5925	0.8828

Table 2.11 Bootstrap of 2009: D&O purchase as proxy variable

This table reports the result of bootstrap of previous OLS regression. Generally, they conclude similar results and D&O insurance purchase is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.0552 (0.94)	0.0818 (1.60)	0.0110 (0.16)	0.0349 (0.88)	0.236* (2.20)
Capital	-0.0485* (-2.16)	-0.0826*** (-4.02)	0.0781** (2.68)	-0.0738*** (-4.42)	0.101* (2.50)
Industry1	-0.460 (-1.28)	-0.498 (-1.44)	-1.138** (-2.59)	-0.239 (-1.79)	-0.775 (-1.16)
Industry2	-0.191 (-0.80)	-0.0909 (-0.49)	-0.355 (-1.78)	-0.114 (-0.85)	0.451 (1.06)
Industry3	0.241 (1.59)	0.265 (1.85)	-0.0133 (-0.05)	-0.229 (-1.63)	0.0170 (0.05)
Industry4	-0.287 (-1.79)	-0.191 (-1.33)	-0.656** (-3.08)	-0.285 (-1.85)	-0.0413 (-0.15)
Industry5	-0.00370 (-0.03)	0.0198 (0.15)	-0.0540 (-0.31)	-0.108 (-0.98)	0.309 (1.12)
Industry6	0.162 (0.83)	0.259 (1.39)	-0.192 (-0.67)	0.00925 (0.05)	0.294 (0.68)
Industry7	0.629** (3.18)	0.864*** (3.86)	0.120 (0.56)	-1.297** (-2.87)	0.144 (0.58)
Industry8	-0.0630 (-0.10)	-0.0258 (-0.06)	0.0632 (0.26)	-0.483 (-1.57)	0.852 (1.48)
Industry9	0.849*** (3.72)	0.673*** (3.36)	0.485 (1.59)	0.0343 (0.27)	0.766** (2.59)
Industry10	0.0212 (0.09)	0.200 (0.89)	0.110 (0.30)	-0.149 (-0.54)	0.655 (1.47)
Industry11	-0.168 (-0.35)	-0.0237 (-0.07)	0.305 (1.17)	-0.391 (-0.90)	1.198* (2.48)
Industry12	0.228	0.0771	-0.224	0.160	0.541

	(1.57)	(0.59)	(-1.29)	(1.38)	(1.86)
Table 2.11 (cont.)					
Industry13	-0.130 (-0.42)	0.0170 (0.08)	-0.224 (-0.64)	-0.0702 (-0.35)	0.467 (1.29)
Industry14	-0.0924 (-0.38)	0.0372 (0.17)	-1.035*** (-3.86)	-0.488 (-1.63)	-1.304 (-0.88)
Industry15	0.203 (1.03)	-0.686*** (-3.48)	-0.282 (-1.14)	0.00244 (0.02)	0.281 (0.86)
Industry16	-0.140 (-0.54)	-0.0785 (-0.30)	-0.952** (-2.87)	-0.164 (-0.98)	0.422 (1.09)
Industry17	-0.277 (-1.69)	-0.214 (-1.41)	-0.671*** (-3.51)	-0.166 (-1.12)	0.267 (0.89)
Industry18	-0.376** (-2.62)	-0.244 (-1.85)	-0.396* (-2.50)	-0.488*** (-3.45)	0.265 (0.85)
Industry19	-0.416* (-2.51)	-0.297 (-1.83)	-0.752*** (-4.15)	0.148 (1.17)	0.226 (0.62)
Industry20	-0.396 (-1.08)	-0.473 (-1.28)	-1.080** (-2.82)	-0.326 (-1.82)	0.435 (0.89)
Industry21	0.179 (1.41)	0.260* (2.27)	-0.200 (-1.34)	0.192 (1.86)	0.450 (1.80)
Industry22	-0.126 (-1.08)	-0.00511 (-0.05)	-0.311* (-2.23)	0.168 (1.63)	0.198 (0.81)
Industry23	0.206 (1.56)	0.303** (2.62)	0.214 (1.21)	0.226* (2.20)	0.817*** (3.47)
Industry24	-0.164 (-1.14)	-0.0940 (-0.69)	-0.308 (-1.95)	0.0867 (0.76)	-0.196 (-0.57)
Industry25	-0.0212 (-0.19)	0.0307 (0.30)	-0.207 (-1.65)	-0.0729 (-0.76)	0.254 (1.11)
Industry26	-0.243 (-1.44)	-0.322* (-2.10)	-0.492** (-2.79)	0.132 (1.21)	0.540 (1.84)
Industry27	-0.120 (-0.55)	0.0189 (0.09)	-0.401 (-1.58)	0.267* (2.18)	0.370 (0.92)
ROE	0.187*** (6.71)				
Remuneration	-0.0481* (-2.29)	-0.0335 (-1.95)	-0.00352 (-0.14)	0.0294 (1.56)	0.0622 (1.19)
Director	-0.0190	-0.00743	-0.0183	-0.00159	0.00737

	(-1.14)	(-0.51)	(-0.98)	(-0.16)	(0.37)
Table 2.11 (cont.)					
Independent director	-0.0171 (-0.72)	-0.0154 (-0.70)	0.0749* (2.39)	0.0327 (1.89)	0.0493 (1.13)
Controlled director	-0.0408* (-2.01)	-0.0260 (-1.48)	-0.0121 (-0.53)	-0.0384** (-2.65)	-0.0125 (-0.39)
Shares held by director	0.00172 (0.90)	0.00183 (1.13)	0.00297 (1.19)	0.00303* (2.26)	-0.00310 (-0.90)
Shares held by major shareholder	0.00427 (1.58)	0.00505* (2.22)	0.00395 (1.32)	0.00194 (1.08)	0.00167 (0.35)
Duality of CEO and COB	0.0281 (0.42)	0.0464 (0.81)	0.0396 (0.53)	0.0310 (0.65)	0.0101 (0.08)
Controlled COB	0.0202 (0.29)	0.0231 (0.39)	0.212* (2.55)	-0.0308 (-0.58)	-0.0703 (-0.53)
Controlled CEO	0.104 (1.64)	0.0870 (1.56)	0.0297 (0.40)	-0.0523 (-1.12)	-0.156 (-1.22)
Controlled financial manager	-0.0607 (-0.44)	0.0467 (0.39)	-0.262 (-1.59)	0.0638 (0.71)	-0.0216 (-0.11)
Controlled supervisory director	0.000485 (0.01)	-0.0230 (-0.45)	-0.0554 (-0.82)	-0.0785 (-1.94)	-0.0905 (-0.86)
Litigation	-0.0116 (-0.19)	-0.00916 (-0.24)	-0.00262 (-0.04)	0.0272 (1.22)	0.107 (1.51)
ROA		0.208*** (7.19)			
EPS			0.257*** (7.45)		
Debt-asset ratio				1.305*** (27.14)	
Short-term investment					0.839*** (69.68)
Constant	1.681*** (3.83)	1.334*** (3.37)	-2.190*** (-3.92)	-1.611*** (-4.94)	-1.736* (-2.25)
<i>N</i>	971	1033	845	1286	940
<i>R</i> ²	0.1890	0.3003	0.2699	0.5925	0.8828
<i>Adj-R</i> ²	0.1523	0.2706	0.2316	0.5788	0.8773

Table 2.12 OLS regression of 2009: D&O coverage as proxy variable

This table contains the result of regression of 2009 where log of D&O coverage is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O coverage and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0267 (0.72)	0.0318 (0.99)	0.0639 (1.39)	0.0602* (2.42)	0.0490 (0.71)
Capital	-0.0501 (-1.52)	-0.0864** (-2.83)	0.0161 (0.42)	-0.102*** (-4.48)	0.0909 (1.79)
Industry1	0.133 (0.60)	-0.276 (-0.50)	-1.011 (-1.65)	0.0278 (0.18)	-0.0978 (-0.09)
Industry2	0.227 (1.50)	0.303* (2.12)	-0.400 (-1.34)	-0.0499 (-0.22)	0.735 (0.68)
Industry3	0.426 (1.84)	0.374 (1.95)	0.589 (1.86)	-0.217 (-1.09)	-0.302 (-0.70)
Industry4	-0.409 (-0.60)	-0.533 (-1.12)	-0.600 (-0.65)	0.238 (1.34)	-0.266 (-0.39)
Industry5	-0.0316 (-0.14)	-0.0432 (-0.22)	-0.502 (-1.70)	0.0183 (0.11)	0.00294 (0.01)
Industry6	-0.0925 (-0.19)	0.113 (0.25)	-0.424 (-1.10)	0.161 (0.66)	-1.102* (-2.45)
Industry7				-2.731*** (-16.31)	
Industry8	0.264 (1.45)	0.0424 (0.14)	-0.00681 (-0.03)	-0.0172 (-0.04)	1.656*** (6.05)
Industry9	0.764* (2.08)	0.627 (1.67)	-0.118 (-0.21)	0.149 (0.69)	0.708 (1.44)
Industry10	0.875*** (4.34)	1.081*** (5.14)	0.906*** (5.09)	0.469 (1.86)	-0.215 (-0.56)

Table 2.12 (cont.)

Industry11	1.024 ^{***} (5.61)	0.648 ^{***} (4.48)		-0.910 ^{***} (-6.35)	
Industry12	0.499 (1.73)	0.202 (0.97)	0.0646 (0.19)	0.0958 (0.47)	0.925 [*] (2.20)
Industry13	0.0209 (0.06)	0.232 (0.94)	0.472 (1.09)	0.130 (0.52)	0.278 (0.63)
Industry14				0.979 ^{***} (6.46)	2.116 ^{***} (6.34)
Industry15	0.375 (1.41)	-0.742 ^{**} (-2.89)	-0.0804 (-0.27)	0.263 (1.40)	0.101 (0.24)
Industry16	-0.0393 (-0.17)	-0.0381 (-0.16)	-0.417 (-1.71)	0.162 (0.43)	1.317 ^{***} (4.40)
Industry17	-0.145 (-0.60)	-0.0709 (-0.35)	-0.743 ^{***} (-3.37)	0.0118 (0.06)	0.289 (0.84)
Industry18	-0.154 (-0.60)	-0.128 (-0.49)	-0.575 (-1.73)	-0.844 ^{**} (-2.98)	0.159 (0.36)
Industry19	-0.227 (-1.10)	0.0700 (0.36)	-0.894 ^{***} (-4.44)	0.335 [*] (1.97)	0.0630 (0.13)
Industry20	-0.0430 (-0.08)	-0.297 (-0.46)	-1.185 ^{***} (-4.22)	-0.150 (-0.53)	-0.682 [*] (-2.04)
Industry21	0.295 (1.82)	0.374 ^{**} (2.72)	-0.247 (-1.37)	0.304 [*] (2.26)	0.593 [*] (2.24)
Industry22	-0.0180 (-0.13)	0.0878 (0.74)	-0.357 [*] (-2.28)	0.247 (1.87)	0.375 (1.43)
Industry23	0.318 (1.82)	0.462 ^{***} (3.34)	0.239 (1.06)	0.234 (1.68)	0.706 ^{**} (2.71)
Industry24	-0.0503 (-0.29)	0.0641 (0.40)	-0.318 (-1.69)	0.134 (0.96)	-0.416 (-0.97)
Industry25	0.0837 (0.58)	0.112 (0.92)	-0.168 (-1.04)	0.0735 (0.57)	0.162 (0.63)
Industry26	-0.0520 (-0.28)	-0.126 (-0.76)	-0.359 (-1.95)	0.212 (1.55)	0.291 (0.82)
Industry27	-0.199 (-0.72)	-0.0410 (-0.15)	-0.458 (-1.60)	0.255 (1.55)	0.499 (1.09)
ROE	0.180 ^{***} (4.14)				

Table 2.12 (cont.)

Remuneration	-0.0459* (-2.49)	-0.0326* (-2.17)	-0.0240 (-0.90)	0.0476** (2.60)	0.0222 (0.41)
Director	-0.0115 (-0.63)	0.00532 (0.33)	0.00257 (0.15)	-0.00225 (-0.21)	-0.0242 (-0.83)
Independent director	-0.0387 (-1.13)	-0.0334 (-1.07)	0.0619 (1.53)	0.0247 (1.05)	0.116* (1.98)
Controlled director	-0.00593 (-0.18)	-0.00114 (-0.04)	0.0519 (1.48)	-0.0119 (-0.52)	-0.000535 (-0.01)
Shares held by director	0.00317 (1.21)	0.00100 (0.42)	-0.00121 (-0.33)	0.00379* (2.00)	-0.00318 (-0.67)
Shares held by major shareholder	0.00418 (0.93)	0.00453 (1.21)	-0.00230 (-0.50)	0.000989 (0.41)	0.000115 (0.02)
Duality of CEO and COB	0.139 (1.38)	0.0426 (0.50)	-0.0543 (-0.55)	0.0877 (1.39)	-0.177 (-0.97)
Controlled COB	0.0508 (0.55)	-0.0500 (-0.64)	0.0187 (0.18)	-0.0887 (-1.34)	-0.334* (-2.07)
Controlled CEO	0.0779 (0.86)	0.140 (1.73)	0.140 (1.41)	-0.118 (-1.82)	0.0573 (0.35)
Controlled financial manager	0.0722 (0.32)	0.105 (0.48)	-0.354 (-1.36)	0.270* (2.25)	0.672 (1.84)
Controlled supervisory director	-0.0337 (-0.41)	-0.0361 (-0.51)	-0.186* (-2.08)	-0.0790 (-1.51)	-0.0000765 (-0.00)
Litigation	-0.0796 (-1.54)	-0.0478 (-1.19)	-0.0721 (-0.95)	-0.00654 (-0.19)	0.0758 (1.00)
ROA		0.148*** (3.61)			
EPS			0.278*** (7.45)		
Debt-asset ratio				1.239*** (19.83)	
Short-term investment					0.842*** (52.52)
Constant	0.979 (1.44)	0.740 (1.31)	-1.957* (-2.13)	-2.437*** (-5.12)	-1.296 (-1.02)
<i>N</i>	490	526	437	660	491
<i>R</i> ²	0.1610	0.3246	0.3037	0.6105	0.8966

Table 2.13 Bootstrap of 2009: D&O coverage as proxy variable

This table reports the result of bootstrap of previous OLS regression. Generally, they conclude similar results and D&O insurance coverage is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0267 (0.71)	0.0318 (0.96)	0.0639 (1.36)	0.0602* (2.30)	0.0490 (0.68)
Capital	-0.0501 (-1.47)	-0.0864** (-2.75)	0.0161 (0.39)	-0.102*** (-4.27)	0.0909 (1.78)
Industry1	0.133 (0.52)	-0.276 (-0.45)	-1.011 (-1.49)	0.0278 (0.17)	-0.0978 (-0.08)
Industry2	0.227 (1.41)	0.303* (2.02)	-0.400 (-1.23)	-0.0499 (-0.22)	0.735 (0.60)
Industry3	0.426 (1.81)	0.374 (1.84)	0.589 (1.74)	-0.217 (-1.05)	-0.302 (-0.67)
Industry4	-0.409 (-0.55)	-0.533 (-0.97)	-0.600 (-0.59)	0.238 (1.21)	-0.266 (-0.33)
Industry5	-0.0316 (-0.14)	-0.0432 (-0.21)	-0.502 (-1.67)	0.0183 (0.11)	0.00294 (0.01)
Industry6	-0.0925 (-0.16)	0.113 (0.22)	-0.424 (-0.90)	0.161 (0.57)	-1.102* (-2.23)
Industry7				-2.731*** (-16.10)	
Industry8	0.264 (1.43)	0.0424 (0.14)	-0.00681 (-0.03)	-0.0172 (-0.04)	1.656*** (5.68)
Industry9	0.764* (2.01)	0.627 (1.59)	-0.118 (-0.18)	0.149 (0.69)	0.708 (1.34)
Industry10	0.875*** (3.94)	1.081*** (4.91)	0.906*** (4.18)	0.469 (1.68)	-0.215 (-0.49)
Industry11	1.024*** (5.66)	0.648*** (4.43)		-0.910*** (-6.42)	
Industry12	0.499 (1.71)	0.202 (0.94)	0.0646 (0.18)	0.0958 (0.46)	0.925* (2.03)

Table 2.13 (cont.)

Industry13	0.0209 (0.05)	0.232 (0.86)	0.472 (1.00)	0.130 (0.50)	0.278 (0.61)
Industry14				0.979*** (6.53)	2.116*** (6.24)
Industry15	0.375 (1.37)	-0.742** (-2.87)	-0.0804 (-0.27)	0.263 (1.37)	0.101 (0.24)
Industry16	-0.0393 (-0.16)	-0.0381 (-0.15)	-0.417 (-1.53)	0.162 (0.38)	1.317*** (3.91)
Industry17	-0.145 (-0.60)	-0.0709 (-0.34)	-0.743** (-3.25)	0.0118 (0.07)	0.289 (0.82)
Industry18	-0.154 (-0.57)	-0.128 (-0.46)	-0.575 (-1.62)	-0.844** (-2.74)	0.159 (0.33)
Industry19	-0.227 (-1.13)	0.0700 (0.35)	-0.894*** (-4.18)	0.335* (2.00)	0.0630 (0.12)
Industry20	-0.0430 (-0.08)	-0.297 (-0.44)	-1.185*** (-4.08)	-0.150 (-0.51)	-0.682* (-1.97)
Industry21	0.295 (1.87)	0.374** (2.79)	-0.247 (-1.36)	0.304* (2.25)	0.593* (2.22)
Industry22	-0.0180 (-0.13)	0.0878 (0.75)	-0.357* (-2.27)	0.247 (1.89)	0.375 (1.41)
Industry23	0.318 (1.88)	0.462*** (3.38)	0.239 (1.06)	0.234 (1.68)	0.706** (2.70)
Industry24	-0.0503 (-0.30)	0.0641 (0.41)	-0.318 (-1.69)	0.134 (0.98)	-0.416 (-0.99)
Industry25	0.0837 (0.61)	0.112 (0.94)	-0.168 (-1.01)	0.0735 (0.59)	0.162 (0.62)
Industry26	-0.0520 (-0.28)	-0.126 (-0.77)	-0.359 (-1.94)	0.212 (1.60)	0.291 (0.83)
Industry27	-0.199 (-0.72)	-0.0410 (-0.15)	-0.458 (-1.57)	0.255 (1.53)	0.499 (1.09)
ROE	0.180*** (4.13)				
Remuneration	-0.0459 (-1.65)	-0.0326 (-1.42)	-0.0240 (-0.55)	0.0476* (1.99)	0.0222 (0.35)
Director	-0.0115 (-0.61)	0.00532 (0.32)	0.00257 (0.14)	-0.00225 (-0.20)	-0.0242 (-0.82)

Table 2.13 (cont.)

Independent director	-0.0387 (-1.12)	-0.0334 (-1.06)	0.0619 (1.50)	0.0247 (1.05)	0.116 (1.95)
Controlled director	-0.00593 (-0.18)	-0.00114 (-0.04)	0.0519 (1.43)	-0.0119 (-0.53)	-0.000535 (-0.01)
Shares held by director	0.00317 (1.19)	0.00100 (0.42)	-0.00121 (-0.32)	0.00379 (1.92)	-0.00318 (-0.65)
Shares held by major shareholder	0.00418 (0.90)	0.00453 (1.16)	-0.00230 (-0.49)	0.000989 (0.41)	0.000115 (0.02)
Duality of CEO and COB	0.139 (1.38)	0.0426 (0.48)	-0.0543 (-0.53)	0.0877 (1.40)	-0.177 (-0.99)
Controlled COB	0.0508 (0.55)	-0.0500 (-0.63)	0.0187 (0.17)	-0.0887 (-1.37)	-0.334* (-2.04)
Controlled CEO	0.0779 (0.86)	0.140 (1.68)	0.140 (1.37)	-0.118 (-1.80)	0.0573 (0.35)
Controlled financial manager	0.0722 (0.29)	0.105 (0.43)	-0.354 (-1.22)	0.270* (2.14)	0.672 (1.72)
Controlled supervisory director	-0.0337 (-0.40)	-0.0361 (-0.50)	-0.186* (-2.02)	-0.0790 (-1.51)	-0.0000765 (-0.00)
Litigation	-0.0796 (-1.49)	-0.0478 (-1.12)	-0.0721 (-0.94)	-0.00654 (-0.18)	0.0758 (0.95)
ROA		0.148*** (3.57)			
EPS			0.278*** (7.25)		
Debt-asset ratio				1.239*** (19.43)	
Short-term investment					0.842*** (52.08)
Constant	0.979 (1.40)	0.740 (1.22)	-1.957* (-2.03)	-2.437*** (-4.82)	-1.296 (-0.95)
<i>N</i>	490	526	437	660	491
<i>R</i> ²	0.1610	0.3246	0.3037	0.6105	0.8966
<i>Adj-R</i> ²	0.0862	0.2689	0.2352	0.5840	0.8874

Table 2.14 OLS regression of 2010: D&O purchase as proxy variable

This table contains the result of regression of 2010 where D&O purchase is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O purchase and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.167* (2.14)	0.197** (2.76)	0.117 (1.37)	0.0671 (1.19)	0.0366 (0.19)
Capital	-0.0486 (-1.04)	-0.0694 (-1.69)	0.102* (2.29)	-0.0780** (-3.17)	0.242* (2.48)
Industry1	0.229 (0.63)	-0.312 (-0.62)	-0.996 (-1.92)	0.395 (1.24)	-2.363*** (-3.80)
Industry2	-0.00974 (-0.04)	-0.222 (-0.70)	-0.695 (-1.80)	0.0444 (0.22)	-0.459 (-0.84)
Industry3	-0.220 (-0.72)	-0.307 (-0.89)	-0.164 (-0.44)	0.118 (0.56)	-0.469 (-1.18)
Industry4	0.400 (1.34)	0.116 (0.33)	0.341 (0.90)	0.0888 (0.40)	-1.212* (-2.56)
Industry5	0.0602 (0.22)	-0.121 (-0.37)	0.327 (0.87)	-0.0675 (-0.35)	-1.388** (-2.87)
Industry6	-0.271 (-0.67)	-0.647 (-1.58)	-0.378 (-0.95)	-0.0106 (-0.05)	-1.044 (-1.55)
Industry7	-0.182 (-0.28)	-0.147 (-0.18)	0.138 (0.32)	-0.382 (-1.77)	-2.182*** (-4.67)
Industry9	0.230 (0.91)	-0.216 (-0.65)	0.185 (0.53)	-0.114 (-0.58)	-0.969* (-2.28)
Industry11	-1.420*** (-5.61)	-1.186*** (-3.84)	-0.844* (-2.40)	0.0225 (0.12)	0.795* (2.07)
Industry12	0.375 (1.44)	0.116 (0.35)	0.243 (0.68)	0.236 (1.28)	-0.973* (-2.00)

Table 2.14 (cont.)

Industry13	0.134 (0.44)	0.000817 (0.00)	-0.00130 (-0.00)	-0.0796 (-0.33)	-1.091 (-1.63)
Industry16	-0.559* (-2.21)	-0.564 (-1.84)	0.174 (0.48)	-0.942*** (-5.21)	-2.283*** (-5.78)
Industry17	-0.0973 (-0.28)	-0.128 (-0.33)	-0.286 (-0.69)	-0.00156 (-0.01)	-2.123** (-3.13)
Industry18	-0.188 (-0.71)	-0.352 (-1.04)	-0.222 (-0.61)	-0.0840 (-0.41)	-0.769 (-1.77)
Industry19	-0.270 (-1.01)	-0.297 (-0.92)	-0.142 (-0.40)	0.176 (0.91)	-0.561 (-1.23)
Industry20	-0.710* (-2.22)	-0.879* (-2.58)	-0.285 (-0.80)	-0.375 (-1.25)	-1.664** (-2.99)
Industry21	0.0707 (0.29)	-0.0122 (-0.04)	0.344 (0.97)	0.311 (1.80)	-0.883* (-2.16)
Industry22	-0.202 (-0.76)	-0.341 (-1.03)	0.0517 (0.15)	0.211 (1.17)	-0.682 (-1.82)
Industry23	0.362 (1.42)	0.228 (0.71)	0.362 (0.99)	-0.0156 (-0.09)	-0.152 (-0.44)
Industry24	-0.534 (-1.54)	-0.578 (-1.60)	-0.427 (-0.88)	0.153 (0.68)	-0.384 (-0.82)
Industry25	0.155 (0.66)	-0.00520 (-0.02)	0.363 (1.03)	0.0589 (0.32)	-0.326 (-0.88)
ROE	0.271*** (7.40)				
Remuneration	-0.0744 (-1.41)	-0.00273 (-0.06)	-0.0250 (-0.40)	0.0869** (2.95)	0.0222 (0.19)
Director	-0.0566* (-2.51)	-0.0429* (-2.54)	-0.0296 (-1.31)	-0.0228 (-1.86)	0.0218 (0.60)
Independent director	-0.0387 (-1.12)	-0.0393 (-1.12)	0.0439 (1.14)	0.0401 (1.62)	0.0274 (0.34)
Controlled director	-0.0208 (-0.80)	-0.00101 (-0.04)	-0.0527 (-1.86)	-0.0201 (-1.10)	0.0277 (0.49)
Shares held by director	-0.00243 (-0.90)	-0.000137 (-0.06)	0.00536 (1.77)	0.00249 (1.40)	0.00638 (1.05)
Shares held by major shareholder	-0.00465 (-1.34)	-0.00347 (-0.95)	-0.00118 (-0.28)	0.00206 (0.77)	0.00846 (0.97)

Table 2.14 (cont.)

Duality of CEO and COB	0.0547 (0.54)	0.110 (1.10)	-0.130 (-1.13)	0.125 (1.85)	0.0750 (0.33)
Controlled COB	0.0412 (0.43)	0.0373 (0.38)	0.195 (1.66)	-0.0279 (-0.42)	-0.179 (-0.78)
Controlled CEO	0.122 (1.39)	0.0517 (0.58)	0.281** (2.87)	-0.0361 (-0.55)	-0.160 (-0.75)
Controlled financial manager	-0.0145 (-0.08)	-0.229 (-1.51)	-0.435* (-2.50)	-0.0658 (-0.57)	0.0384 (0.09)
Controlled supervisory director	0.0355 (0.46)	-0.0338 (-0.39)	0.0733 (0.83)	-0.168** (-3.08)	-0.235 (-1.22)
Litigation	0.0241 (0.75)	-0.0201 (-0.44)	-0.0311 (-0.81)	-0.0133 (-0.61)	0.0470 (0.46)
ROA		0.158** (3.13)			
EPS			0.257*** (6.48)		
Debt-asset ratio				0.768*** (17.51)	
Short-term investment					0.800*** (37.78)
Constant	2.687** (3.13)	1.665* (2.02)	-3.289** (-3.28)	-1.563** (-3.10)	-3.704* (-2.37)
<i>N</i>	493	515	477	575	445
<i>R</i> ²	0.2849	0.1869	0.3146	0.4491	0.8221

Table 2.15 Bootstrap of 2010: D&O purchase as proxy variable

This table reports the result of bootstrap of previous OLS regression. Generally, they conclude similar results and D&O insurance purchase is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O purchase	0.167* (2.13)	0.197** (2.79)	0.117 (1.33)	0.0671 (1.19)	0.0366 (0.18)
Capital	-0.0486 (-1.02)	-0.0694 (-1.70)	0.102* (2.31)	-0.0780** (-3.15)	0.242* (2.46)
Industry1	0.229 (0.58)	-0.312 (-0.58)	-0.996 (-1.77)	0.395 (1.20)	-2.363*** (-3.38)
Industry2	-0.00974 (-0.04)	-0.222 (-0.69)	-0.695 (-1.73)	0.0444 (0.21)	-0.459 (-0.80)
Industry3	-0.220 (-0.70)	-0.307 (-0.88)	-0.164 (-0.43)	0.118 (0.54)	-0.469 (-1.12)
Industry4	0.400 (1.31)	0.116 (0.33)	0.341 (0.87)	0.0888 (0.38)	-1.212* (-2.51)
Industry5	0.0602 (0.22)	-0.121 (-0.37)	0.327 (0.85)	-0.0675 (-0.33)	-1.388** (-2.83)
Industry6	-0.271 (-0.65)	-0.647 (-1.55)	-0.378 (-0.93)	-0.0106 (-0.04)	-1.044 (-1.51)
Industry7	-0.182 (-0.25)	-0.147 (-0.15)	0.138 (0.30)	-0.382 (-1.57)	-2.182*** (-4.22)
Industry9	0.230 (0.87)	-0.216 (-0.64)	0.185 (0.51)	-0.114 (-0.56)	-0.969* (-2.27)
Industry11	-1.420*** (-5.27)	-1.186*** (-3.75)	-0.844* (-2.32)	0.0225 (0.12)	0.795* (2.05)
Industry12	0.375 (1.39)	0.116 (0.34)	0.243 (0.65)	0.236 (1.24)	-0.973 (-1.96)
Industry13	0.134 (0.41)	0.000817 (0.00)	-0.00130 (-0.00)	-0.0796 (-0.32)	-1.091 (-1.64)
Industry16	-0.559* (-2.10)	-0.564 (-1.81)	0.174 (0.46)	-0.942*** (-4.96)	-2.283*** (-5.57)

Table 2.15 (cont.)

Industry17	-0.0973 (-0.26)	-0.128 (-0.32)	-0.286 (-0.66)	-0.00156 (-0.01)	-2.123** (-2.91)
Industry18	-0.188 (-0.68)	-0.352 (-1.03)	-0.222 (-0.59)	-0.0840 (-0.39)	-0.769 (-1.76)
Industry19	-0.270 (-0.97)	-0.297 (-0.92)	-0.142 (-0.38)	0.176 (0.89)	-0.561 (-1.18)
Industry20	-0.710* (-2.08)	-0.879* (-2.47)	-0.285 (-0.77)	-0.375 (-1.19)	-1.664** (-2.72)
Industry21	0.0707 (0.27)	-0.0122 (-0.04)	0.344 (0.93)	0.311 (1.74)	-0.883* (-2.12)
Industry22	-0.202 (-0.73)	-0.341 (-1.02)	0.0517 (0.14)	0.211 (1.15)	-0.682 (-1.74)
Industry23	0.362 (1.36)	0.228 (0.71)	0.362 (0.96)	-0.0156 (-0.08)	-0.152 (-0.42)
Industry24	-0.534 (-1.44)	-0.578 (-1.54)	-0.427 (-0.82)	0.153 (0.65)	-0.384 (-0.77)
Industry25	0.155 (0.63)	-0.00520 (-0.02)	0.363 (0.99)	0.0589 (0.31)	-0.326 (-0.85)
ROE	0.271*** (7.47)				
Remuneration	-0.0744 (-1.42)	-0.00273 (-0.06)	-0.0250 (-0.39)	0.0869** (2.92)	0.0222 (0.19)
Director	-0.0566* (-2.48)	-0.0429* (-2.50)	-0.0296 (-1.29)	-0.0228 (-1.80)	0.0218 (0.57)
Independent director	-0.0387 (-1.10)	-0.0393 (-1.13)	0.0439 (1.12)	0.0401 (1.62)	0.0274 (0.33)
Controlled director	-0.0208 (-0.79)	-0.00101 (-0.04)	-0.0527 (-1.82)	-0.0201 (-1.07)	0.0277 (0.48)
Shares held by director	-0.00243 (-0.90)	-0.000137 (-0.05)	0.00536 (1.77)	0.00249 (1.39)	0.00638 (1.03)
Shares held by major shareholder	-0.00465 (-1.35)	-0.00347 (-0.94)	-0.00118 (-0.29)	0.00206 (0.78)	0.00846 (0.93)
Duality of CEO and COB	0.0547 (0.55)	0.110 (1.10)	-0.130 (-1.11)	0.125 (1.79)	0.0750 (0.33)
Controlled COB	0.0412 (0.41)	0.0373 (0.37)	0.195 (1.65)	-0.0279 (-0.43)	-0.179 (-0.77)

Table 2.15 (cont.)

Controlled CEO	0.122 (1.35)	0.0517 (0.59)	0.281** (2.80)	-0.0361 (-0.56)	-0.160 (-0.74)
Controlled financial manager	-0.0145 (-0.08)	-0.229 (-1.42)	-0.435* (-2.44)	-0.0658 (-0.56)	0.0384 (0.09)
Controlled supervisory director	0.0355 (0.45)	-0.0338 (-0.39)	0.0733 (0.82)	-0.168** (-3.13)	-0.235 (-1.19)
Litigation	0.0241 (0.59)	-0.0201 (-0.39)	-0.0311 (-0.57)	-0.0133 (-0.52)	0.0470 (0.42)
ROA		0.158** (3.10)			
EPS			0.257*** (6.37)		
Debt-asset ratio				0.768*** (17.38)	
Short-term investment					0.800*** (37.64)
Constant	2.687** (3.09)	1.665* (2.02)	-3.289** (-3.29)	-1.563** (-3.02)	-3.704* (-2.38)
<i>N</i>	493	515	477	575	445
<i>R</i> ²	0.2849	0.1869	0.3146	0.4491	0.8221
<i>Adj-R</i> ²	0.2284	0.1257	0.2585	0.4122	0.8064

Table 2.16 OLS regression of 2010: D&O coverage as proxy variable

This table contains the result of regression of 2010 where log of D&O coverage is used as the proxy variable of D&O insurance, after fixing industry effect and White's heteroscedasticity correction. Standard deviation of ROE, ROA, EPS, debt-asset ratio and short-term investment are used as dependent variables in respective panels. This is to test how D&O coverage and control variables affect the volatility of returns of firms. Also, ROE and other variables' average values are added as independent variables in respective panels as an underlying measure of central tendency. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0254 (0.44)	0.0935 (1.50)	0.0624 (0.89)	0.0416 (1.01)	0.115 (0.74)
Capital	-0.100 (-1.48)	-0.126* (-2.04)	0.0484 (0.76)	-0.103** (-2.91)	0.238* (2.11)
Industry1	-0.119 (-0.44)	-1.208*** (-3.81)	-1.641*** (-4.20)		-3.377*** (-6.83)
Industry2	-0.00654 (-0.02)	-0.118 (-0.35)	-0.483 (-1.21)	0.0884 (0.39)	-0.204 (-0.18)
Industry3	0.255 (0.80)	-0.0346 (-0.10)	0.00102 (0.00)	-0.0577 (-0.22)	-0.230 (-0.38)
Industry4	0.219 (0.71)	0.243 (0.66)	-0.291 (-0.74)	0.339 (1.26)	0.246 (0.45)
Industry5	-0.111 (-0.36)	-0.168 (-0.48)	0.381 (0.85)	-0.0988 (-0.41)	-0.907 (-1.16)
Industry6	-0.0195 (-0.04)	-0.620 (-1.37)	-0.476 (-1.11)	0.0970 (0.22)	-3.153*** (-4.82)
Industry7	-1.529*** (-5.08)	-1.959*** (-4.90)		-0.701** (-3.03)	
Industry9	0.219 (0.76)	-0.243 (-0.63)	0.0120 (0.03)	-0.334 (-1.35)	-1.393* (-2.24)
Industry11	-1.399*** (-5.23)	-1.153*** (-3.81)	-0.776* (-2.02)	-0.0416 (-0.21)	0.943 (1.88)
Industry12	0.642 (1.91)	0.386 (1.08)	0.336 (0.81)	0.153 (0.59)	-1.117 (-1.23)

Table 2.16 (cont.)

Industry13	0.365 (0.85)	0.111 (0.25)	-0.0364 (-0.06)	0.0918 (0.35)	0.0836 (0.14)
Industry17	0.319 (1.01)	0.124 (0.33)	0.304 (0.78)	0.237 (0.72)	-2.522* (-2.39)
Industry18	0.227 (0.69)	0.0549 (0.13)	0.0106 (0.02)	0.0908 (0.42)	-0.123 (-0.20)
Industry19	-0.207 (-0.67)	-0.251 (-0.72)	-0.0185 (-0.05)	0.280 (1.32)	-0.606 (-0.99)
Industry20	-0.0413 (-0.15)	-0.355 (-1.16)	0.00221 (0.01)	0.126 (0.53)	-0.890 (-1.54)
Industry21	-0.0233 (-0.09)	0.0125 (0.04)	0.372 (0.99)	0.265 (1.43)	-0.667 (-1.50)
Industry22	-0.256 (-0.90)	-0.433 (-1.30)	-0.0364 (-0.10)	0.160 (0.83)	-0.694 (-1.72)
Industry23	0.298 (1.14)	0.223 (0.71)	0.481 (1.21)	-0.0330 (-0.17)	-0.269 (-0.71)
Industry24	-0.441 (-1.31)	-0.371 (-1.06)	-0.298 (-0.61)	0.189 (0.79)	-0.400 (-0.82)
Industry25	0.0812 (0.32)	-0.0302 (-0.10)	0.405 (1.07)	0.0579 (0.30)	-0.258 (-0.61)
ROE	0.196*** (4.57)				
Remuneration	-0.0602 (-0.88)	-0.0464 (-0.69)	-0.0266 (-0.30)	0.113** (2.86)	-0.0609 (-0.42)
Director	-0.0198 (-0.75)	-0.0353 (-1.41)	-0.0143 (-0.46)	-0.0429* (-2.57)	0.00728 (0.12)
Independent director	0.00348 (0.08)	-0.0211 (-0.46)	0.0424 (0.79)	0.0358 (1.19)	0.106 (1.01)
Controlled director	0.0180 (0.43)	0.0404 (0.95)	-0.000861 (-0.02)	-0.00199 (-0.07)	0.0978 (0.92)
Shares held by director	-0.00187 (-0.51)	0.00138 (0.38)	0.00701 (1.53)	0.00151 (0.65)	0.00493 (0.55)
Shares held by major shareholder	-0.00872 (-1.81)	-0.00607 (-1.29)	-0.00572 (-0.84)	0.000636 (0.21)	0.0112 (0.87)
Duality of CEO and COB	0.262 (1.76)	0.235 (1.50)	-0.0861 (-0.44)	0.168 (1.71)	-0.423 (-1.32)

Table 2.16 (cont.)

Controlled COB	0.0572 (0.48)	-0.0363 (-0.28)	0.152 (0.94)	0.0147 (0.19)	-0.447 (-1.45)
Controlled CEO	-0.0656 (-0.56)	-0.123 (-0.92)	0.158 (1.11)	-0.174 (-1.78)	0.115 (0.40)
Controlled financial manager	0.169 (0.88)	0.0339 (0.16)	-0.360 (-1.88)	-0.0328 (-0.17)	-0.354 (-0.52)
Controlled supervisory director	0.0465 (0.47)	-0.0359 (-0.30)	0.147 (1.12)	-0.159* (-2.25)	-0.0500 (-0.20)
Litigation	0.0214 (0.65)	-0.0185 (-0.35)	-0.0430 (-1.31)	-0.00411 (-0.16)	0.0376 (0.33)
ROA		0.0535 (0.94)			
EPS			0.271*** (5.34)		
Debt-asset ratio				0.805*** (13.69)	
Short-term investment					0.799*** (27.18)
Constant	2.967* (2.55)	2.103 (1.92)	-3.316* (-2.26)	-2.059** (-2.62)	-4.381 (-1.42)
<i>N</i>	266	283	260	319	248
<i>R</i> ²	0.2562	0.2102	0.2866	0.5084	0.8109

Table 2.17 Bootstrap of 2010: D&O coverage as proxy variable

This table reports the result of bootstrap of previous OLS regression. Generally, they conclude similar results and D&O insurance coverage is not significant in all regressions. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Standard deviation of ROE	(2) Standard deviation of ROA	(3) Standard deviation of EPS	(4) Standard deviation of debt-asset ratio	(5) Standard deviation of short-term investment
D&O coverage	0.0254 (0.43)	0.0935 (1.51)	0.0624 (0.89)	0.0416 (0.99)	0.115 (0.71)
Capital	-0.100 (-1.40)	-0.126* (-2.03)	0.0484 (0.76)	-0.103** (-2.93)	0.238* (2.09)
Industry1	-0.119 (-0.42)	-1.208*** (-3.69)	-1.641*** (-3.93)		-3.377*** (-6.60)
Industry2	-0.00654 (-0.02)	-0.118 (-0.33)	-0.483 (-1.11)	0.0884 (0.38)	-0.204 (-0.16)
Industry3	0.255 (0.75)	-0.0346 (-0.10)	0.00102 (0.00)	-0.0577 (-0.23)	-0.230 (-0.36)
Industry4	0.219 (0.69)	0.243 (0.66)	-0.291 (-0.69)	0.339 (1.06)	0.246 (0.43)
Industry5	-0.111 (-0.35)	-0.168 (-0.48)	0.381 (0.83)	-0.0988 (-0.40)	-0.907 (-1.15)
Industry6	-0.0195 (-0.03)	-0.620 (-1.26)	-0.476 (-0.99)	0.0970 (0.19)	-3.153*** (-4.48)
Industry7	-1.529*** (-4.65)	-1.959*** (-4.69)		-0.701** (-2.84)	
Industry9	0.219 (0.73)	-0.243 (-0.62)	0.0120 (0.03)	-0.334 (-1.39)	-1.393* (-2.05)
Industry11	-1.399*** (-5.08)	-1.153*** (-3.72)	-0.776 (-1.88)	-0.0416 (-0.21)	0.943 (1.89)
Industry12	0.642 (1.83)	0.386 (1.07)	0.336 (0.78)	0.153 (0.59)	-1.117 (-1.16)
Industry13	0.365 (0.81)	0.111 (0.24)	-0.0364 (-0.06)	0.0918 (0.33)	0.0836 (0.13)
Industry17	0.319 (0.91)	0.124 (0.31)	0.304 (0.70)	0.237 (0.63)	-2.522* (-2.16)

Table 2.17 (cont.)

Industry18	0.227 (0.64)	0.0549 (0.13)	0.0106 (0.02)	0.0908 (0.41)	-0.123 (-0.19)
Industry19	-0.207 (-0.66)	-0.251 (-0.73)	-0.0185 (-0.04)	0.280 (1.32)	-0.606 (-0.95)
Industry20	-0.0413 (-0.14)	-0.355 (-1.12)	0.00221 (0.01)	0.126 (0.53)	-0.890 (-1.47)
Industry21	-0.0233 (-0.09)	0.0125 (0.04)	0.372 (0.94)	0.265 (1.42)	-0.667 (-1.49)
Industry22	-0.256 (-0.90)	-0.433 (-1.32)	-0.0364 (-0.10)	0.160 (0.84)	-0.694 (-1.67)
Industry23	0.298 (1.12)	0.223 (0.72)	0.481 (1.17)	-0.0330 (-0.17)	-0.269 (-0.70)
Industry24	-0.441 (-1.19)	-0.371 (-0.99)	-0.298 (-0.57)	0.189 (0.75)	-0.400 (-0.74)
Industry25	0.0812 (0.31)	-0.0302 (-0.10)	0.405 (1.02)	0.0579 (0.30)	-0.258 (-0.57)
ROE	0.196 ^{***} (4.47)				
Remuneration	-0.0602 (-0.85)	-0.0464 (-0.70)	-0.0266 (-0.30)	0.113 ^{**} (2.84)	-0.0609 (-0.41)
Director	-0.0198 (-0.72)	-0.0353 (-1.37)	-0.0143 (-0.43)	-0.0429 [*] (-2.53)	0.00728 (0.11)
Independent director	0.00348 (0.08)	-0.0211 (-0.43)	0.0424 (0.78)	0.0358 (1.17)	0.106 (0.95)
Controlled director	0.0180 (0.42)	0.0404 (0.95)	-0.000861 (-0.02)	-0.00199 (-0.07)	0.0978 (0.89)
Shares held by director	-0.00187 (-0.49)	0.00138 (0.37)	0.00701 (1.50)	0.00151 (0.65)	0.00493 (0.51)
Shares held by major shareholder	-0.00872 (-1.75)	-0.00607 (-1.25)	-0.00572 (-0.82)	0.000636 (0.20)	0.0112 (0.81)
Duality of CEO and COB	0.262 (1.75)	0.235 (1.56)	-0.0861 (-0.43)	0.168 (1.70)	-0.423 (-1.30)
Controlled COB	0.0572 (0.47)	-0.0363 (-0.27)	0.152 (0.91)	0.0147 (0.19)	-0.447 (-1.52)
Controlled CEO	-0.0656 (-0.53)	-0.123 (-0.95)	0.158 (1.11)	-0.174 (-1.76)	0.115 (0.38)

Table 2.17 (cont.)

Controlled financial manager	0.169 (0.81)	0.0339 (0.14)	-0.360 (-1.54)	-0.0328 (-0.16)	-0.354 (-0.45)
Controlled supervisory director	0.0465 (0.47)	-0.0359 (-0.30)	0.147 (1.07)	-0.159* (-2.22)	-0.0500 (-0.19)
Litigation	0.0214 (0.50)	-0.0185 (-0.30)	-0.0430 (-0.94)	-0.00411 (-0.14)	0.0376 (0.28)
ROA		0.0535 (0.97)			
EPS			0.271*** (5.25)		
Debt-asset ratio				0.805*** (13.02)	
Short-term investment					0.799*** (26.30)
Constant	2.967* (2.42)	2.103 (1.93)	-3.316* (-2.21)	-2.059** (-2.59)	-4.381 (-1.37)
<i>N</i>	266	283	260	319	248
<i>R</i> ²	0.2562	0.2102	0.2866	0.5084	0.8109
<i>Adj-R</i> ²	0.1430	0.0983	0.1788	0.4495	0.7807

Table 2.18 Table of variables (2)

	Hypothesis	Variables	Definition	
Insurers	Insurance	<i>LN_s_coverage</i>	The total coverage companies offered	
	Capital	<i>LNcapital2</i>	Total capital of the insurers	
	Profiting ability		<i>ROE2</i>	Return on equity of insurers
			<i>investment</i>	Investment income of insurers
	Potential risk		<i>DAratio2</i>	Debt-asset ratio of insurers
			<i>retention</i>	The coverage that insurers keep by themselves instead of ceding to reinsurers
Reputation		<i>marketshare</i>	Market share of specific insurer	
		<i>DOmarketshare</i>	D&O insurance market share of specific insurer	
Insured firms	Business structure	<i>LNcapital</i>	Total capital of the companies	
	Financial performance		<i>ROE</i>	Return on equity of firms
			<i>Sdirector</i>	The percentage of shares held by directors (%)
	Corporate governance		<i>SMH</i>	The percentage of shares held by major shareholders (%)
			<i>LNRemu</i>	The total of compensation package offered to directors
			<i>Director</i>	The total number of directors
			<i>IDirector</i>	The total number of independent directors
		<i>Ctrldirector</i>	Controlled directors. This indicates the number of directors nominated or controlled by the largest controlling group of the company, such as family, relatives, or parent company.	
	Litigation risk		<i>DAratio</i>	Debt-asset ratio of firms
			<i>StdDevROA</i>	Standard deviation of ROA

Table 2.19 Descriptive analysis (1)

This table presents the descriptive statistics of proxy variables of the qualities of insurers and insured firms.

Variables	Mean	stdev
Log of capital	18.15714	3.849586
ROE	1.140339	13.73671
Log of remuneration	13.48168	6.504939
Director	9.507853	2.768724
Independent director	1.421667	1.339524
Controlled director	1.43093	1.491975
Shares held by directors	22.21868	15.3792
Shares held by major shareholders	18.94886	11.19971
Debt-asset ratio	139.6203	398.9496
Standard deviation of ROA	1.546662	2.325674
Log of D&O insurance coverage	18.85111	1.034086
Log of capital	23.21419	1.174927
Debt-asset ratio	74.76789	5.716327
ROE	0.650141	2.96838
Return on investment	2.068907	1.756284
Retention part of insurers	99.50513	20.36973
Total market share	4.817382	7.578623
D&O insurance market share	0.20853	0.117149

Table 2.20 Descriptive analysis (2)

This table presents the qualities of individual D&O insurers. Currently, there are sixteen major insurers providing D&O insurance. Group 17 represents the D&O insurance carriers who do not belong to the previous 16 major insurers. Every insurer is coded from 1 to 16. The second column “N” represents the number of D&O insurance transactions that the insurer has. Thus, insurer number 1 has 901 out of 2485 D&O insurance transactions form 2008-2010.

Insurer	N	Log of D&O insurance coverage		Log of capital		Return on investment		Retention part of insurers	
		mean	Std.	mean	Std.	mean	Std.	mean	Std.
1	901	18.77	1.04	23.43	0.08	2.04	0.66	112.96	5.92
2	484	18.72	1.07	24.87	0.04	4.22	0.35	86.34	2.37
3	387	19.24	0.87	21.93	0.23	1.15	0.34	115.29	29.64
4	311	18.88	1.31	21.18	0.16	0.45	0.35	69.95	2.18
5	58	19.02	1.79	23.37	0.06	0.37	0.10	96.84	5.56
6	102	18.62	0.94	23.77	0.04	1.22	0.84	88.24	7.31
7	89	18.43	0.74	23.85	0.05	0.82	2.10	93.85	5.82
8	20	19.30	0.73	23.12	0.07	0.52	1.52	89.33	4.32
9	19	19.26	0.81	23.12	0.02	1.44	0.36	95.91	4.83
10	24	18.67	0.56	23.78	0.09	5.68	2.14	93.97	5.24
11	28	17.89	2.31	23.37	0.06	2.77	1.03	89.42	0.84
12	13	18.69	1.11	23.41	0.03	2.19	0.64	92.27	4.71
13	16	18.44	1.15	23.36	0.13	5.91	10.27	92.35	7.71
14	14	17.64	1.22	23.28	0.08	1.21	0.23	103.07	8.65
15	11	18.18	0.60	23.25	0.07	3.87	6.66	95.03	5.57
16	3	19	0	21.47	0.21	2.77	2.83	112.16	6.84
17	5	17	2.12	0	0	0	0	0	0

Table 2.20 (cont.)

Insurer	ROE		Debt-asset ratio		Total market share of insurers		D&O insurance market share	
	mean	Std.	mean	Std.	mean	Std.	mean	Std.
1	-1.59	3.24	77.66	2.27	0.82	3.53	0.34	0.05
2	3.38	0.89	66.46	2.28	16.98	7.25	0.18	0.03
3	0.24	0.89	77.21	2.74	1.20	0.37	0.19	0
4	2.21	0.99	73.14	4.55	0.39	0.36	0.13	0
5	-0.62	1.82	67.75	2.98	2.55	3.81	0.07	0.01
6	2.62	1.16	82.06	2.33	10.13	3.07	0.04	0.01
7	0.78	0.55	81.69	1.91	6.11	4.28	0.02	0
8	0.70	1.92	80.84	0.56	3.03	3.35	0.01	0
9	1.11	0.46	75.55	0.68	3.12	0.47	0.01	0
10	4.80	1.90	75.20	3.98	8.44	3.31	0.01	0
11	3.22	0.75	72.02	0.29	5.57	2.17	0.01	0
12	2.29	1.13	71.37	2.04	4.82	1.92	0	0
13	4.62	2.49	65.01	5.57	3.22	1.52	0	0
14	-2.76	1.43	87.83	1.33	3.75	4.79	0	0
15	3.23	2.63	70.38	3.52	3.52	2.02	0	0
16	-3.62	4.16	83.64	1.12	-1.86	5.05	0	0
17	0	0	0	0	0	0	0	0

Table 2.21 The summarized result of canonical analysis

This table contains the final result of the canonical analysis. The Wilks L. of both canonical variables are significant at 5% level. An asterisk denotes statistical significance at the 5% level.

X (Insured firms)	x_1	x_2	Y (Insurers)	η_1	η_2
Log of capital	-.92265	.31435	Log of D&O coverage	-.06914	.87945
ROE	.02218	-.07046	Log of capital	-.01038	-.05867
Log of remuneration	.66596	.51005	Debt-asset ratio	.33814	-.06160
Director	.00143	.23929	ROE	-.86634	.09405
Independent director	.02307	-.31695	Return on investment	-.23534	.04553
Controlled director	.01442	-.13561	Retention	.37841	-.08772
Shares held by directors	-.01242	-.26077	Total market share	-.39758	.12962
Shares held by major shareholders	.02268	-.04345	D&O insurance market share	.26717	-.36359
Debt-asset ratio	.06378	.36303			
Standard deviation of ROA	.10476	-.27135			
Proportion of variance explained by opposite canonical variable	4.96822	0.37423	Proportion of variance explained by its own canonical variable	16.22262	11.85339
Cumulative proportion of variance explained by opposite canonical variable	4.96822	5.34245	Cumulative proportion of variance explained by its own canonical variable	16.22262	28.07601
Proportion of variance explained by its own canonical variable	13.11728	8.15357	Proportion of variance explained by opposite canonical variable	6.14438	0.54404
Cumulative proportion of variance explained by its own canonical variable	13.11728	21.27084	Cumulative proportion of variance explained by opposite canonical variable	6.14438	6.68842
Wilks L.	0.57745*	0.92951*			
Eigenvalue	0.60967	0.04811			
Percentage	89.12897	7.03262			
Cumulative percentage	89.12897	96.1616			
Canonical correlation	0.61543	0.21424			
Squared correlation	0.37875	0.0459			

Table 2.22 Pearson correlation analysis

Note: This table contains the result of Pearson correlation analysis. This tests the correlation between the qualities of insurers and the insured firms and thus to figure out if there is any tendency in D&O insurance transactions. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Log of D&O coverage	Log of capital of insurer	Debt-asset ratio of insurer	ROE of insurer	Return on investment	Retention	Total market share	D&O insurance market share	Log of capital of insured
Log of D&O coverage	1	-.036	.060**	-.044*	-.062**	.072**	-.064**	.037	.102**
		.072	.003	.029	.002	.000	.001	.066	.000
Log of capital of insurers	-.036	1	.139**	.091**	.489**	.138**	.494**	.158**	-.002
		.072	.000	.000	.000	.000	.000	.000	.926
Debt-asset ratio of insurers	.060**	.139**	1	-.529**	-.443**	.371**	-.539**	.217**	-.193**
		.003	.000	.000	.000	.000	.000	.000	.000
ROE of insurers	-.044*	.091**	-.529**	1	.405**	-.534**	.526**	-.598**	.498**
		.029	.000	.000	.000	.000	.000	.000	.000
Return on investment	-.062**	.489**	-.443**	.405**	1	.001	.612**	.031	.128**
		.002	.000	.000	.000	.971	.000	.120	.000
Retention	.072**	.138**	.371**	-.534**	.001	1	-.251**	.489**	-.227**
		.000	.000	.000	.971	.000	.000	.000	.000
Total market share	-.064**	.494**	-.539**	.526**	.612**	-.251**	1	-.280**	.223**
		.001	.000	.000	.000	.000	.000	.000	.000
D&O insurance market share	.037	.158**	.217**	-.598**	.031	.489**	-.280**	1	-.175**
		.066	.000	.000	.120	.000	.000	.000	.000
Log of capital of insured firms	.102**	-.002	-.193**	.498**	.128**	-.227**	.223**	-.175**	1
		.000	.926	.000	.000	.000	.000	.000	.000

Table 2.22 (cont.)

	ROE of insured	Log of remuneration of insured	Director	Independent director	Controlled director	Shares held by directors	Shares held by major shareholders	Debt-asset ratio of insured	Standard deviation of ROA of insured
Log of D&O coverage	-.017	.062**	.060**	-.045*	-.032	-.066**	-.029	.077**	-.045*
	.389	.002	.003	.024	.114	.001	.150	.000	.026
Log of capital of insurers	.013	-.005	-.007	-.028	.031	.008	-.010	-.025	.015
	.526	.815	.732	.156	.125	.704	.625	.213	.448
Debt-asset ratio of insurers	.005	.126**	.010	.007	.011	-.021	.029	.013	.043*
	.786	.000	.629	.740	.578	.303	.146	.518	.033
ROE of insurers	-.005	-.339**	-.003	-.021	-.017	.021	-.002	-.030	-.061**
	.797	.000	.866	.291	.391	.299	.925	.137	.003
Return on investment	.006	-.089**	-.028	-.043*	.005	.010	-.006	-.026	-.022
	.755	.000	.160	.032	.803	.618	.762	.203	.264
Retention	-.005	.134**	-.026	-.024	.037	-.016	.000	.013	.022
	.810	.000	.197	.232	.062	.433	.985	.532	.265
Total market share	-.007	-.139**	-.022	-.066**	.038	.014	-.013	-.045*	-.062**
	.722	.000	.275	.001	.060	.489	.524	.026	.002
D&O insurance market share	.003	.060**	-.006	.037	.014	-.013	-.033	-.010	.048*
	.884	.003	.771	.067	.489	.530	.104	.604	.017
Log of capital of insured firms	.024	-.460**	.227**	.019	-.028	-.067**	.008	.153**	-.164**
	.226	.000	.000	.334	.158	.001	.690	.000	.000

Table 2.22 (cont.)

	Log of D&O coverage	Log of capital of insurer	Debt-asset ratio of insurer	ROE of insurer	Return on investment	Retention	Total market share	D&O insurance market share	Log of capital of insured
ROE of the insured	-.017	.013	.005	-.005	.006	-.005	-.007	.003	.024
	.389	.526	.786	.797	.755	.810	.722	.884	.226
Log of remuneration	.062**	-.005	.126**	-.339**	-.089**	.134**	-.139**	.060**	-.460**
	.002	.815	.000	.000	.000	.000	.000	.003	.000
Director	.060**	-.007	.010	-.003	-.028	-.026	-.022	-.006	.227**
	.003	.732	.629	.866	.160	.197	.275	.771	.000
Independent director	-.045*	-.028	.007	-.021	-.043*	-.024	-.066**	.037	.019
	.024	.156	.740	.291	.032	.232	.001	.067	.334
Controlled director	-.032	.031	.011	-.017	.005	.037	.038	.014	-.028
	.114	.125	.578	.391	.803	.062	.060	.489	.158
Shares held by directors	-.066**	.008	-.021	.021	.010	-.016	.014	-.013	-.067**
	.001	.704	.303	.299	.618	.433	.489	.530	.001
Shares held by major shareholders	-.029	-.010	.029	-.002	-.006	.000	-.013	-.033	.008
	.150	.625	.146	.925	.762	.985	.524	.104	.690
Debt-asset ratio of the insured	.077**	-.025	.013	-.030	-.026	.013	-.045*	-.010	.153**
	.000	.213	.518	.137	.203	.532	.026	.604	.000
Standard deviation of ROA of the insured	-.045*	.015	.043*	-.061**	-.022	.022	-.062**	.048*	-.164**
	.026	.448	.033	.003	.264	.265	.002	.017	.000

Table 2.22 (cont.)

	ROE of insured	Log of remuneration of insured	Director	Independent director	Controlled director	Shares held by directors	Shares held by major shareholders	Debt-asset ratio of insured	Standard deviation of ROA of insured
ROE of the insured	1	.019	.012	.014	.033	-.029	.012	-.204**	.222**
		.337	.539	.474	.099	.149	.547	.000	.000
Log of remuneration	.019	1	.013	.019	.031	-.059**	-.060**	-.033	.040*
	.337		.507	.342	.119	.003	.003	.104	.047
Director	.012	.013	1	.173**	.085**	.113**	-.035	.226**	-.123**
	.539	.507		.000	.000	.000	.079	.000	.000
Independent director	.014	.019	.173**	1	-.125**	-.012	.003	.100**	-.018
	.474	.342	.000		.000	.546	.880	.000	.381
Controlled director	.033	.031	.085**	-.125**	1	-.174**	-.037	-.126**	-.072**
	.099	.119	.000	.000		.000	.065	.000	.000
Shares held by directors	-.029	-.059**	.113**	-.012	-.174**	1	-.141**	.027	.013
	.149	.003	.000	.546	.000		.000	.182	.516
Shares held by major shareholders	.012	-.060**	-.035	.003	-.037	-.141**	1	.046*	.062**
	.547	.003	.079	.880	.065	.000		.021	.002
Debt-asset ratio of the insured	-.204**	-.033	.226**	.100**	-.126**	.027	.046*	1	-.004
	.000	.104	.000	.000	.000	.182	.021		.849
Standard deviation of ROA of the insured	.222**	.040*	-.123**	-.018	-.072**	.013	.062**	-.004	1
	.000	.047	.000	.381	.000	.516	.002	.849	

Table 2.23 The result of stepwise regressions

This table reports the result of stepwise regressions after White's heteroscedasticity correction. The dependent variables are the proxy variables of the qualities of insurers. The independent variables are the proxy variables of the qualities of insured firms. The latter is selected by stepwise regressions until no more significant variables can be found. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln_s_coverage	daratio2	Domarket -share	investment	marketshare	retention	roe2
lncapital	0.0428*** (6.79)	-0.351*** (-9.88)	-0.00527*** (-9.50)	0.0643*** (7.29)	0.481*** (11.85)	-1.258*** (-13.14)	0.371*** (26.29)
lnremu	0.0226*** (5.88)						-0.0516*** (-7.74)
daratio	0.000171*** (4.23)				-0.00123** (-2.98)	0.00252* (2.80)	-0.000646* (-4.15)
idirector	-0.0523** (-3.03)		0.00350* (1.99)		-0.314** (-2.86)		
sd	-0.00416** (-2.77)						0.0116*** (3.49)
Ctrl-director	-0.0312* (-2.03)						
director		0.134** (3.02)		-0.0382* (-2.41)	-0.146* (-2.46)		-0.106*** (-5.21)
Constant	17.92*** (109.43)	79.71*** (119.22)	0.299*** (26.94)	1.261*** (6.77)	-1.911* (-2.34)	121.8*** (64.16)	-4.546*** (-13.09)
<i>N</i>	2485	2485	2485	2485	2485	2485	2485
<i>R</i> ²	0.0360	0.0402	0.0321	0.0199	0.0628	0.0538	0.2842

Table 2.24 The result of panel data

This table reports the result of panel data test. This test considers the variables in previous stepwise OLS regression. F-test is conducted to test if fixed-effects regression has better effect than OLS regression, and Breusch and Pagan Lagrangian multiplier test is carried out to test if random-effects GLS regression has better effect than OLS regression. Then, Hausman test is used to test which appropriate between fixed-effects regression and random-effects GLS regression. Generally, this test demonstrates similar result with the previous test.

	(1) ln_s_covera ge	(2) daratio2	(3) Domarket- share	(4) Invest- ment	(5) marketshare	(6) retention	(7) roe2
Incapital	-0.000115 (-0.02)	-0.422*** (-16.75)	-0.00476*** (-10.70)	0.0732*** (8.54)	0.555*** (14.25)	-1.252*** (-13.97)	0.400*** (21.10)
lnremu	-0.000314 (-0.11)						-0.0678*** (-5.77)
daratio	0.0000168 (0.35)				-0.000812 (-1.53)	0.00148 (1.38)	-0.000469* (-2.47)
idirector	-0.0210 (-1.46)		0.00614*** (3.73)		-0.699*** (-4.24)		
sd	-0.00129 (-1.17)	-0.00893 (-1.17)					0.00313 (0.70)
ctrldirector	0.0101 (0.89)						
director		0.0689 (1.59)		-0.0188 (-1.37)	-0.0926 (-1.26)		-0.0938*** (-3.63)
Constant	18.79*** (155.78)	81.56*** (135.80)	0.293*** (32.65)	0.990*** (5.30)	-3.123*** (-3.51)	122.0*** (72.35)	-4.843*** (-9.90)
<i>N</i>	2003	2003	2003	2003	2003	2003	2003
<i>F-test</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>B-P test</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>Hausman test</i>	0.0000 (fixed -effects)	0.8901 (random -effects)	0.6493 (random -effects)	0.7096 (random -effects)	0.0118 (fixed -effect)	0.3435 (random -effects)	0.0004 (fixed -effect)
<i>sigma_u</i>	1.0433947	5.256645	.08355662	.8955631	5.846477	11.29233	1.79960
<i>sigma_e</i>	.54241282	4.017212	.0713723	1.397048	5.9764545	14.56216	2.14631
<i>rho</i>	.7872478	.6313027	.57816112	.2912482	.48900765	.3755204	.412808

Table 2.25 Number of cases in each cluster

This table reports the result of cluster analysis. The proxy variables of qualities of insurers and the insured firms are used as criteria for attempting to classify 2,485 D&O insurance contracts. There are 86 observations in cluster 1, 2,393 observations in cluster 2, and 6 observations in cluster 3.

Cluster	N
1	86
2	2393
3	6
Valid observations	2485
Missing observation	0

Table 2.26 Final cluster centers of cluster analysis

This table reports the detailed result of cluster analysis. All D&O insurance contracts are classified as three clusters, demonstrating the characteristics of insurers and insured firms. Generally, their characteristics are consistent. Insured firms with poor qualities intend to contract with insurers whose qualities are not very good, and vice versa. The homogeneity of market is thus implied.

	Characteristics	Cluster 1	Cluster 2	Cluster 3
Insurers	Log of capital	Low	Medium	High
	Return on investment	Low	High	Medium
	Retention	Medium	Low	High
	ROE	High	Medium	Low
	Debt-asset ratio	Low	Medium	High
	Log of D&O insurance coverage	Medium	Low	High
	Total market share	Medium	Large	Small
	D&O insurance market share	Small	Medium	Large
The insured	Log of capital	High	Medium	Low
	ROE	High	Medium	Low
	Director	High	Low	Medium
	Independent director	High	Low	Medium
	Controlled director	Low	High	Medium
	Shares held by directors	Low	Medium	High
	Shares held by major shareholders	Medium	Low	High
	Debt-asset ratio	Medium	Low	High
	Standard deviation of ROA	Low	Medium	High
	Log of remuneration	Low	Medium	High

Table 2.27 Result of multinomial logistic regression

This table contains the result of the multinomial logistic regression, using the second group as the base outcome to be compared. *t* statistics is reported in parentheses.

	(1)	(2)	(3)
Log of D&O insurance coverage	-0.527 (-0.00)		-7.018 (-0.00)
Log of capital of insurers	0.144 (0.00)		2.134 (0.00)
Debt-asset ratio of insurers	-0.538 (-0.00)		-1.560 (-0.00)
ROE of insurers	0.200 (0.00)		0.446 (0.00)
Return on investment of insurers	0.453 (0.00)		-0.549 (-0.00)
Retention of insurers	-0.212 (-0.00)	(base outcome)	-0.185 (-0.00)
Total market share of insurers	-0.452 (-0.00)		-1.157 (-0.00)
D&O insurance market share of insurers	56.10 (0.00)		88.45 (0.00)
Log of capital of insured firms	-2.643 (-0.01)		-3.048 (-0.00)
ROE of insured firms	0.277 (0.00)		0.242 (0.00)
Log of remuneration of insured firms	-0.345 (-0.00)		1.100 (0.00)

Table 2.27 (cont.)

Director of insured firms	0.693 (0.00)	-0.00196 (-0.00)
Independent director of insured firms	-3.613 (-0.00)	-4.456 (-0.00)
Controlled director of insured firms	4.599 (0.01)	9.022 (0.00)
Shares held by directors of insured firms	-0.307 (-0.00)	-0.358 (-0.00)
Shares held by major shareholders of insured firms	-0.0713 (-0.00)	0.143 (0.00)
Debt-asset ratio of insured firms	0.101 (0.02)	0.113 (0.02)
Standard deviation of ROA of insured firms	-1.727 (-0.00)	-1.735 (-0.00)
Constant	37.58 (0.00)	131.7 (0.00)

$N = 2485$

$LR\chi^2 = 831.42$

$Goodness-of-Fit = 1.000$

$Prob > \chi^2 = 0.0000$

$PseudoR^2 = 1.0000$

Table 2.28 Taiwan Stock Exchange Corporation (TWSE) sector group

TWSE Code	TWSE sector group	high technology industry	Code 2 - Label of individual dummy variable
1	Cement Industry	N	Industry1
2	Food Industry	N	Industry2
3	Plastic Industry	N	Industry3
4	Textile Industry	N	Industry4
5	Electric Machinery Industry	N	Industry5
6	Electrical and Cable Industry	N	Industry6
8	Glass and Ceramic Industry	N	Industry7
9	Paper and Pulp Industry	N	Industry8
10	Iron and Steel Industry	N	Industry9
11	Rubber Industry	N	Industry10
12	Automobile Industry	N	Industry11
14	Building Material and Construction Industry	N	Industry12
15	Shipping and Transportation Industry	N	Industry13
16	Tourism Industry	N	Industry14
17	Financial and Insurance Industry	N	Industry15
18	Trading and Consumers' Goods Industry	N	Industry16
19	Other Industry	N	Industry17
21	Chemical Industry	N	Industry18
22	Biotechnology and Medical Care Industry	N	Industry19
23	Composite Oil, Gas and Electricity Industry	N	Industry20
24	Semiconductor Industry	Y	Industry21
25	Computer and Peripheral Equipment Industry	Y	Industry22
26	Optoelectronic Industry	Y	Industry23
27	Communications and Internet Industry	Y	Industry24
28	Electronic Parts/Components Industry	Y	Industry25
29	Electronic Products Distribution Industry	N	Industry26
30	Information Service Industry	N	Industry27
31	Other Electronic Industry	N	-

Table 2.29 Table of variables (3)

	Hypothesis	Variables	Definition	Expected sign
Dependent variables		<i>Coverage</i>	The total coverage companies purchased.	N/A
	-	<i>Purchase</i>	The dummy variable equals 1 if companies purchase D&O insurance and 0 otherwise.	N/A
Independent variables		<i>Log of capital</i>	Total capital of companies	+/-
	Business structure	<i>Industry of firms</i>	The dummy variable equals 1 if companies are a high technology industry and 0 otherwise. The result of fixing effect of all industries will also be compared.	+
	Financial performance	<i>ROE</i>	Return on equity of companies	-
		<i>Log of remuneration</i>	The total compensation package offered to directors	+/-
		<i>Directors</i>	The total number of directors	+/-
	Corporate governance	<i>Independent director</i>	The total number of independent directors	+/-
		<i>Shares held by director</i>	The percentage of shares held by directors (%)	+
		<i>Shares held by major shareholder</i>	The percentage of shares held by major shareholders (%)	+

Table 2.29 (cont.)

	<i>Controlled director</i>	Controlled director indicates the number of directors nominated or controlled by the largest controlling group of the company, such as family, relatives, or parent company.	+
	<i>Duality of CEO and COB</i>	The dummy variable equals 1 if the chairman of the board of directors is identical to CEO and 0 otherwise.	+
	<i>Internal risk</i>	If any chairman of the board, CEO, financial manager and supervisory director is appointed by a parent or controlling group, the value will be 1. The total ranges from 0 to 4. The result of fixing effect of four separate situations will also be compared.	+
	<i>Debt-asset ratio</i>	Debt-asset ratio of firms	-
	<i>Shares of foreign natural person</i>	The percentage of shares of foreign natural person	+
Signal hypothesis	<i>Shares of foreign juristic person</i>	The percentage of shares of foreign juristic person	+
	<i>Shares of foreign financial juristic person</i>	The percentage of shares of foreign juristic financial person	+
Litigation risk	<i>Prior significant litigation</i>	The number of disclosed significant litigations	+

Table 2.30 Descriptive analysis of D&O insurance purchase in Taiwan

This table contains the descriptive statistics of variables, comparing the firms with D&O insurance and the firms without D&O insurance from 2008-2010. In general, firms with D&O insurance have larger capital, more remuneration, more directors, and independent directors, lesser shares held by directors and major shareholders, lesser controlled directors, lesser duality of CEO and COB, lesser internal risk and lesser debt-asset ratio. This implies that firms with D&O insurance generally have better qualities of corporate governance. Also, firms with D&O insurance have more shares held by foreign juristic persons and financial persons. This implies that foreign investors emphasize D&O insurance and D&O insurance can convey a positive signal to attract investments.

Variables	2008				2009				2010			
	Insured		Uninsured		Insured		Uninsured		Insured		Uninsured	
	Mean	Stdv	Mea	Stde	Mea	Stde	Mea	Stde	Mea	Stde	Mea	Stde
	n=613	49.4%	n=626	50.5%	n=674	50.8%	n=653	49.2%	n=705	56.8%	n=536	43.1%
Log of D&O coverage	18.93	1.24	-	-	18.90	1.16	-	-	18.85	1.03	-	-
Log of capital	15.44	1.69	15.06	1.38	15.34	1.73	14.91	1.41	15.34	1.76	14.98	1.42
ROE	2.28	17.88	0.83	7.23	2.22	12.32	1.51	3.85	0.95	9.72	0.42	23.55
Log of remuneration	16.64	1.11	16.21	1.01	16.35	1.02	16.04	0.96	16.30	1.42	16.02	1.22
Director	9.85	2.62	9.34	2.46	9.66	2.29	9.49	2.77	9.39	2.72	9.01	3.17
Independent director	1.86	1.46	1.01	1.41	1.66	1.36	0.92	1.29	1.58	1.21	0.74	1.12
Shares held by director	24.05	14.86	24.07	14.38	1.44	1.39	2.03	1.88	1.34	1.34	1.90	1.81
Shares held by major shareholder	17.91	11.06	19.87	11.57	22.59	14.97	25.92	15.18	22.45	14.85	25.13	14.60
Controlled director	1.50	1.43	2.12	1.99	18.63	10.84	20.81	11.74	18.69	10.74	21.85	12.03
Duality of CEO and COB	0.26	0.44	0.29	0.46	0.26	0.44	0.30	0.46	0.28	0.45	0.29	0.46
Internal risk	1.78	0.87	2.11	0.87	1.75	0.88	2.08	0.91	1.69	0.91	2.09	0.92
Debt-asset ratio	109.60	235.13	117.74	281.64	142.99	480.49	144.53	572.29	123.21	335.23	131.38	504.44

Table 2.30 (cont.)

Shares of foreign natural person	0.30	1.05	0.46	1.66	0.31	1.22	0.35	1.40	0.32	1.40	0.45	1.67
Shares of foreign juristic person	10.81	14.70	5.62	10.62	10.04	14.29	5.95	10.32	8.02	13.02	4.81	9.41
Shares of foreign financial juristic person	0.22	0.94	0.05	0.32	0.29	1.10	0.09	0.68	0.21	1.01	0.05	0.26
Prior significant litigation	0.15	0.74	0.13	0.64	0.17	0.61	0.14	0.84	0.20	0.76	0.15	1.37

Table 2.31 Independent samples test of 2008

This table contains the independent sample test from 2008, which illustrates whether the difference between firms with D&O insurance and without D&O insurance is significant or not. The significant variables include: capital, industry, remuneration, number of directors, number of independent directors, shares held by major shareholders, number of controlled directors, internal risk, shares of foreign natural persons, shares of foreign juristic persons, and shares of foreign financial juristic persons. In general, this implies that the quality of corporate governance of firms with D&O insurance is statistically different from the firms without D&O insurance. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Log of capital	assumed	18.181	.000	4.259	1237	.000***	.37277	.08753	.20106	.54449
	not assumed			4.250	1179.189	.000***	.37277	.08771	.20069	.54486
Industry of firms	assumed	165.339	.000	7.421	1237	.000***	.19802	.02668	.14567	.25036
	not assumed			7.412	1210.780	.000***	.19802	.02672	.14560	.25043
ROE	assumed	3.363	.067	1.878	1237	.061	1.44984	.77218	-.06508	2.96477
	not assumed			1.863	803.574	.063	1.44984	.77803	-.07737	2.97706
Log of remuneration	assumed	7.761	.005	6.978	1232	.000***	.42228	.06052	.30355	.54101
	not assumed			6.971	1214.930	.000***	.42228	.06058	.30343	.54112
Director	assumed	.005	.945	3.506	1222	.000***	.50902	.14520	.22414	.79389
	not assumed			3.503	1212.845	.000***	.50902	.14532	.22391	.79412
Independent director	assumed	.372	.542	10.314	1236	.000***	.84368	.08180	.68319	1.00416
	not assumed			10.310	1232.508	.000***	.84368	.08183	.68314	1.00421
Shares held by director	assumed	.262	.609	-.024	1222	.981	-.02009	.83578	-1.65982	1.61963

Table 2.31 (cont.)

	not assumed			-.024	1217.68 2	.981	-.02009	.83615	-1.66055	1.6203 6
Shares held by major shareholder	assumed	.466	.49 5	-3.046	1236	.002**	-1.9599	.64350	-3.22236	-69744
	not assumed			-3.047	1235.16 0	.002**	-1.9599	.64321	-3.22181	-69799
Controlled director	assumed	27.955	.00 0	-6.279	1236	.000***	-.61912	.09860	-.81256	-42568
	not assumed			-6.298	1136.017	.000***	-.61912	.09830	-.81199	-42625
Duality of CEO and COB	assumed	7.632	.00 6	-1.380	1236	.168	-.03505	.02540	-.08487	.01477
	not assumed			-1.381	1235.49 9	.168	-.03505	.02539	-.08486	.01475
Internal risk	assumed	.039	.84 4	-6.597	1236	.000***	-.32733	.04962	-.42468	-22999
	not assumed			-6.597	1235.39 6	.000***	-.32733	.04962	-.42468	-22999
Debt-asset ratio	assumed	.413	.52 1	-.552	1237	.581	-8.14072	14.75524	-37.0887 7	20.807 34
	not assumed			-.553	1206.92 2	.581	-8.14072	14.72760	-37.0352 6	20.753 82
Shares of foreign natural person	assumed	17.315	.00 0	-2.040	1236	.042*	-.16147	.07914	-.31673	-.00620
	not assumed			-2.049	1058.81 7	.041*	-.16147	.07881	-.31612	-.00682
Shares of foreign juristic person	assumed	60.380	.00 0	7.118	1236	.000***	5.18138	.72790	3.75333	6.6094 3
	not assumed			7.097	1112.633	.000***	5.18138	.73012	3.74881	6.6139 5
Shares of foreign financial juristic person	assumed	64.500	.00 0	4.270	1236	.000***	.16965	.03973	.09169	.24760
	not assumed			4.237	751.228	.000***	.16965	.04004	.09104	.24825
Prior significant litigation	assumed	.561	.45 4	.444	1237	.657	.01739	.03917	-.05946	.09424
	not assumed			.443	1203.17 5	.658	.01739	.03923	-.05958	.09436

Table 2.32 Independent samples test of 2009

This table contains the independent sample test from 2009, which illustrates whether the difference between firms with D&O insurance and without D&O insurance is significant or not. The significant variables include: capital, industry, remuneration, number of directors, number of independent directors, shares held by major shareholders, number of controlled directors, internal risk, shares of foreign juristic persons, and shares of foreign financial juristic persons. In general, this implies that the quality of corporate governance of firms with D&O insurance is statistically different from the firms without D&O insurance. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variance s	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Log of capital	assumed	23.116	.000	4.888	1325	.000***	.42408	.08677	.25387	.59430
	not assumed			4.903	1289.186	.000***	.42408	.08650	.25439	.59378
Industry of firms	assumed	66.012	.000	8.669	1325	.000***	.23019	.02655	.17810	.28229
	not assumed			8.677	1324.086	.000***	.23019	.02653	.17815	.28224
ROE	assumed	3.731	.054	1.369	1269	.171	.71528	.52265	-.31008	1.74064
	not assumed			1.424	805.306	.155	.71528	.50241	-.27090	1.70146
Log of remuneration	assumed	15.135	.000	5.562	1304	.000***	.30581	.05498	.19795	.41367
	not assumed			5.573	1303.923	.000***	.30581	.05488	.19815	.41346
Director	assumed	7.240	.007	1.232	1288	.218	.17374	.14105	-.10297	.45045
	not assumed			1.225	1214.283	.221	.17374	.14183	-.10452	.45201
Independent director	assumed	.340	.560	10.095	1288	.000***	.74581	.07388	.60087	.89075
	not assumed			10.110	1287.901	.000***	.74581	.07377	.60109	.89053
Shares held by director	assumed	25.167	.000	-6.396	1288	.000***	-.58731	.09182	-.76744	-.40717

Table 2.32 (cont.)

	not assumed			-6.341	1147.488	.000***	-5.8731	.09262	-.76903	-.40558
Shares held by major shareholder	assumed	.140	.709	-3.966	1288	.000***	-3.33079	.83983	-4.97837	-1.68321
	not assumed			-3.964	1281.217	.000***	-3.33079	.84017	-4.97905	-1.68253
Controlled director	assumed	6.005	.014	-3.461	1288	.001***	-2.17656	.62883	-3.41021	-.94291
	not assumed			-3.453	1263.864	.001***	-2.17656	.63031	-3.41313	-.94000
Duality of CEO and COB	assumed	10.463	.001	-1.621	1307	.105	-.04003	.02469	-.08846	.00841
	not assumed			-1.619	1293.634	.106	-.04003	.02472	-.08852	.00847
Internal risk	assumed	.179	.673	-6.643	1307	.000***	-.32956	.04961	-.42689	-.23223
	not assumed			-6.636	1295.736	.000***	-.32956	.04966	-.42699	-.23213
Debt-asset ratio	assumed	.002	.960	-.053	1282	.958	-1.54718	29.40213	-59.22874	56.13439
	not assumed			-.052	1195.969	.958	-1.54718	29.64908	-59.71717	56.62282
Shares of foreign natural person	assumed	.890	.346	-.435	1288	.663	-.03179	.07301	-.17503	.11144
	not assumed			-.434	1238.154	.665	-.03179	.07332	-.17564	.11205
Shares of foreign juristic person	assumed	50.101	.000	5.864	1288	.000***	4.09187	.69775	2.72303	5.46072
	not assumed			5.919	1207.340	.000***	4.09187	.69130	2.73558	5.44816
Shares of foreign financial juristic person	assumed	49.591	.000	3.771	1288	.000***	.19340	.05128	.09279	.29401
	not assumed			3.821	1118.541	.000***	.19340	.05062	.09408	.29272
Prior significant litigation	assumed	1.643	.200	.817	1325	.414	.03285	.04018	-.04598	.11167
	not assumed			.813	1193.183	.416	.03285	.04038	-.04637	.11206

Table 2.33 Independent samples test of 2010

This table contains the independent sample test from 2010, which illustrates whether the difference between firms with D&O insurance and without D&O insurance is significant or not. The significant variables include: capital, industry, remuneration, number of directors, number of independent directors, shares held by directors, shares held by major shareholders, number of controlled directors, internal risk, shares of foreign juristic persons, and shares of foreign financial juristic persons. In general, this implies that the quality of corporate governance of firms with D&O insurance is statistically different from the firms without D&O insurance. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Log of capital	assumed	24.390	.000	4.156	1239	.000***	.38275	.09210	.20205	.56345
	not assumed			4.267	1231.595	.000***	.38275	.08970	.20677	.55873
Industry of firms	assumed	79.487	.000	8.561	1239	.000***	.23745	.02774	.18303	.29186
	not assumed			8.638	1186.800	.000***	.23745	.02749	.18351	.29138
ROE	assumed	1.238	.266	.582	1239	.561	.56835	.97665	-1.34773	2.48443
	not assumed			.527	666.753	.598	.56835	1.07800	-1.54833	2.68504
Log of remuneration	assumed	8.054	.005	4.000	1239	.000***	.30288	.07572	.15433	.45143
	not assumed			4.074	1215.055	.000***	.30288	.07435	.15701	.44876
Director	assumed	1.933	.165	2.558	1239	.011**	.42852	.16749	.09993	.75712
	not assumed			2.506	1051.478	.012**	.42852	.17099	.09301	.76404
Independent director	assumed	8.789	.003	11.390	1239	.000***	.76907	.06752	.63660	.90154
	not assumed			11.530	1197.898	.000***	.76907	.06670	.63820	.89994
Shares held by director	assumed	18.834	.000	-6.025	1239	.000***	-.54270	.09008	-.71943	-.36597

Table 2.33 (cont.)

	not assumed			-5.806	963.888	.000***	-54270	.09347	-.72614	-.35926
Shares held by major shareholder	assumed	.019	.890	-3.046	1203	.002**	-2.61289	.85768	-4.29561	-.93018
	not assumed			-3.053	1120.623	.002**	-2.61289	.85574	-4.29192	-.93386
Controlled director	assumed	6.556	.011	-4.635	1203	.000***	-3.07539	.66354	-4.37722	-1.77356
	not assumed			-4.571	1049.454	.000***	-3.07539	.67283	-4.39563	-1.75515
Duality of CEO and COB	assumed	1.953	.163	-.703	1239	.482	-.01818	.02587	-.06893	.03257
	not assumed			-.701	1140.273	.484	-.01818	.02594	-.06907	.03271
Internal risk	assumed	.760	.384	-7.136	1239	.000***	-3.7563	.05264	-.47890	-.27236
	not assumed			-7.137	1152.408	.000***	-3.7563	.05263	-.47890	-.27236
Debt-asset ratio	assumed	1.006	.316	-.533	1239	.594	-12.57156	23.58850	-58.84939	33.70626
	not assumed			-.504	858.543	.615	-12.57156	24.96803	-61.57709	36.43396
Shares of foreign natural person	assumed	6.075	.014	-1.343	1239	.179	-.11674	.08691	-.28725	.05377
	not assumed			-1.311	1031.859	.190	-.11674	.08906	-.29149	.05801
Shares of foreign juristic person	assumed	31.668	.000	4.888	1239	.000***	3.23666	.66216	1.93758	4.53574
	not assumed			5.098	1236.641	.000***	3.23666	.63490	1.99106	4.48226
Shares of foreign financial juristic person	assumed	48.129	.000	3.583	1239	.000***	.15911	.04441	.07198	.24623
	not assumed			4.038	826.782	.000***	.15911	.03941	.08176	.23646
Prior significant litigation	assumed	1.310	.253	.699	1239	.484	.04276	.06114	-.07720	.16272
	not assumed			.650	777.628	.516	.04276	.06579	-.08638	.17190

Table 2.34 Demand of D&O insurance in 2008

This table contains the result of logistic regression of 2008. The dependent variable is a binary variable depending on whether firms purchase D&O insurance or not. The independent variables are the proxy variables of corporate governance. These test the association between D&O insurance purchase and firms' qualities of corporate governance. An asterisk denotes statistical significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisks indicate significance at 1% level.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Log of capital	.009	.062	.022	1	.883	1.009	.893	1.140
Industry of firms	.564	.141	15.958	1	.000***	1.758	1.333	2.318
ROE	.004	.005	.642	1	.423	1.004	.995	1.013
Log of remuneration	.268	.078	11.752	1	.001***	1.307	1.121	1.523
Director	.071	.027	7.097	1	.008***	1.074	1.019	1.132
Independent director	.350	.046	57.518	1	.000***	1.418	1.296	1.552
Shares held by director	-.002	.005	.183	1	.669	.998	.989	1.007
Shares held by major shareholder	-.011	.006	3.582	1	.058*	.989	.977	1.000
Controlled director	-.126	.045	7.852	1	.005***	.882	.808	.963
Duality of CEO and COB	.098	.151	.420	1	.517	1.103	.820	1.484
Internal risk	-.319	.087	13.312	1	.000***	.727	.613	.863
Debt-asset ratio	.000	.000	1.217	1	.270	1.000	.999	1.000
Shares of foreign natural person	-.086	.049	3.096	1	.078*	.918	.835	1.010
Shares of foreign juristic person	.020	.006	10.133	1	.001***	1.020	1.008	1.033

Table 2.34 (cont.)

	.311	.156	3.983	1	.046**	1.365	1.006	1.854
Shares of foreign financial juristic person								
Prior significant litigation	.040	.087	.217	1	.641	1.041	.878	1.234
Constant	-4.994	1.156	18.669	1	.000***	.007		

Hosmer and Lemeshow Test: $\chi^2 = 7.624$ (Sig. = .471)

Omnibus Tests of Model Coefficients: $\chi^2 = 252.657$ (Sig. = .000)

2 Log likelihood = 1435.688

Cox & Snell $R^2 = .187$

Nagelkerke $R^2 = .250$ del Summary

Table 2.35 Demand of D&O insurance in 2009

This table contains the result of logistic regression of 2009. The dependent variable is a binary variable depending on whether firms purchase D&O insurance or not. The independent variables are the proxy variables of corporate governance. These test the association between D&O insurance purchase and firms' qualities of corporate governance. An asterisk denotes statistical significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisks indicate significance at 1% level.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Log of capital	.045	.057	.624	1	.430	1.046	.936	1.169
Industry of firms	.686	.135	25.671	1	.000***	1.985	1.523	2.589
ROE	.015	.014	1.233	1	.267	1.016	.988	1.044
Log of remuneration	.239	.082	8.472	1	.004***	1.270	1.081	1.491
Director	-.046	.030	2.358	1	.125	.955	.900	1.013
Independent director	.388	.050	59.888	1	.000***	1.474	1.336	1.626
Shares held by director	-.147	.047	9.668	1	.002***	.863	.787	.947
Shares held by major shareholder	-.018	.005	14.259	1	.000***	.982	.974	.992
Controlled director	-.022	.006	12.640	1	.000***	.978	.967	.990
Duality of CEO and COB	.050	.154	.108	1	.742	1.052	.779	1.421
Internal risk	-.296	.085	12.029	1	.001***	.744	.629	.879
Debt-asset ratio	.000	.000	.276	1	.599	1.000	1.000	1.000
Shares of foreign natural person	.016	.048	.110	1	.740	1.016	.924	1.117
Shares of foreign juristic person	.020	.006	10.234	1	.001***	1.021	1.008	1.033

Table 2.35 (cont.)

Shares of foreign financial juristic person	.116	.087	1.778	1	.182	1.123	.947	1.333
Prior significant litigation	-.001	.086	.000	1	.989	.999	.844	1.181
Constant	-3.331	1.263	6.952	1	.008***	.036		

Hosmer and Lemeshow Test: $\chi^2 = 5.840$ (Sig. = .665)

Omnibus Tests of Model Coefficients: $\chi^2 = 267.495$ (Sig. = .000)

2 Log likelihood = 1478.761

Cox & Snell R² = .191

Nagelkerke R² = .255

Table 2.36 Demand of D&O insurance in 2010

This table contains the result of logistic regression of 2010. The dependent variable is a binary variable depending on whether firms purchase D&O insurance or not. The independent variables are the proxy variables of corporate governance. These test the association between D&O insurance purchase and firms' qualities of corporate governance. An asterisk denotes statistical significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisks indicate significance at 1% level.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Log of capital	.074	.059	1.537	1	.215	1.076	.958	1.209
Industry of firms	.605	.140	18.542	1	.000***	1.831	1.390	2.412
ROE	-.001	.004	.119	1	.730	.999	.991	1.006
Log of remuneration	.190	.071	7.189	1	.007***	1.210	1.053	1.390
Director	-.037	.034	1.239	1	.266	.963	.902	1.029
Independent director	.514	.060	73.026	1	.000***	1.672	1.486	1.881
Shares held by director	-.146	.051	8.193	1	.004***	.864	.782	.955
Shares held by major shareholder	-.016	.005	10.338	1	.001***	.984	.975	.994
Controlled director	-.025	.006	15.623	1	.000***	.976	.964	.988
Duality of CEO and COB	.285	.157	3.317	1	.069*	1.330	.979	1.807
Internal risk	-.320	.087	13.600	1	.000***	.726	.612	.861
Debt-asset ratio	.000	.000	1.068	1	.301	1.000	.999	1.000
Shares of foreign natural person	-.056	.043	1.687	1	.194	.946	.869	1.029

Table 2.36 (cont.)

Shares of foreign juristic person	.015	.007	4.716	1	.030**	1.015	1.001	1.029
Shares of foreign financial juristic person	.403	.187	4.629	1	.031**	1.496	1.037	2.159
Prior significant litigation	.010	.058	.033	1	.857	1.010	.903	1.131
Constant	-2.858	1.189	5.778	1	.016**	.057		

Hosmer and Lemeshow Test: $\chi^2 = 6.481$ (Sig. = .593)

Omnibus Tests of Model Coefficients: $\chi^2 = 274.510$ (Sig. = .000)

2 Log likelihood = 1371.626

Cox & Snell R² = .204

Nagelkerke R² = .273

Table 2.37 The result of log transformed regression and bootstrap

This table contains the results of the regressions where dependent variables are log transformed. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level. The dependent variables are the logarithm of D&O coverage from 2008 to 2009 respectively. This transforms the D&O coverage which is highly skewed and makes the regression close to liner relation. This table also presents the result of 10,000 bootstrap replications of each year which does not have to follow the assumption of normality of residual and covariance. These results are similar and thus unbiased.

	(1)	(2)	(3)	(4)	(5)	(6)
	D&O coverage 2008	Bootstrap of 2008	D&O coverage 2009	Bootstrap of 2009	D&O coverage 2010	Bootstrap of 2010
Log of capital	0.335*** (7.77)	0.335*** (7.36)	0.307*** (9.57)	0.307*** (9.64)	0.326*** (12.00)	0.326*** (12.04)
Industry of firms	0.169 (1.70)	0.169 (1.65)	0.231** (2.90)	0.231** (2.93)	0.178** (2.68)	0.178** (2.64)
ROE	0.00216 (0.83)	0.00216 (0.64)	-0.00172 (-0.56)	-0.00172 (-0.21)	-0.00917* (-2.47)	-0.00917* (-2.40)
Log of remuneration	0.103 (1.88)	0.103* (2.00)	0.189*** (4.03)	0.189*** (3.42)	0.0338 (1.10)	0.0338 (1.02)
Director	0.0108 (0.56)	0.0108 (0.68)	-0.0430* (-2.32)	-0.0430 (-1.89)	-0.0131 (-0.83)	-0.0131 (-0.77)
Independent director	-0.0453 (-1.38)	-0.0453 (-1.41)	-0.00708 (-0.25)	-0.00708 (-0.25)	0.00345 (0.13)	0.00345 (0.12)
Shares held by director	-0.000359 (-0.11)	-0.000359 (-0.11)	-0.0503 (-1.55)	-0.0503 (-1.60)	-0.0564* (-2.06)	-0.0564* (-2.19)
Shares held by major shareholder	-0.00244 (-0.56)	-0.00244 (-0.56)	0.00400 (1.44)	0.00400 (1.23)	0.00362 (1.53)	0.00362 (1.24)

Table 2.37 (cont.)

Controlled director	-0.0718 (-1.86)	-0.0718 (-1.84)	-0.00545 (-1.46)	-0.00545 (-1.48)	-0.00539 (-1.75)	-0.00539 (-1.66)
Duality of CEO and COB	-0.0663 (-0.60)	-0.0663 (-0.58)	0.137 (1.48)	0.137 (1.64)	0.0610 (0.83)	0.0610 (0.89)
Internal risk	0.0200 (0.31)	0.0200 (0.32)	-0.0795 (-1.51)	-0.0795 (-1.62)	-0.0314 (-0.76)	-0.0314 (-0.82)
Debt-asset ratio	-0.000483* (-2.04)	-0.000483* (-2.46)	-0.000133 (-1.57)	-0.000133 (-1.28)	-0.000291* (-2.49)	-0.000291* (-2.06)
Shares of foreign natural person	-0.0114 (-0.26)	-0.0114 (-0.34)	0.000734 (0.02)	0.000734 (0.02)	0.0273 (1.24)	0.0273 (1.60)
Shares of foreign juristic person	0.00211 (0.53)	0.00211 (0.50)	-0.00118 (-0.35)	-0.00118 (-0.27)	0.00100 (0.36)	0.00100 (0.31)
Shares of foreign financial juristic person	0.0561 (1.06)	0.0561 (1.34)	0.0808* (2.20)	0.0808** (2.72)	0.0700* (2.18)	0.0700* (2.10)
Prior significant litigation	-0.00831 (-0.13)	-0.00831 (-0.16)	0.0181 (0.30)	0.0181 (0.32)	-0.0384 (-0.94)	-0.0384 (-0.89)
cons	12.08*** (14.86)	12.08*** (14.88)	11.61*** (15.58)	11.61*** (12.80)	13.50*** (24.50)	13.50*** (23.20)
<i>N</i>	602	602	663	663	688	688
<i>R</i> ²	0.2712		0.323004		0.349823	
<i>Adj-R</i> ²	0.2512		0.306236		0.334320	

Table 2.38 The result of Box-cox transformed regression

This table contains the result of regressions where dependent variables are Box-cox transformed. Box-Cox transformation is conducted to fit the regression closer to linearity by computing the proper power of dependent variables. The power of dependent variable (λ) is 5.58423 for year 2008, 3.831266 for year 2009 and 2.643553 for year 2010. t statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)
	Log of D&O coverage 2008	Log of D&O coverage 2009	Log of D&O coverage 2010
Log of capital	1465554.8*** (10.14)	5006.0*** (10.31)	111.0*** (12.55)
Industry of firms	575256.0 (1.73)	3575.1** (2.96)	55.99** (2.59)
ROE	7368.2 (0.84)	-17.52 (-0.38)	-3.224** (-2.67)
Log of remuneration	312907.0 (1.71)	2811.4*** (3.96)	10.69 (1.07)
Director	34608.0 (0.54)	-612.8* (-2.18)	-4.110 (-0.80)
Independent director	-95213.1 (-0.86)	-158.2 (-0.37)	1.292 (0.14)
Shares held by director	-930.9 (-0.09)	65.89 (1.57)	1.417 (1.84)
Shares held by major shareholder	-8417.2 (-0.57)	-78.78 (-1.39)	-1.668 (-1.67)
Controlled director	-338523.6** (-2.61)	-926.3 (-1.88)	-19.84* (-2.22)

Table 2.38 (cont.)

Duality of CEO and COB	-201396.2 (-0.54)	1691.1 (1.21)	18.69 (0.78)
Internal risk	78309.8 (0.36)	-1192.1 (-1.50)	-11.19 (-0.83)
Debt-asset ratio	-2310.8** (-2.91)	-2.572* (-2.02)	-0.107** (-2.79)
Shares of foreign natural person	-51442.5 (-0.35)	-46.46 (-0.10)	9.158 (1.27)
Shares of foreign juristic person	14801.6 (1.11)	19.17 (0.38)	0.549 (0.60)
Shares of foreign financial juristic person	266381.0 (1.49)	1349.3* (2.43)	24.50* (2.34)
Prior significant litigation	-62944.0 (-0.30)	69.64 (0.08)	-13.87 (-1.04)
Constant	-13444773.6*** (-4.93)	-36452.0** (-3.23)	552.5** (3.08)
<i>N</i>	602	663	688
<i>R</i> ²	0.3696	0.3626	0.3710
<i>Adj-R</i> ²	0.3524	0.3469	0.3560

Table 2.39 The result of Tobit model

This table contains results of the Tobit model from 2008 to 2010. The dependent variable is the logarithm of D&O insurance coverage from 2008 to 2010 respectively. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)
	Log of D&O coverage 2008	Log of D&O coverage 2009	Log of D&O coverage 2010
Log of capital	0.336*** (7.84)	0.307*** (9.68)	0.326*** (12.13)
Industry of firms	0.170 (1.72)	0.232** (2.94)	0.178** (2.72)
ROE	0.00219 (0.84)	-0.00171 (-0.57)	-0.00917* (-2.50)
Log of remuneration	0.103 (1.89)	0.189*** (4.08)	0.0339 (1.12)
Director	0.0106 (0.55)	-0.0431* (-2.35)	-0.0132 (-0.84)
Independent director	-0.0457 (-1.40)	-0.00711 (-0.25)	0.00341 (0.13)
Shares held by director	-0.000385 (-0.12)	0.00401 (1.46)	0.00362 (1.55)
Shares held by major shareholder	-0.00239 (-0.55)	-0.00544 (-1.47)	-0.00539 (-1.77)
Controlled director	-0.0718 (-1.87)	-0.0502 (-1.56)	-0.0563* (-2.08)
Duality of CEO and COB	-0.0693 (-0.63)	0.137 (1.50)	0.0612 (0.84)

Table 2.39 (cont.)

Internal risk	0.0197 (0.31)	-0.0795 (-1.53)	-0.0314 (-0.77)
Debt-asset ratio	-0.000485* (-2.07)	-0.000132 (-1.59)	-0.000291* (-2.51)
Shares of foreign natural person	-0.0115 (-0.26)	0.000786 (0.03)	0.0274 (1.25)
Shares of foreign juristic person	0.00215 (0.55)	-0.00120 (-0.36)	0.000992 (0.36)
Shares of foreign financial juristic person	0.0558 (1.06)	0.0808* (2.22)	0.0701* (2.20)
Prior significant litigation	-0.00853 (-0.14)	0.0182 (0.30)	-0.0384 (-0.95)
Constant	12.07*** (14.94)	11.60*** (15.75)	13.50*** (24.76)
<hr/> <i>N</i>	602	663	688
<i>sigma</i>	1.128***	0.933***	0.795***
<i>Pseudo R</i> ²	0.0919	0.1259	0.1526

Table 2.40 The result of censored least absolute deviations (CLAD)

This table contains results of censored least absolute deviations estimator (CLAD) from 2008 to 2010. The dependent variable is the logarithm of D&O insurance coverage from 2008 to 2010 respectively. CLAD does not have to follow assumptions of the Tobin model where dependent variable shall be normally distributed with certain censoring point. Thus, the result here is more robust. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1) Log of D&O coverage 2008	(2) Log of D&O coverage 2009	(3) Log of D&O coverage 2010
Log of capital	0.384 ^{***} (20.88)	0.229 ^{***} (15.26)	0.217 ^{***} (8.04)
Industry of firms	-0.153 ^{***} (-3.50)	0.380 ^{***} (9.95)	-0.0176 (-0.29)
ROE	0.00545 ^{***} (9.10)	-0.00104 [*] (-2.52)	-0.0131 ^{***} (-3.54)
Log of remuneration	0.107 ^{***} (4.47)	0.152 ^{***} (7.27)	0.118 ^{**} (3.06)
Director	-0.0111 (-1.17)	-0.0225 [*] (-2.54)	-0.0137 (-0.97)
Independent director	-0.0689 ^{***} (-4.83)	-0.0930 ^{***} (-6.82)	0.0576 [*] (2.16)
Shares held by director	0.000852 (0.59)	-0.00288 [*] (-2.19)	-0.00474 [*] (-2.22)
Shares held by major shareholder	-0.0150 ^{***} (-7.28)	-0.0232 ^{***} (-13.42)	-0.0110 ^{***} (-3.67)
Controlled director	-0.0665 ^{***} (-4.07)	-0.0617 ^{***} (-4.20)	-0.0668 [*] (-2.55)

Table 2.40 (cont.)

Duality of CEO and COB	-0.113 [*] (-2.44)	0.125 ^{**} (2.71)	0.0948 (1.40)
Internal risk	-0.112 ^{***} (-3.96)	-0.0961 ^{***} (-3.73)	-0.111 ^{**} (-2.87)
Debt-asset ratio	-0.00141 ^{***} (-10.47)	-0.0000976 ^{***} (-4.40)	-0.000550 ^{***} (-4.28)
Shares of foreign natural person	-0.0466 ^{**} (-2.80)	-0.0418 ^{***} (-4.90)	0.0193 (0.62)
Shares of foreign juristic person	0.00319 (1.70)	0.0136 ^{***} (9.60)	0.00634 [*] (2.44)
Shares of foreign financial juristic person	0.0642 ^{***} (4.13)	0.0764 ^{***} (4.01)	0.0706 [*] (2.13)
Prior significant litigation	-0.0492 ^{***} (-4.37)	0.0957 ^{**} (3.07)	-0.125 ^{**} (-3.20)
cons	12.28 ^{***} (33.54)	13.68 ^{***} (38.94)	14.23 ^{***} (23.80)
<i>N</i>	604	661	686
<i>Sigma</i>	1.119077	.9318748	.7941698

CHAPTER 3

SIGNALING HYPOTHESIS

3.1 Introduction

The release of economically relevant information is important for the evaluation of firms' outstanding securities and the ability to attract investment in the future.³⁴³ Under this theory, this section will test whether insured firms purchase D&O insurance in order to convey a positive signal to the market and even promote their reputation or value. The previous chapter initially tests monitoring hypothesis of D&O insurance in Taiwan. After rejecting the monitoring hypothesis, this chapter will find an alternative theory to explain the role of D&O insurance in corporate governance, which is the signal hypothesis. This dissertation argues that the purchase of D&O insurance can convey positive signals to investors, and firms would prefer to purchase insurance to convey a positive signal to attract investment and to promote their value.

Three empirical works are processed to test this signal hypothesis. First of all, in order to assess how D&O insurance conveys a positive signal, the first set of regressions applies Ohlson model and uses the market value of insured firms as dependent variable. If D&O insurance indeed has a positive signal effect, the purchase will positively contribute to the market value of insured firms. The second set of regressions use foreign investments as

³⁴³ See Robert M. Lawless, Stephen P. Ferris, & Bryan Bacon, *The Influence of Legal Liability on Corporate Financial Signaling*, 23 J. CORP. L. 209 (1998).

dependent variables. Foreign investor usually concerns more about firms' corporate governance. If D&O insurance contributes to the increase of foreign investments, then the positive signal effect of D&O insurance is implied. Alternatively, the third set of regressions uses D&O insurance as dependent variable and foreign investments as well as other control variables as independent variables. This is to test how foreign investors care about D&O insurance. Then, it is found that the firms purchase more D&O insurance usually have better qualities of corporate governance. Concluding the findings here, this research infers that D&O insurance in Taiwan has a positive effect, and this may be the reason why good firms have more D&O insurance.

3.2 The first test of signal effect of D&O insurance: market value of insured firms as dependent variable

3.2.1 Introduction

By the reasoning of signal hypothesis, the purchase of D&O insurance will release a signal to investors, and investors will evaluate that positively. Thus, D&O insurance purchase should have a positive effect on firms' stock price. In addition to the proxy variable, percentage of shares of foreign investors, used in following section, this section will use another intuitive proxy variable, which is stock price.

This study applies the famous model proposed by Ohlson (1995) concerning evaluating the value of firms. If the empirical result demonstrates a positive relationship between D&O insurance and stock price, then the hypothesis concerning the positive effect of

D&O insurance will be supported. In contrast, inverse association between D&O insurance and stock price implies D&O insurance emits a negative signal to the market. Under such circumstance, it would be necessary to try to find the reasons which can explain this result which is different from the previous chapter. Finally, the empirical evidence supports the former, and the positive effect of D&O insurance is confirmed.

3.2.2 Literature review: The development and application of Ohlson's model

3.2.2.1 Corporate governance and market value of firms

Albeit the discussion of corporate governance is sprouting, it should be wondered that firm's corporate governance behavior indeed increase their market value? However, in the United States, many empirical works cannot provide strong evidence for the relationship between corporate governance behavior and increase of market value.³⁴⁴ Similar problems are also addressed in emerging market. Bernard S. Black, Hasung Jang and Woochan Kim test the relationship between corporate governance and market value of firms in Korea by OLS regression and instrument variables.³⁴⁵ They find that corporate governance is an important but maybe casual factor of market value of firms.³⁴⁶ Bernard S. Black also carries out empirical analysis in Russian.³⁴⁷ He concludes that firm's

³⁴⁴ See Bernard S. Black, *Does Corporate Governance Matter? A Crude Test Using Russian Data*, 149 U. PA. L. REV. 2131, 2131 (2001). Different arguments like corporate governance can increase Apple's market value, see *In re Apple Computer, Inc. Derivative Litig.*, No. C 06-4128 JF (HRL), 2008 WL 4820784, at 2 (N.D. Cal. Nov. 5, 2008)

³⁴⁵ See Bernard S. Black, Hasung Jang & Woochan Kim, *Does Corporate Governance Predict Firms' Market Values? Evidence from Korea*, 22 J.L. ECON. & ORG. 366, 366 (2006).

³⁴⁶ *Id.*

³⁴⁷ See Bernard S. Black, *supra* note 344, at 2131.

corporate governance will affect their market value significantly if countries' constraints on corporate governance are limited.³⁴⁸

However, different argument advocates corporate governance would substantially affect market value and shareholders.³⁴⁹ Lawrence D. Brown and Marcus L. Caylor test the association between firms' performance and Gov-Score, which is composed by 51 corporate governance factors. They find firms with better governance indeed have better profit, more value and more benefit for shareholders.³⁵⁰ Lucian A. Bebchuk, Alma Cohen and Allen Ferrell test the association between market value and corporate governance arrangements which are based on six provisions: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. They find the index of such arrangements is inversely associated with market value.³⁵¹ Literature also proposes that market value of firms would be affected by their corporate governance in Russia.³⁵²

3.2.2.2 D&O insurance, signal effect and market value of firms

It is controversy that whether D&O insurance increase firm performance and shareholder's wealth. The negative viewpoint mainly bases on the problem and risk that

³⁴⁸ *Id.*

³⁴⁹ See Lucian A. Bebchuk, Alma Cohen & Allen Ferrell, *What Matters in Corporate Governance?* 22:2 Rev. Fin. Stud. 783, 783 (2009), available at <http://ssrn.com/abstract=593423>.

³⁵⁰ See Lawrence D. Brown & Marcus L. Caylor, *Corporate Governance and Firm Performance* 28-32 (2004), <http://ssrn.com/abstract=586423>.

³⁵¹ See Lucian A. Bebchuk, Alma Cohen & Allen Ferrell, *supra* note 349, at 39.

³⁵² 5 L of Intl Trade § 151:3.

might be induced by D&O insurance. If D&O insurance represents the potential risk, opportunistic behavior and moral hazard, firms would avoid purchasing D&O insurance to damage the reputation and value of firms.

For example, John M. R. Chalmers, Larry Y. Dann, Jarrad Harford find there is an inverse association between D&O insurance coverage and the performance of 3-year stock price.³⁵³ And managers who have high D&O insurance coverage have poor performance in the future.³⁵⁴ In this way, the negative signal effect of D&O insurance is expected. Similarly, M. Martin Boyer proposes that if firms signal their quality by purchasing less D&O insurance,³⁵⁵ this implies D&O insurance itself is a bad signal. Zhihong Chen, Oliver Zhen Li and Hong Zou further find that shareholders perceive D&O insurance negatively, especially when firms are with excessive coverage.³⁵⁶ All these studies imply D&O insurance may have a negative signal effect.

In contrast, some literature proposes the positive effect of D&O insurance on firm's performance and market value. Sanjai Bhagat, James A. Brickley and Jeffrey L. Coles find that D&O insurance has positive on shareholder wealth and no negative effect is found.³⁵⁷ Jinyoung Park also finds the D&O insurance can positively contribute

³⁵³ See John M. R. Chalmers, Larry Y. Dann & Jarrad Harford, *supra* note 156, at 633. They provide two interpretations for the use of D&O insurance. First, managers use insurance to solidify their ability to exploit inside information. Secondly, D&O insurance is used to protect the assets of managers and firms from litigation. Even though these two interpretations are not exclusive, their evidence implies that the former is more important.

³⁵⁴ *Id.*

³⁵⁵ See M. Martin Boyer, *supra* note 6, at 12.

³⁵⁶ See Zhihong Chen, Oliver Zhen Li & Hong Zou, *Directors' and Officers' Liability Insurance and the Cost of Equity Capital* 31 (2011), <http://ssrn.com/abstract=1837912>.

³⁵⁷ See Sanjai Bhagat, James A. Brickley & Jeffrey L. Coles, *Managerial Indemnification and Liability Insurance: The Effect on Shareholder Wealth*, 54.4 *J. Risk & Ins.* 733 (1987).

shareholder's wealth.³⁵⁸ He tests the association between D&O insurance coverage and the quality of firms' voluntary disclosure.³⁵⁹ He finds that there is an association between insurance coverage and forecast frequency and precision.³⁶⁰ The more insurance coverage, the more disclosure occurs. There is also more precise and timely.³⁶¹ Also, positive response from market is given to such information.³⁶² All these results imply the positive signal effect of D&O insurance.

3.2.2.3 Introduction of the Ohlson model

When evaluating firm value, non-accounting is usually and relatively less explored.³⁶³ The Ohlson model can give a direct link between accounting amount and firm value. With the following refinement, Ohlson model has been frequently applied in the valuation model of firms in accounting research.³⁶⁴ The model postulates abnormal earnings by following two equations:³⁶⁵

$$\tilde{x}_{t+1}^a = \alpha x_t^a + v_t + \tilde{\varepsilon}_{1t+1} \quad (1)$$

$$\tilde{v}_{t+1} = \gamma v_t + \tilde{\varepsilon}_{2t+1} \quad (2)$$

³⁵⁸ See Jinyoung Park *supra* note 86, at 30.

³⁵⁹ *Id.* at 3.

³⁶⁰ *Id.*, at 4.

³⁶¹ *Id.*

³⁶² *Id.*

³⁶³ See Alnoor Bhimania, Mohamed Azzim Gulamhussenb, Samuel Da-Rocha Lopesc, *Accounting and Non-Accounting Determinants of Default: An Analysis of Privately-Held Firms*, 29:6 J. ACCT. & PUB. POL'Y 517, 520 (2010).

³⁶⁴ See CHII-SHYAN KUO, THE PRICING AND DETERMINANTS OF THE DISCRETIONARY COMPONENT OF EMPLOYEE STOCK OPTION VALUE 51 (2007).

³⁶⁵ See Kin Lo & Thomas Z. Lys, *The Ohlson Model: Contribution to Valuation Theory, Limitations, and Empirical Applications* 12 (2000), <http://ssrn.com/abstract=210948>.

Where v_t indicates the information not yet captured by accounting and $\tilde{\varepsilon}$ is mean 0 disturbance term.³⁶⁶ Ohlson model is applied to evaluate how D&O insurance and corporate governance might affect firms' market value.

3.2.3 Hypothesis development

In addition to Ohlson model, this dissertation also follows the thoughts of Lawrence D. Brown and Marcus L. Caylor which tests the relationship between firm performance and corporate governance,³⁶⁷ to test the relation between firm performance, corporate governance and D&O insurance purchase. This research assumes D&O insurance have positive effect on firms' market value. The detailed hypothesis can be presented below.

3.2.3.1 Signal hypothesis

The core issue that should be defined first is, is D&O insurance a positive or negative signal to the market? Even though D&O itself is positive news, if it is accompanied by other information such as more internal risks, will this negatively affect firms' performance and market price? If D&O insurance protects directors and officers and lets them concentrate on management without worrying about litigation risk, D&O insurance will have positive signal effect. In contrast, if D&O insurance implies that firms might be not confident about their businesses, and firms might be in potential litigation trouble.

³⁶⁶ *Id.*

³⁶⁷ See Lawrence D. Brown & Marcus L. Caylor, *supra* note 350, at 1.

Even worse, if the problems of moral hazard and adverse selection have been induced, then the purchase of D&O insurance is a bad news to the market.

Whether or not D&O insurance can spur firms to optimize their corporate governance is an important signal to the market.³⁶⁸ Under the theory of signal hypothesis, the purchase and coverage of D&O insurance will convey a positive signal to the market and thus improve the market value of insured firms. The hypothesis is set up below:

H1: The purchase and coverage of D&O insurance is positively related to the market value of firms.

3.2.3.2 Corporate governance hypothesis

In addition to the main hypothesis, other relevant variables are used as control variables. As discussed in the literature review, the effect of corporate governance on firms' market value is controversial. If D&O insurance is an outside monitoring mechanism for corporate governance, it would be reasonable to believe that D&O insurance and other governance mechanisms affect insured firms' market value. This study assumes other corporate governance mechanisms would positively affect firms' market value.

H2: The quality of corporate governance is positive related to the market value of firms.

3.2.4 Data, variables, methods and research design

³⁶⁸ See Sean J. Griffith, *supra* note 85, at 28.

3.2.4.1 Data

The data source of this section is the same as the test in 2.2.4. There were 1,239 observations in 2008, 1,327 observations in 2009, and 1,241 observations in 2010.

3.2.4.2 Variables

Utilizing the Olhson model, accounting and non-accounting information affects firms' market value. Researchers traditionally use stock price as market value. In D&O insurance literature, M. Martin Boyer also uses market value of equity as the measure of the wealth of shareholder.³⁶⁹ This study uses the market value of firms as the dependent variable. According to the regulation in Taiwan, within three months after the close of each fiscal year, listed firms have to publicly announce and register with the competent authority financial reports duly audited and attested by a certified public accountant, approved by the board of directors, and recognized by the supervisors.³⁷⁰ Firms are required to disclose the information regarding D&O insurance after three months of each fiscal year. Prior to November 24, 2010 when the authority amended the regulation, this period was four months. Therefore, the data from different periods following different regulations are used in this study. In order to assess the influence of finance information more accurately, the average stock price of firms of May as dependent variable is used in panels of 2008 and 2009. The average stock price of April is assigned as dependent

³⁶⁹ See M. Martin Boyer, *supra* note 6, at 9.

³⁷⁰ Securities and Exchange Act (Amended 2010. 11. 24) Article 36 sec1.

variable in panel of in 2010.

Regarding independent variable, the variables *bv* and *EPS* represent the book value of and earnings per share of firms. Regarding the proxy variable of D&O insurance, *purchase* is a binary variable, which is coded as “1” when firms with insurance and “0” otherwise. Then variable *lncoverage* is the natural logarithm of D&O insurance coverage. In order to analyze the effect of D&O insurance on firms’ performance completely, this research will use these two D&O insurance proxy variables in separate panels. The variable *purchase* would be used in panel A, and the variable *lncoverage* would be used in panel B.

In terms of the proxy variables of corporate governance, this dissertation would like to consider non-accounting information and the factors concerning directors and D&O insurance. First of all, it is usually believed that the duality of the chairman of board (COB) and Chief Executive Officer (CEO) is negatively related to market value of firms. Under agency theory, the duality of COB and CEO might cause interest conflict and damage the benefit of firms. Maria Carapeto, Meziane Lasfer and Katerina Machera test this issue by event study, and their research strongly support agency theory.³⁷¹ They find that the announcement of split of COB and CEO would cause positive abnormal returns and vice versa.³⁷² In order to test the influence of duality of COB and CEO on the performance of firms, this study sets up the variable *dual*. It is a dummy variable, which

³⁷¹ See Maria Carapeto, Meziane Lasfer & Katerina Machera, *Does Duality Destroy Value?* (2005), <http://ssrn.com/abstract=686707>.

³⁷² *Id.*

is granted 1 when the chairman of board is identical to CEO and 0 otherwise.

Ideally, independent directors are not affected by interest conflict and it is usually considered as a good mechanism for corporate governance.³⁷³ Accordingly, appointment of independent or outside directors should convey positive signal to the market and have a significant positive price effect. However, Bernard S. Black, Hasung Jang and Woochan Kim argue that even in developed countries there is no evidence to prove that firms with more independent directors have better performance or higher share price.³⁷⁴ Moreover, appointment of additional independent directors may signal that firms plan to address business problem.³⁷⁵ Some empirical research propose that more independent directors have no statistically significant effect on board's performance. Some literature even argue that more independent directors would make board's performance worse.³⁷⁶ In emerging market, Rajesh Chakrabarti, Krishnamurthy Subramanian and Frederick Tung test India market and find that independent director is indeed an importance component of monitoring function and adds the value of firms.³⁷⁷ Even though the results are controversial, but the importance of independent director is undisputable. This dissertation hypothesizes that the number of independent directors is positively or negatively related to market value of firms. The variable *idirector* indicates the number of

³⁷³ See Perry E. Wallace, *Accounting, Auditing and Audit Committees after, et al.: Governing outside the Box without Stepping off the Edge in the Modern Economy*, 43 WASHBURN L.J. 91, 114 (2003).

³⁷⁴ See Bernard S. Black, Hasung Jang & Woochan Kim, *supra* note 345, at 408.

³⁷⁵ See Sanjai Bhagat & Roberta Romano, *Event Studies and the Law: Part Ii: Empirical Studies of Corporate Law*, 4 AM. L. & ECON. REV. 380, 402 (2002).

³⁷⁶ See Sanjai Bhagat & Bernard Black, *The Uncertain Relationship Between Board Composition and Firm Performance*, 54 BUS. LAW. 921, 943 (1999).

³⁷⁷ See Rajesh Chakrabarti, Krishnamurthy Subramanian & Frederick Tung, *Independent Directors and Firm Value: Evidence from an Emerging Market* 20 (2010), <http://ssrn.com/abstract=1631710>.

independent directors.

The value of shares may be affected the ownership structure of firms. In firms with dispersed ownership, individual shareholders have less possibility and more cost to control the firms. They also have less incentive to monitor firms. As a result, control is in the hand of management.³⁷⁸ On the other hand, in firms with concentrated ownership, controlling shareholders and blockholders have more incentive to monitor management.³⁷⁹ However, blockholders are also a source of agency cost because they may act for their own benefits and other investors may have to pay for such costs. If investors expect more cost than benefit from ownership, they will discount the shares. In contrast, if investors expect more benefit than cost, they may be willing to pay more.³⁸⁰ Every ownership structure may have different impacts on investors. This is also why securities law regulates the disclosure of ownership structure.³⁸¹ Moreover, dominant owner might also influence firms' performance and corporate governance.³⁸² Jayesh Kumar tests Indian market and finds that the shares of directors would significantly influence firms' performance beyond a certain threshold.³⁸³

These factors such as board and ownership structure also affect the risk of directors and related with D&O insurance. This research sets up following variables to be proxies. The

³⁷⁸ See Michael C. Schouten, *The Case for Mandatory Ownership Disclosure*, 15 STAN. J.L. BUS. & FIN. 127, 135 (2009).

³⁷⁹ *Id.*

³⁸⁰ *Id.*

³⁸¹ *Id.*

³⁸² See Jayesh Kumar, *Agency Theory and Firm Value in India* 23 (2004),

<http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN023822.pdf>

³⁸³ *Id.*, at 23-4.

variable *Intrlrisk* indicates the number of directors and officers appointed by parent company or the controlling group. If the chairman of the board, the CEO, the financial manager or supervisory director is appointed by the parent company or the controlling group, the value will be 1 and 0 otherwise. The final summation ranges from 0 to 4. This variable might be negatively related to market value of firms. The variable *ctrldirector* indicates the number of controlled directors. This dissertation hypothesizes that it is negatively related to market value of firms. The variable *sd* indicates the percentage of shares of directors and *smh* indicates the percentage of shares of major shareholders. These variables are also expected to be negatively related to market value of firms. All of the variables and their descriptions are provided in Table 3.1.

In conclusion, in order to consider the effect of D&O insurance and corporate governance on firms' market value, this study adds D&O insurance and corporate governance into Ohlson model and reformulates the new equation below. *DO* represents the proxy variable of D&O insurance, including *purchase* and *lncoverage*. *CG* represents the proxy variables of corporate governance, including *dual*, *intrlrisk*, *idirector*, *sd*, *smh* and *ctrldirector*.

$$MV = a_0 + a_1BV + a_2EPS + CG + DO \quad (3)$$

3.2.4.3 Methods and research design

Ordinary least square (OLS) regression is used in this research. After an initial test of

regression, further regression analyses are conducted by generating interaction terms which consisted of D&O insurance and other significant variables. Like 2.2.5.2.3, the variables in interaction models are mean-centered. The relationships between market value of firms and how those variables are affected by D&O insurance can be tested. For robustness, the binary variable, insured or not, is used in panel A, and insurance coverage is used in panel B.

3.2.5 Empirical result and analysis

3.2.5.1 Descriptive analysis

From 2008 to 2010, the mean of market value, book value and EPS all grow gradually. The standard deviations also increase slightly. Similarly, the insured rate has the same tendency. The average of the binary variable, *purchase*, in 2008 is 0.49, and this means the overall insured rate is around 49%. Then the insured rate is 51% in 2009 and 57% in 2010. The mean of coverage also increases gradually from 2008 to 2010, but the standard deviation is less. This indicates that more firms begin to increase insurance coverage, but the difference between coverage becomes less. This matches with the intuition about the insurance market. When the insured ratio is low, some firms purchase a large amount and some purchase nothing, and thus, the deviation is larger. When more and more firms start to buy insurance, the difference between coverage will decrease and the deviation of coverage will become less. The results of descriptive analysis are presented in Table 3.2

and 3.3.

In order to further observe the difference between insured firms and uninsured firms, independent sample tests are conducted in this section. It is found that the difference of means between insured and uninsured firms is significant. This indicates that insured firms have significantly higher market value than uninsured firms from 2008 to 2010. Two implications can be drawn from this result. First, firms that purchase D&O insurance also have higher market value, and this implies D&O may be beneficial for firms' market value. The effect and magnitude of D&O insurance will be tested by following regression analyses. Secondly, firms with higher market value may purchase more insurance. The results of independent samples test are presented in Table 3.4, 3.5, and 3.6.

3.2.5.2 Regression analysis

In the first panel, the dummy variable, insured or not, is used as proxy variable of D&O insurance. From the result of 2008, it is found that the variables of D&O insurance purchase and the number of independent directors are positively significant. Furthermore, its coefficient 0.0957 largest, compared with other significant variables. This demonstrates that the purchase of D&O insurance is positively correlated to market value of firms. In the second panel, D&O insurance coverage is used as a proxy variable of D&O insurance. From 2008 to 2010, coverage of insurance is positively significant. This provides more obvious evidence than the previous panel and indicates a positive association between D&O insurance and market value. From such positive correlation,

the positive signal effect of D&O insurance will be one possible explanation. The results are reported in Table 3.7 and 3.8.

3.2.6 Conclusion

From the empirical tests in this section, they demonstrate a positive association between D&O insurance purchase and market value of firms. Purchasing D&O insurance and increasing insurance coverage are positively correlated to the increase of market value of firms. This result not only matches with the previous empirical results, but also sheds light on the effect of D&O insurance. A possible explanation is the signal hypothesis – a firm may purchase D&O insurance for bettering its reputation albeit its litigation risk is low. Even though insurance costs premium, but it can convey a positive signal which is even more significant than the book value and EPS of firms. Hence, the empirical result provides possible support for the signal hypothesis and explains why firms will do so even though they have good corporate governance and their litigation risk is comparatively low. More substantial elaboration will be provided in the following section.

3.3 Second test of signal effect of D&O insurance: foreign investment as dependent variable

3.3.1 Introduction

The previous section uses market value of firms as a dependent variable in regressions to

test the signal effect of D&O insurance. To secure its robustness, this section will conduct a regression on another dependent variable, which is foreign investment. It is usually believed that foreign investors emphasize firms' corporate governance more. This section will analyze if there is a positive association between foreign investment and D&O insurance purchase.

3.3.2 Variables and hypothesis development

Professor Sean J. Griffith argues that the following information about D&O insurance conveys an important signal concerning insured firms' qualities of corporate governance: the amount of coverage, identity of insurer, type of D&O insurance, and price.³⁸⁴ Like previous research, this study hypothesizes that more insurance coverage should emit positive signal to the market and thus would attract more foreign investments. In addition, as Sean J. Griffith suggests, the identity of the D&O insurer could also be an important signal.³⁸⁵ Different insurers may have different reputations and risk criteria of risk assessment.³⁸⁶ Being covered by a prestigious D&O insurer means that the insurer would like to ensure the loss of insured firms by his estate and reputation, and good signal is implied. In contrast, a cut-rate insurer may have worse risk management and less security. As a result, being covered by a cut-rate D&O insurer may not be good news to the market. Taking this into account, this dissertation uses the identity of the insurer as another proxy

³⁸⁴ See Sean J. Griffith, *supra* note 51, at 1204-6.

³⁸⁵ *Id.* at 1205.

³⁸⁶ *Id.*

variable of D&O insurance information.

In sum, because of the availability, this study will use D&O insurance coverage and identity of insurer as the proxy variables of D&O insurance information.³⁸⁷ And, such information about D&O insurance is set as the independent variables in the regression analysis. Regarding the calculation of D&O insurance coverage, it is common that one insured firm may purchase D&O insurance from more than one insurer. In other words, multiple insurers may coinsure insured firms. Under this circumstance, the amount of each insurance policy will be calculated by proportion of coinsurance.

Foreign investments, including the percentage of shares of foreign natural persons, foreign juristic persons and foreign financial juristic persons, are set as dependent variables. This is to further test the signal effect of D&O insurance: how D&O insurance emits signal to the market and, consequently, whether foreign investors are attracted or repelled. Other variables about firms' corporate governance are set as control variables in regressions. The variables used in this dissertation are presented in table 3.9. In conclusion, two hypotheses are presented from the discussion above:

H₁: D&O insurance coverage is correlated to foreign investments

H₂: Being insured by a prestigious insurer is correlate to foreign investments

³⁸⁷ In Taiwan, D&O insurance information about insurance purchase, insurance coverage and insurer are public, but the type of insurance policy and premium are not. Even though the importance of D&O insurance premium is also emphasized by Sean J. Griffith, this research does not consider this because the information is not available. Neither is the type of D&O insurance policy that firms purchased available. This situation also happens in the United States where D&O insurance information is not mandatorily disclosed. In contrast, the Canadian market has a full disclosure system and this information is available. See Sean J. Griffith, *supra* note 51, at 1203.

3.3.3 Data and method

The source of data in this section is the same as the test in 2.4.3. Ordinary least square regression (OLS) is applied to estimate the relationship between dependent variables and independent variables. This dissertation uses different proxy variables about foreign investments in respective panels, including the percentage of shares of foreign natural persons, foreign juristic persons and foreign financial juristic persons. Furthermore, bootstrap of 10,000 times replications is also conducted. The regression is presented below:

$$\begin{aligned} & \textit{foreign investment} \\ & = \alpha + \beta_1 \textit{D\&O insurance information} + \beta_2 \textit{corporate governance} \\ & + \varepsilon \end{aligned} \tag{1}$$

3.3.4 Empirical result and analysis

There are two main panels in empirical analyses. The first panel is to use D&O insurance coverage as the proxy variable of D&O insurance information. The second panel is to use the identity of the insurer as the proxy variable of D&O insurance information. The final results are presented in Table 3.10, 3.11, 3.12, and 3.12.

3.3.4.1 Panel 1

In the first panel, when the dependent variable is the percentage of shares held by foreign

natural persons, the D&O insurance coverage is not statistically significant. However, when the dependent variable is the percentage of shares held by foreign juristic persons, D&O insurance coverage is positively significant from 2008 to 2010. This result generally shows that D&O insurance coverage is positively related to the shares held by foreign juristic persons. The result of bootstrap is very similar. The variable D&O insurance coverage is still positively significant except for 2008. When the dependent variable is the percentage of shares held by foreign financial juristic persons, the variable D&O insurance coverage is positively significant from 2008 to 2010. The result of bootstrap is also identical. This result demonstrates that the more D&O insurance coverage purchased, the more investments there are from foreign financial juristic persons. This demonstrates a positive correlation of D&O insurance coverage and foreign investment.

3.3.4.2 Panel 2

Sean J. Griffith argues that the identity of the insurer can convey the signal concerning insured firms' qualities.³⁸⁸ Taking this into account, the reputation and quality of insurers should be positively related to the qualities of insured firms. In order to test this theory, the second panel uses the identity of the D&O insurer as the proxy variable of D&O insurance information. Five dummy variables, insurer 1 to 5, denote the six categories of

³⁸⁸ *Id.*, at 1025.

D&O insurers, the top 5 insurers and other insurers,³⁸⁹ in property insurance market. Similarly, percentage of shares held by foreign natural persons, foreign juristic persons and foreign financial juristic person are used as dependent variables in respective regressions.

Generally, the results in this panel is much vaguer than the previous models, especially proxy variables of the identity of insurer are not significant in 2010. Other significant results have discrepant tendencies: coefficient of insurer 3 is positive in 2008 and 2009, but insurer 4 is negative in 2009 and insurer 1 is negative in 2010. A possible explanation is that, as discusses in 1.3, Taiwanese D&O insurance market is comparatively young, and its market leaders are not identical to those in general property insurance market. Different insurers may have different implication to the market, and thus affect the evaluations from investors of insured firms. However, since most of the tests are not significant, and thus the overall effect of the identity of insurer is still vague. More comprehensive empirical tests, especially when more data are available, are suggested by this research.

3.3.5 Conclusions

In this section, the empirical evidence shows that D&O insurance coverage is generally and positively correlated to the foreign investment of the insured firms. This result is

³⁸⁹ If a categorical variable has n levels, not n but $n-1$ dummy variables each with two levels are required. See DAVID RAY ANDERSON, DENNIS J. SWEENEY & THOMAS A. WILLIAMS, *STATISTICS FOR BUSINESS AND ECONOMICS* 672 (2010).

similar to the previous findings that D&O insurance purchase is positively related to the quality of insured firms, and also provides initial support of theory of Sean J. Griffith in the background of Taiwan. Such findings may provide grounds for signal hypothesis – D&O insurance conveys a positive signal to market and thus attracts foreign investors. More arguments and responses to counterarguments will be provided in the Chapter 4.

3.4 Third test of signal effect of D&O insurance: D&O insurance as dependent variable

3.4.1 Introduction

Similar to the previous two sections, more robustness checks of the signal hypothesis of D&O insurance will be conducted in different approaches in this section. In Chapter 2, in addition to the test of the monitoring hypothesis, this research also sets up three proxy variables for the signal effect of D&O insurance, which includes the shares of foreign natural person, the shares of foreign juristic person and shares of foreign financial juristic person. If they are positively associated with the proxy variables of D&O insurance, then this result would indicate that foreign investors indeed emphasize D&O insurance. This will also imply the positive effect of D&O insurance and echo the empirical result of this chapter. The comparison between these results would be made to check their robustness.

3.4.2 Descriptive statistics

In the dataset of Chapter 2, the statistical analysis implies that the signal hypothesis is supported. Foreign natural persons hold more shares in uninsured companies rather than

insured companies in 2008. However, foreign juristic persons and foreign financial juristic persons, which are more professional and concerned about corporate governance, have more shares in insured companies than uninsured companies. This indicates foreign juristic persons and foreign financial juristic persons indeed emphasize the importance of D&O insurance, and the hypothesis that the purchase of D&O insurance has signal effects to attract investment is sustained. Similar situations also happen in 2009 and 2010. Shares of foreign natural persons are slightly higher for uninsured companies than insured ones, but this is not statistically significant. In contrast, firms with D&O insurance have more shares of foreign juristic persons and financial persons than firms without D&O insurance; this is very significant statistically (<0.001). This shows that foreign juristic persons and financial persons who care corporate governance and signal also care the purchase of D&O insurance. This implies that the signal hypothesis may be supported.

3.4.3 Model 1: logistic regression

3.4.3.1 Panel A: 2008

Different from monitoring hypothesis, signal hypothesis is implied by the empirical result in this section. The firms with good corporate governance care more about corporate governance. In contrast to the firms with poor corporate governance, they are more willing to improve governance and reputation. Therefore, even though they have better governance and less litigation record, they are still willing to purchase D&O insurance.

This may be because they care about corporate governance, so they do not mind doing everything possible to promote governance and reputation in order to attract greater investments. In this model, the percentage of shares of foreign juristic persons and foreign juristic financial persons are positively significant. This indicates that foreign juristic persons and foreign juristic financial persons indeed evaluate D&O insurance positively. The coefficient of foreign juristic financial persons is 0.311 and comparatively high. This may provide possible explanation for signal hypothesis – firms may attract investments via insurance purchase. Thus, signal hypothesis is implied.

3.4.3.2 Panel B: 2009

Regarding proxies of signal hypothesis, the variable of the percentage of shares of foreign financial juristic persons is not significant. However, the percentage of shares of foreign juristic persons is still positively significant. This indicates that more shares of foreign juristic persons will increase the demand for D&O insurance. The positive association between D&O insurance and foreign investment is still demonstrated.

3.4.3.3 Panel C: 2010

The percentage of shares of foreign juristic persons and foreign juristic financial persons is positive and significant. All these results are different from the theory of monitoring hypothesis, and instead provide possible ground for the signal hypothesis.

3.4.4 Model 2: OLS and censored regression

3.4.4.1 Log transformation

In log transformation model, the shares held by foreign financial juristic persons are positively significant and thus imply that signal hypothesis is supported. In Taiwan, firms with good corporate governance have more interest in purchasing D&O insurance. This may be because they care about corporate governance and intend to purchase insurance to emit some signal, albeit litigation risk is low.

3.4.4.2 Box-Cox transformation

The result here provides similar evidence. In 2009 and 2010, shares of foreigner financial juristic persons are positively related to coverage, and signal hypothesis may be implied.

3.4.4.3 Censored regression and CLAD

The variable for the percentage of shares held by foreigner financial juristic persons is positively significant in 2009 and 2010. Attention should be given to the results that the percentage of shares held by foreign person variable is negatively significant. This indicates that more shares that are held by foreign persons, the more likely it is to result in decreased demand for insurance. However, the percentage of shares held by foreign juristic persons and foreign financial juristic persons are both positively significant. This matches with the previous results. In comparison with natural persons, foreign institutional investors are usually concerned primarily with corporate governance in

relationship to investment targets. Accordingly, the positive association between D&O insurance and foreign investment is still suggested.

3.4.5 Principle component analysis (PCA) and regression

Form the analysis above, it is found that the regressions in Chapter 2 do not provide grounds for the monitoring hypothesis but the signal hypothesis. Such result corresponds with the empirical result in this chapter. This section will use the dataset in Chapter 2 to carry out principle component analysis to further test the magnitudes of proxy variables of signal hypothesis.

The principal component analysis is proposed by Karl Pearson proposed.³⁹⁰ It is a multivariate technique to extract important components' form variables and still explain variance properly.³⁹¹ It can reduce data dimensionality³⁹² and explore data trends but also retain as much of the original data as possible. PCA is widely used in social science, business and finance research.³⁹³ PCA will be employed to find the principal component of variables. If the proxies of signal hypothesis are significant in PCA, then signal hypothesis may be implied. The detailed results are presented from Table 3.14 through

³⁹⁰ See K. Pearson, *On Lines and Planes of Closest Fit to Systems of Points in Space*, 2:6 PHIL. MAG. 559-72 (1901).

³⁹¹ See Hervé Abdi & Lynne J. Williams, *Principal component analysis*, 2:4 WILEY INTERDISC. REV. 433, 433 (2010).

³⁹² See Sampath Deegalla & Henrik Bostrom, *Reducing High-Dimensional Data by Principal Component Analysis vs. Random Projection for Nearest Neighbor Classification*, in ICMLA '06 PROCEEDINGS OF THE 5TH INTERNATIONAL CONFERENCE ON MACHINE LEARNING AND APPLICATIONS (IEEE Computer Society Washington, 2006).

³⁹³ For example, David F. Larcker, Scott A. Richardson & A. Irem Tuna use PCA to reduce dimensions from 39 individual corporate governance indicators to 14 factors. See David F. Larcker, Scott A. Richardson & A. Irem Tuna, *Corporate Governance, Accounting Outcomes, and Organizational Performance*. 82:4 ACCT. REV. 963, 965 (2007), available at <http://ssrn.com/abstract=976566>.

Table 3.18.

3.4.5.1 Panel A. 2008

For preparation, KMO and Bartlett's Test are helpful to determine whether the data is suitable for PCA or not. As for the data of 2008, the test score of Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.602. A low value (<0.5) for this score indicates that the data may not be appropriate for PCA. And, the test score of Bartlett's Test of Sphericity is 0.000 and thus null hypothesis that the correlation matrix is an identity matrix³⁹⁴ is rejected. A total of 16 variables can be extracted to seven components, which are significant. These seven components can explain 61.485% of all variance.

Among these seven components, component 1 is the most important and significant; 14% of all variance is explained by it. It can be found that component 1 primarily consists of capital, remuneration and the percentage of shares of foreign juristic persons. Considering these factors, component 1 could be named as “capital and compensation of directors.” And, in component 1, the proxy of signal hypothesis, the percentage of shares of foreign juristic persons, is the top third factor. This indicates the importance of the percentage of shares of foreign juristic persons among all variables.

Again, if component 1 is used as the dependent variable and the amount of D&O insurance coverage is used as the independent variable to conduct OLS regression, the

³⁹⁴ See UCLA ATS Statistical Consulting, http://www.ats.ucla.edu/stat/SPSS/output/principal_components.htm (last visited Jan. 15, 2013).

adjust R-square is 0.206. The coefficient of variable component 1 is 0.541 and the p-value is close to 0. Similarly, if component 1 is used as the independent variable and whether D&O insurance was purchased or not is used as the dependent, the model is significant and p-value is close to 0. This result not only confirms the importance of component 1 with PCA above but also indicates that the percentage of shares of foreign juristic persons positively and significantly affects the demand for D&O insurance.

3.4.5.2 Panel B. 2009

The result from 2009 is almost identical to that of 2008. There are seven components, which are significant and extracted from 16 variables, and the most important component is consists of capital, remuneration and the percentage of shares of foreign juristic persons; 15.12% of total variance can be explained by component 1. This also demonstrates the importance of the proxy of signal hypothesis, which contains the percentage of shares of foreign juristic persons. When component 1 is used as the independent variable and D&O insurance coverage is used as the dependent variable, the adjust R-square is 0.217 Component 1 is very significant. The PCA and regression of 2009 also confirms the positive contributions of the proxy of signal hypothesis to the demand for insurance.

3.4.5.3 Panel C. 2010

The result for 2010 is slightly different from the previous models. There are only six,

rather than seven, components, which is significant. However, the most important component “capital and compensation of directors” also consists of capital, remuneration and the percentage of shares of foreign juristic persons; 14% of all variance can be explained by this component. The percentage of shares of foreign juristic persons ranks as number two in component 1. This is more significant than it was in the previous two years and indicates the importance of proxy of signal hypothesis. This result is confirmed by regression analysis. In OLS regression, where the dependent variable is coverage, adjust R-square is 0.231 and component 1 is still positively significant at 0.001 level. In the logistic regression, where the dependent variable is whether a company is insured or not, component 1 is also positively significant at 0.001 level. This result shows that the proxy of signal hypothesis is critical among all variables and positively contributes to the demand for D&O insurance.

3.4.6 Conclusions

This section has discussed monitoring hypothesis and tested it within the context of Taiwan. The empirical evidence shows that the monitoring hypothesis is not supported in Taiwan. Firms with good corporate governance and less risk intend to purchase more D&O insurance. In contrast, firms with bad corporate governance and more risk intend to purchase less D&O insurance. A possible alternative explanation of this phenomenon is signal hypothesis. Firms with good corporate governance are usually more concerned about corporate governance. Even though they are of better quality and have less

potential risk, they are still willing to purchase insurance to convey that they are good firms and thus improve their reputations and attract investors. In the empirical works in this section, the percentage of shares of foreign investors are used as the proxy variables of signal hypothesis. This hypothesis is implied by regressions and principal component analysis. This study summarizes that firms with good corporate governance have more demand for insurance, and this is likely because it can emit a positive signal rather than because they need insurance to cancel out potential risks.

FIGURES AND TABLES

Table 3.1 Table of variables (1)

Hypothesis	Variables	Definition	Expected sign
Dependent variables	<i>Log of market value</i>	Natural logarithm of market value of firms. The natural logarithm of average stock price of May 2009 in panel 2008. The natural logarithm of average stock price of May 2010 in panel 2009. The natural logarithm of average stock price of April 2011 in panel 2010.	N/A
Independent variables	<i>Book value</i>	Book value of firms	+
	<i>EPS</i>	Earnings per share of firms	+
Signal hypothesis	<i>D&O purchase</i>	The dummy variable equals 1 when firms with insurance and 0 otherwise	+
	<i>D&O coverage</i>	Natural logarithm of D&O insurance coverage	+
Corporate governance hypothesis	<i>Duality of CEO and COB</i>	The dummy variable equals 1 if chairman of board of directors is identical to CEO and 0 otherwise.	-
	<i>Internal risk</i>	If any chairman of the board, CEO, financial manager and supervisory director is appointed by a parent or controlling group, the value will be 1. The total ranges from 0 to 4.	-
	<i>Independent Director</i>	Independent directors. This indicates the number of independent directors.	+
	<i>Shares held by director</i>	The percentage of shares held by directors (%)	-
	<i>Shares held by major shareholder</i>	The percentage of shares held by major shareholders (%)	-
	<i>Controlled director</i>	Controlled directors. This indicates the number of directors who are nominated or controlled by the largest controlling group of the company, such as family, relatives, or parent company.	-

Table 3.2 Descriptive statistics (1)

This table contains the descriptive statistics of variables used in this chapter by year.

Variables	2008		2009		2010	
	mean	Stdev.	mean	Stdev.	mean	Stdev.
Log of market value	2.75	0.79	3.19	0.78	3.25	0.85
Book value	16.17	8.87	17.09	9.82	18.14	11.37
EPS	1.07	3.87	1.32	3.15	2.06	3.41
D&O purchase	0.49	0.50	0.51	0.50	0.57	0.50
D&O coverage	18.89	1.31	18.90	1.16	18.87	1.04
Director	9.58	2.53	9.27	2.99	9.55	2.51
Independent Director	1.30	1.38	1.17	1.24	1.23	1.23
Controlled director	1.72	1.67	1.61	1.62	1.63	1.57
Shares held by director	24.23	15.14	23.60	14.83	23.32	14.99
Shares held by major shareholder	19.67	11.32	20.12	11.42	19.85	11.54
Duality of CEO and COB	0.28	0.45	0.28	0.45	0.29	0.45
Internal risk	1.91	0.91	1.87	0.94	1.84	0.95

Table 3.3 Descriptive statistics (2)

This table contains the descriptive statistics of variables, comparing the firms with D&O insurance and the firms without D&O insurance. In general, firms with D&O insurance have increased capital, directors and independent directors than firms without D&O insurance. Firms with D&O insurance also have fewer controlled directors, shares held by directors and major shareholders, duality of CEO and COB, and internal risk.

	2008				2009				2010			
	Uninsured		Insured		Uninsured		Insured		Uninsured		Insured	
	mean	stdev	mean	stdev	mean	stdev	mean	stdev	mean	stdev	mean	stdev
Log of market value	2.62	0.73	2.87	0.82	3.09	0.71	3.28	0.82	3.12	0.75	3.32	0.88
Book value	16.11	8.35	15.78	8.95	16.70	9.18	17.66	10.56	17.97	10.98	18.73	12.37
EPS	1.28	4.47	0.82	3.24	1.22	3.24	1.41	3.08	2.15	3.50	2.12	3.58
D&O purchase	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
D&O coverage	-	-	18.89	1.31	-	-	18.90	1.16	-	-	18.87	1.04
Capital	15.06	1.43	15.37	1.74	15.01	1.42	15.44	1.77	21.91	1.37	22.33	1.70
Director	9.50	2.83	9.64	2.27	9.08	3.24	9.47	2.70	9.34	2.68	9.64	2.29
Independent Director	0.87	1.27	1.64	1.36	0.83	1.15	1.50	1.24	0.79	1.13	1.53	1.18
Controlled director	2.06	1.88	1.42	1.39	1.86	1.81	1.37	1.37	1.93	1.72	1.38	1.35
Shares held by director	25.24	14.64	22.06	14.59	25.24	15.09	22.04	14.42	25.17	14.76	21.76	14.60
Shares held by major shareholder	20.33	11.29	18.62	10.89	21.76	12.04	18.56	10.58	21.47	11.59	18.36	10.97
Duality of CEO and COB	0.30	0.46	0.27	0.44	0.28	0.45	0.29	0.45	0.29	0.46	0.28	0.45
Internal risk	2.11	0.90	1.76	0.88	2.03	0.95	1.72	0.91	2.06	0.91	1.67	0.94

Table 3.4 Independent samples test of 2008

This table contains the independent sample test of 2008. This assesses the difference between firms with D&O insurance and without D&O insurance. Except book value, director and duality of CEO and COB, other variables are significant. This indicates the differences of mean in table 3 are significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variance	F	Sig.	t	df	Sig.(two tailed)	Mean difference	Std. Error Mean	95 % CI	
									Lower	Upper
Log of market value	assumed	7.037	.008	-5.869	1233	.000***	-.259	.044	-.346	-.173
	not assumed			-5.862	1212.457	.000***	-.259	.044	-.346	-.173
Book value	assumed	.034	.854	.630	1135	.529	.325	.516	-.687	1.337
	not assumed			.633	1132.945	.527	.325	.514	-.683	1.333
EPS	assumed	3.752	.053	2.085	1237	.037*	.464	.222	.027	.900
	not assumed			2.092	1140.674	.037*	.464	.222	.029	.899
Log of capital	assumed	25.64	.000	-3.484	1237	.001***	-.314	.090	-.492	-.137
	not assumed			-3.477	1182.634	.001***	-.314	.090	-.492	-.137
Director	assumed	6.645	.010	-.956	1218	.339	-.141	.147	-.430	.148
	not assumed			-.958	1173.420	.338	-.141	.147	-.429	.147
Independent Director	assumed	2.191	.139	-10.27	1218	.000***	-.774	.075	-.922	-.626
	not assumed			-10.264	1209.334	.000***	-.774	.075	-.922	-.626
Controlled director	assumed	23.88	.000	6.707	1218	.000***	.638	.095	.451	.824
	not assumed			6.727	1132.554	.000***	.638	.095	.452	.824
Shares held by director	assumed	.121	.728	3.800	1218	.000***	3.182	.837	1.539	4.825
	not assumed			3.800	1217.681	.000***	3.182	.837	1.539	4.825
Shares held by major shareholder	assumed	1.889	.170	2.682	1218	.007**	1.705	.636	.458	2.953
	not assumed			2.683	1217.708	.007**	1.705	.636	.459	2.952

Table 3.4 (cont.)

Duality of CEO and COB	assumed	8.612	.003	1.466	1237	.143	.038	.026	-.013	.088
	not assumed			1.467	1236.562	.143	.038	.026	-.013	.088
Internal risk	assumed	.021	.884	6.877	1237	.000***	.348	.051	.249	.448
	not assumed			6.879	1236.932	.000***	.348	.051	.249	.448

Table 3.5 Independent samples test of 2009

This table contains the independent sample test of 2009. This assesses the difference between firms with D&O insurance and without D&O insurance. Except book value, EPS, director and duality of CEO and COB, other variables are significant. This indicates the differences of mean in table 3 are significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variance	F	Sig.	t	df	Sig.(two tailed)	Mean difference	Std. Error Mean	95 % CI	
									Lower	Upper
Log of market value	assumed	11.15	.000	-4.43	1273	.000***	-.19275	.04342	-.27793	-.10757
	not assumed			-4.47	1271.44	.000***	-.19275	.04309	-.27728	-.10822
Book value	assumed	3.125	.077	-1.71	1260	.086	-.95739	.55787	-2.05185	.13708
	not assumed			-1.72	1247.86	.085	-.95739	.55627	-2.04871	.13394
EPS	assumed	.011	.917	-1.110	1324	.267	-.19269	.17360	-.53324	.14787
	not assumed			-1.10	1315.32	.268	-.19269	.17373	-.53350	.14813
Log of capital	assumed	32.898	.000	-4.89	1324	.000***	-.43072	.08804	-.60345	-.25800
	not assumed			-4.90	1279.22	.000***	-.43072	.08776	-.60289	-.25856
Director	assumed	4.410	.036	-2.40	1324	.016	-.39302	.16363	-.71402	-.07201
	not assumed			-2.39	1268.61	.017	-.39302	.16407	-.71490	-.07113
Independent Director	assumed	3.480	.062	-10.2	1324	.000***	-.67082	.06580	-.79990	-.54174
	not assumed			-10.2	1321.93	.000***	-.67082	.06573	-.79976	-.54188
Controlled director	assumed	26.679	.000	5.55	1324	.000***	.48913	.08813	.31624	.66201
	not assumed			5.527	1212.60	.000***	.48913	.08849	.31551	.66274

Table 3.5 (cont.)

Shares held by director	assumed	.844	.359	3.878	1284	.000***	3.19131	.82298	1.57677	4.80585
	not assumed			3.873	1271.78	.000***	3.19131	.82397	1.57483	4.80779
Shares held by major shareholder	assumed	9.573	.002	5.068	1284	.000***	3.19897	.63121	1.96066	4.43728
	not assumed			5.051	1243.55	.000***	3.19897	.63334	1.95643	4.44151
Duality of CEO and COB	assumed	.078	.780	-.140	1324	.889	-.00347	.02482	-.05215	.04522
	not assumed			-.140	1323.06	.889	-.00347	.02482	-.05215	.04521
Internal risk	assumed	.198	.657	6.118	1324	.000***	.31146	.05091	.21159	.41133
	not assumed			6.114	1316.65	.000***	.31146	.05094	.21152	.41140

Table 3.6 Independent samples test of 2010

This table contains the independent sample test of 2010. This assesses the difference between firms with D&O insurance and without D&O insurance. Except book value, director and duality of CEO and COB, other variables are significant. This indicates the differences of mean in table 3 are significant. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	Equal variance	F	Sig.	t	df	Sig.(two tailed)	Mean difference	Std. Error Mean	95 % CI	
									Lower	Upper
Log of market value	assumed	10.698	.001	-4.14	1237	.000***	-.19696	.04752	-.29019	-.10372
	not assumed			-4.23	1220.32	.000***	-.19696	.04652	-.28822	-.10570
Book value	assumed	1.371	.242	-1.115	1211	.265	-.76169	.68319	-2.10205	.57867
	not assumed			-1.13	1183.51	.258	-.76169	.67241	-2.08093	.55755
EPS	assumed	.255	.614	.106	1239	.915	.02163	.20323	-.37708	.42034
	not assumed			.107	1163.87	.915	.02163	.20264	-.37595	.41922
Log of capital	assumed	18.249	.000	-4.72	1239	.000***	-.42409	.08985	-.60035	-.24782
	not assumed			-4.86	1235.05	.000***	-.42409	.08726	-.59528	-.25289
Director	assumed	3.164	.076	-2.118	1239	.034	-.29927	.14132	-.57653	-.02201
	not assumed			-2.07	1048.68	.038	-.29927	.14435	-.58251	-.01602
Independent Director	assumed	.085	.770	-11.14	1239	.000***	-.73900	.06632	-.86912	-.60889
	not assumed			-11.20	1174.11	.000***	-.73900	.06596	-.86842	-.60959
Controlled director	assumed	12.904	.000	6.372	1239	.000***	.55553	.08718	.38450	.72656
	not assumed			6.173	991.618	.000***	.55553	.09000	.37892	.73214

Table 3.6 (cont.)

Shares held by director	assumed	.118	.731	4.050	1239	.000***	3.40361	.84045	1.75475	5.05246
	not assumed			4.044	1145.39	.000***	3.40361	.84169	1.75218	5.05503
Shares held by major shareholder	assumed	3.874	.049	4.820	1239	.000***	3.10462	.64416	1.84085	4.36839
	not assumed			4.784	1118	.000***	3.10462	.64899	1.83126	4.37799
Duality of CEO and COB	assumed	.626	.429	.397	1237	.692	.01032	.02600	-.04069	.06133
	not assumed			.396	1141.25	.692	.01032	.02604	-.04077	.06141
Internal risk	assumed	3.661	.056	7.384	1237	.000***	.39275	.05319	.28839	.49711
	not assumed			7.408	1161.35	.000***	.39275	.05302	.28873	.49677

Table 3.7 The result of regression panel A

This table contains the result of the regression where binary variable purchasing D&O insurance or not is used as the proxy variable of D&O insurance. The dependent variable is the natural logarithm of firms' market value. Interaction terms are generated by the product of D&O insurance purchase and significant variables. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)
year	2008	2008-interaction	2009	2010
Book value	0.0177 (0.85)	0.0191 (0.92)	-0.0105 (-0.50)	0.0384 (1.36)
EPS	-0.0290 (-1.64)	-0.0283 (-1.61)	0.0456* (2.11)	-0.0117 (-0.57)
D&O purchase	0.0957* (2.45)	0.0834* (2.18)	0.0759 (1.75)	0.0468 (1.12)
Duality of CEO and COB	-0.0423 (-1.02)		-0.128** (-2.74)	-0.195*** (-4.30)
Internal risk	0.0468* (1.97)	0.0139 (0.45)	0.0628* (2.38)	0.0784** (3.05)
Independent Director	0.0828*** (6.01)	0.119*** (5.76)	0.113*** (6.64)	0.112*** (6.66)
Controlled director	-0.0298* (-2.39)	-0.0372* (-2.54)	-0.0158 (-1.11)	-0.0217 (-1.47)
Shares held by director	0.00144 (1.15)		0.000960 (0.69)	0.00154 (1.12)
Shares held by major shareholder	-0.00136 (-0.82)		-0.00154 (-0.87)	-0.00165 (-0.95)

Table 3.7 (cont.)

D&O purchase * controlled director		0.0217 (0.84)		
D&O purchase * independent director		-0.0594* (-2.16)		
D&O purchase * internal risk		0.0483 (1.05)		
Constant	1.986*** (16.26)	2.148*** (21.95)	2.639*** (19.88)	2.459*** (17.98)
<i>N</i>	789	791	894	1015
<i>R</i> ²	0.0898	0.0955	0.0809	0.0744
<i>Adj- R</i> ²	0.0793	0.0851	0.0716	0.0661
<i>Breusch-Pagan test</i>	0.8448	0.6695	0.7794	0.0813

Table 3.8 The result of regression panel B

This table contains the result of the regression where D&O insurance coverage is used as the proxy variable of D&O insurance. The dependent variable is the natural logarithm of firms' market value. Interaction terms are generated by the product of D&O insurance purchase and significant variables. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	2008	2008	2009	2009	2010	2010
		-interaction		-interaction		-interaction
Book value	0.0356 (1.19)	0.0223 (1.07)	-0.0321 (-1.09)		0.0264 (0.69)	
EPS	-0.0357 (-1.46)	-0.0368* (-2.10)	0.0579 (1.83)		0.00298 (0.11)	
D&O coverage	0.0440* (2.38)	0.0507** (2.65)	0.0575* (2.17)	0.0572* (2.18)	0.0840** (3.28)	0.134*** (4.25)
Duality of CEO and COB	-0.0333 (-0.54)		-0.155* (-2.26)	-0.107 (-1.94)	-0.204** (-3.18)	-0.257*** (-4.45)
Internal risk	0.0698 (1.92)		0.0682 (1.70)		0.0823* (2.21)	0.100*** (3.62)
Independent Director	0.0623** (3.30)	0.103*** (7.95)	0.0728** (3.05)	-0.0204 (-0.86)	0.115*** (5.02)	0.114*** (5.40)
Controlled director	-0.0162 (-0.72)		0.00543 (0.22)		0.0213 (0.87)	
Shares held by director	0.000308 (0.17)		-0.00266 (-1.28)		0.000356 (0.18)	
Shares held by major shareholder	-0.00151 (-0.62)		-0.00149 (-0.56)		-0.00535* (-2.16)	

Table 3.8 (cont.)

D&O coverage *						
Independent Director	-0.00360			-0.0158		-0.0520**
	(-0.28)			(-0.82)		(-2.64)
D&O coverage *						
Duality of CEO and COB				-0.0780		-0.139*
				(-1.43)		(-2.15)
D&O coverage *						
Internal risk						0.0618*
						(2.14)
Constant	1.164**	2.162***	1.839**	2.913***	0.985	2.932***
	(2.81)	(22.26)	(3.30)	(88.09)	(1.86)	(94.70)
<i>N</i>	409	812	477	672	577	704
<i>R</i> ²	0.0528	0.0843	0.0503	0.0180	0.0940	0.0873
<i>Adj-R</i> ²	0.0315	0.0787	0.0320	0.0106	0.0796	0.0781
<i>Breusch-Pagan test</i>	0.6286	0.6481	0.9101	0.1873	0.6239	0.3700

Table 3.9 Table of variables (2)

Factor	Variables	Definition	Expected sign	
Dependent variables	<i>Shares held by foreign natural person</i>	The percentage of shares of foreign natural person		
	<i>Shares held by foreign juristic person</i>	The percentage of shares of foreign juristic person		
	<i>Shares held by foreign financial juristic person</i>	The percentage of shares of foreign juristic financial person		
Independent variables	<i>D&O insurance information</i>	<i>D&O coverage</i>	Natural logarithm of D&O insurance coverage	?
		<i>D&O insurer</i>	Identity of D&O insurer	?
		<i>Log of capital</i>	Natural logarithm of total capital of firms	?
		<i>ROE</i>	Return on equity of firms	-
		<i>Log of remuneration</i>	Natural logarithm of total compensation package offered to directors	?
	<i>Corporate governance</i>	<i>Director</i>	The total number of directors	?
		<i>Independent director</i>	The number of independent directors	?
	<i>Controlled director</i>	Controlled directors.	+	

Table 3.9 (cont.)

	This indicates the number of directors who are nominated or controlled by the largest controlling group of the company, such as family, relatives, or parent company.	
<i>Shares held by director</i>	The percentage of shares held by directors (%)	+
<i>Shares held by major shareholder</i>	The percentage of shares held by major shareholders (%)	+
<i>Duality of CEO and COB</i>	The dummy variable equals 1 if chairman of board of directors is identical to CEO and 0 otherwise.	+
<i>Internal risk</i>	If any chairman of board, CEO, financial manager or supervisory director is appointed by parent or controlling group, the value is granted 1. The total ranges from 0 to 4.	+
<i>Debt-asset ratio</i>	Debt-asset ratio of firms	+
<i>Significant litigation</i>	The number of disclosed significant litigations	+

Table 3.10 The test of signal effect of D&O insurance information: D&O coverage

This table reports the test of the effects of D&O insurance information in respective years, applying OLS regression after White's heteroscedasticity correction. The proxy variables of signal effect of D&O insurance are the percentage of shares held by foreign natural person, foreign juristic person and foreign financial juristic person. The D&O insurance information tested here is its coverage. Other independent variables about insured firms' corporate governance are used as controlled variables. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2008	2009	2010	2008	2009	2010	2008	2009	2010
	Shares held by foreign natural person			Shares held by foreign juristic person			Shares held by foreign financial juristic person		
D&O coverage	0.0188 (0.94)	0.0436 (1.35)	0.0282 (1.24)	0.827 (1.61)	1.519** (2.92)	1.591** (2.79)	0.156*** (3.93)	0.221*** (5.31)	0.240*** (5.36)
Log of capital	-0.0183 (-0.67)	-0.0149 (-0.53)	-0.0130 (-0.79)	5.217*** (12.07)	5.130*** (12.64)	6.616*** (16.00)	0.198*** (4.10)	0.194*** (5.73)	0.386*** (9.96)
ROE	-0.00266 (-1.90)	-0.00702* (-2.24)	0.00722* (2.08)	0.0212 (0.84)	-0.0239 (-1.48)	-0.0527 (-1.16)	0.00520 (0.96)	-0.00103 (-0.60)	-0.00252 (-0.88)
Log of remuneration	0.0294 (1.59)	0.0604** (2.98)	-0.000495 (-0.14)	2.927*** (6.01)	0.724 (1.95)	-0.112* (-2.09)	0.173*** (3.46)	0.133*** (6.29)	-0.0272*** (-5.53)
Director	-0.0352** (-2.89)	-0.0278* (-2.09)	-0.0173 (-1.90)	-0.706** (-2.86)	-0.903*** (-4.60)	-0.853*** (-3.93)	-0.0869* (-2.57)	-0.103*** (-4.90)	-0.127*** (-4.78)
Independent director	0.0260 (1.06)	0.0333 (0.87)	-0.0112 (-0.61)	1.229** (3.26)	1.209** (3.09)	0.998** (2.61)	0.0357 (1.08)	0.0655 (1.66)	0.0313 (0.80)
Controlled director	0.0512 (1.06)	0.0265 (0.61)	0.0253 (0.61)	1.077** (2.69)	0.812* (2.27)	0.697 (1.78)	0.114* (2.12)	0.0609 (1.70)	0.0488 (1.09)
Shares held by director	-0.0000739 (-0.02)	-0.00375 (-1.63)	-0.00474* (-2.31)	0.0545 (1.34)	0.0919* (2.40)	0.0837* (2.24)	-0.00859*** (-3.37)	-0.00441 (-1.58)	-0.00321 (-1.51)

Table 3.10 (cont.)

Shares held by major shareholder	0.00362 (0.85)	0.00353 (1.06)	0.000780 (0.38)	0.413*** (8.79)	0.320*** (6.67)	0.336*** (6.49)	0.0101* (2.10)	0.0148*** (4.12)	0.0140*** (4.15)
Duality of CEO and COB	0.00208 (0.02)	-0.0514 (-0.59)	0.0337 (0.53)	1.365 (1.36)	3.051** (3.03)	2.639** (2.83)	-0.0493 (-0.43)	0.328*** (3.34)	0.410*** (4.66)
Internal risk	-0.0891 (-1.20)	-0.0363 (-0.49)	-0.00509 (-0.11)	-1.625* (-2.42)	-0.848 (-1.36)	-0.765 (-1.22)	-0.0109 (-0.17)	-0.000527 (-0.01)	0.0846 (1.57)
Debt-asset ratio	0.0000494 (0.64)	0.0000599 (0.83)	0.000178 (1.83)	-0.00246 (-1.85)	-0.00280* (-2.18)	-0.00950*** (-4.64)	0.0000528 (0.34)	-0.000160 (-1.75)	-0.000682** (-2.89)
Significant litigation	0.0639 (0.77)	-0.0189 (-0.26)	-0.0187 (-0.45)	-0.481 (-0.76)	-0.371 (-0.61)	-0.481 (-1.07)	-0.154** (-3.27)	-0.0895 (-1.84)	-0.0640 (-1.58)
Constant	0.0494 (0.08)	-0.966 (-1.29)	0.281 (0.54)	-135.5*** (-14.79)	-111.9*** (-12.54)	-167.8*** (-19.08)	-7.798*** (-8.00)	-8.517*** (-10.39)	-11.91*** (-11.23)
<i>N</i>	764	845	854	764	845	854	764	845	854
<i>R</i> ²	0.0155	0.0288	0.0192	0.5695	0.4878	0.5348	0.2682	0.3144	0.4199

Table 3.11 The test of signal effect of D&O insurance information: D&O coverage

Following the previous test, this table reports the result of bootstrapping. t statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2008	2009	2010	2008	2009	2010	2008	2009	2010
	Shares held by foreign natural person			Shares held by foreign juristic person			Shares held by foreign financial juristic person		
D&O coverage	0.0188 (0.90)	0.0436 (1.32)	0.0282 (1.22)	0.827 (1.56)	1.519** (2.84)	1.591** (2.71)	0.156*** (3.80)	0.221*** (5.10)	0.240*** (5.44)
Log of capital	-0.0183 (-0.65)	-0.0149 (-0.50)	-0.0130 (-0.78)	5.217*** (11.54)	5.130*** (11.78)	6.616*** (15.72)	0.198*** (4.03)	0.194*** (5.46)	0.386*** (9.93)
ROE	-0.00266 (-0.24)	-0.00702 (-1.35)	0.00722* (2.00)	0.0212 (0.10)	-0.0239 (-0.88)	-0.0527 (-1.11)	0.00520 (0.11)	-0.00103 (-0.35)	-0.00252 (-0.83)
Log of remuneration	0.0294 (1.43)	0.0604** (2.73)	-0.000495 (-0.14)	2.927*** (4.73)	0.724 (1.69)	-0.112* (-2.08)	0.173** (2.80)	0.133*** (5.46)	-0.0272*** (-5.52)
Director	-0.0352** (-2.79)	-0.0278* (-2.06)	-0.0173 (-1.86)	-0.706** (-2.85)	-0.903*** (-4.49)	-0.853*** (-3.88)	-0.0869* (-2.50)	-0.103*** (-4.79)	-0.127*** (-4.74)
Independent director	0.0260 (1.05)	0.0333 (0.87)	-0.0112 (-0.61)	1.229*** (3.30)	1.209** (3.09)	0.998** (2.62)	0.0357 (1.05)	0.0655 (1.67)	0.0313 (0.80)
Controlled director	0.0512 (1.06)	0.0265 (0.61)	0.0253 (0.61)	1.077** (2.65)	0.812* (2.25)	0.697 (1.79)	0.114* (2.14)	0.0609 (1.70)	0.0488 (1.10)
Shares held by director	-0.0000739 (-0.02)	-0.00375 (-1.62)	-0.00474* (-2.30)	0.0545 (1.33)	0.0919* (2.39)	0.0837* (2.25)	-0.00859*** (-3.31)	-0.00441 (-1.56)	-0.00321 (-1.50)
Shares held by major shareholder	0.00362 (0.84)	0.00353 (1.04)	0.000780 (0.37)	0.413*** (8.53)	0.320*** (6.63)	0.336*** (6.54)	0.0101* (2.08)	0.0148*** (4.10)	0.0140*** (4.08)

Table 3.11 (cont.)

Duality of CEO and COB	0.00208 (0.02)	-0.0514 (-0.59)	0.0337 (0.53)	1.365 (1.36)	3.051** (2.99)	2.639** (2.83)	-0.0493 (-0.43)	0.328*** (3.38)	0.410*** (4.58)
Internal risk	-0.0891 (-1.20)	-0.0363 (-0.49)	-0.00509 (-0.11)	-1.625* (-2.45)	-0.848 (-1.37)	-0.765 (-1.22)	-0.0109 (-0.17)	-0.000527 (-0.01)	0.0846 (1.57)
Debt-asset ratio	0.0000494 (0.49)	0.0000599 (0.59)	0.000178 (1.73)	-0.00246 (-1.62)	-0.00280 (-1.50)	-0.00950*** (-4.41)	0.0000528 (0.31)	-0.000160 (-1.25)	-0.000682** (-2.78)
Significant litigation	0.0639 (0.73)	-0.0189 (-0.25)	-0.0187 (-0.42)	-0.481 (-0.72)	-0.371 (-0.59)	-0.481 (-0.97)	-0.154** (-2.97)	-0.0895 (-1.70)	-0.0640 (-1.43)
Constant	0.0494 (0.08)	-0.966 (-1.29)	0.281 (0.54)	-135.5*** (-14.28)	-111.9*** (-12.46)	-167.8*** (-18.83)	-7.798*** (-7.81)	-8.517*** (-10.21)	-11.91*** (-11.30)
<i>N</i>	764	845	854	764	845	854	764	845	854
<i>R</i> ²	0.0155	0.0288	0.0192	0.5695	0.4878	0.5348	0.2682	0.3144	0.4199

Table 3.12 The test of signal effect of D&O insurance information: D&O coverage

This table presents the test of the effects of D&O insurance information in respective years. The proxy variables of signal effect of D&O insurance are the percentage of shares held by foreign natural person, foreign juristic person and foreign financial juristic person. The D&O insurance information tested here is its insurer. Variables Insure 1 ~ 5 are dummy variables denoting the top 5 and other insurers in property insurance market. Other independent variables about insured firms' corporate governance are used as controlled variables. *t* statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2008	2009	2010	2008	2009	2010	2008	2009	2010
	Shares held by foreign natural person			Shares held by foreign juristic person			Shares held by foreign financial juristic person		
Insurer1	0.103 (0.90)	0.113 (1.00)	0.0884 (0.79)	-0.930 (-0.74)	-0.900 (-0.85)	-2.568* (-2.19)	0.268 (1.64)	0.230 (1.61)	0.00897 (0.09)
Insurer2	-0.0844 (-0.41)	-0.0382 (-0.21)	0.315 (0.74)	-5.887 (-1.39)	1.168 (0.28)	1.913 (0.41)	-0.308 (-1.83)	0.234 (0.65)	0.154 (0.32)
Insurer3	1.107 (1.41)	0.962 (1.47)	0.761 (1.47)	12.24** (2.82)	12.85* (2.50)	20.53 (1.95)	1.095 (1.45)	1.070 (1.45)	1.960 (1.60)
Insurer4	-0.244 (-1.98)	-0.340** (-2.93)	-0.278 (-1.16)	7.134 (1.27)	-6.862* (-2.23)	-2.430 (-0.32)	0.443 (0.69)	-0.289 (-1.30)	-0.176 (-0.39)
Insurer5	-0.0644 (-0.52)	-0.0832 (-0.78)	0.402 (1.03)	3.311 (0.93)	3.522 (1.21)	2.374 (0.79)	0.259 (0.67)	0.196 (1.06)	-0.0527 (-0.25)
Log of capital	-0.0137 (-0.55)	0.00306 (0.10)	-0.0653 (-1.49)	5.485*** (14.75)	5.764*** (15.98)	2.550** (2.72)	0.260*** (5.60)	0.291*** (9.06)	0.246*** (4.77)
ROE	-0.00264 (-1.90)	-0.00723* (-2.47)	0.00946* (2.45)	0.0210 (0.86)	-0.0345* (-2.09)	0.132* (2.13)	0.00542 (1.03)	-0.00221 (-1.53)	0.00714* (2.06)
Log of remuneration	0.0248 (1.34)	0.0596** (2.88)	0.00546 (1.14)	3.015*** (5.86)	0.758 (1.95)	-0.0316 (-0.48)	0.176** (3.19)	0.138*** (5.86)	-0.0217*** (-4.24)

Table 3.12 (cont.)

Director	-0.0337** (-2.89)	-0.0281* (-2.10)	-0.00563 (-0.38)	-0.742** (-3.06)	-0.974*** (-4.91)	-0.0361 (-0.11)	-0.0953** (-2.84)	-0.112*** (-5.11)	-0.0897** (-2.96)
Independent director	0.0229 (0.92)	0.0303 (0.80)	0.0112 (0.48)	1.206** (3.18)	1.266** (3.17)	1.809*** (3.58)	0.0332 (0.98)	0.0749 (1.83)	0.0774 (1.70)
Controlled director	0.0489 (1.02)	0.0215 (0.50)	-0.0133 (-0.30)	0.979* (2.40)	0.713* (1.99)	-0.382 (-0.75)	0.111* (2.01)	0.0472 (1.30)	-0.0161 (-0.33)
Shares held by director	-0.000491 (-0.16)	-0.00360 (-1.60)	-0.00678* (-2.14)	0.0510 (1.25)	0.101** (2.74)	-0.0611 (-1.27)	-0.00913*** (-3.54)	-0.00323 (-1.14)	-0.00923*** (-3.45)
Shares held by major shareholder	0.00381 (0.88)	0.00336 (1.01)	0.00976* (2.04)	0.409*** (8.52)	0.314*** (6.71)	0.361*** (4.82)	0.0101* (2.09)	0.0140*** (3.92)	0.0146*** (3.50)
Duality of CEO and COB	-0.00462 (-0.04)	-0.0398 (-0.46)	-0.0865 (-1.00)	1.152 (1.14)	3.496*** (3.42)	1.438 (1.05)	-0.0611 (-0.54)	0.408*** (4.00)	0.381*** (3.54)
Internal risk	-0.0862 (-1.16)	-0.0395 (-0.53)	0.0169 (0.30)	-1.464* (-2.17)	-0.860 (-1.38)	-1.001 (-1.36)	-0.0150 (-0.23)	-0.0137 (-0.21)	0.0637 (1.15)
Debt-asset ratio	0.0000546 (0.71)	0.0000537 (0.78)	0.000221 (1.77)	-0.00256 (-1.91)	-0.00316* (-2.11)	-0.00131 (-0.54)	0.0000391 (0.25)	-0.000210 (-1.74)	-0.000331 (-1.36)
Significant litigation	0.0594 (0.71)	-0.0230 (-0.31)	-0.0358 (-0.82)	-0.441 (-0.68)	-0.491 (-0.84)	-0.610 (-1.23)	-0.164** (-3.18)	-0.106* (-2.20)	-0.0820* (-2.16)
Constant	0.394 (0.85)	-0.402 (-0.77)	1.738 (1.79)	-124.8*** (-17.59)	-92.70*** (-13.55)	-50.28* (-2.51)	-5.760*** (-7.14)	-5.849*** (-8.23)	-4.375*** (-3.98)
<i>N</i>	764	845	864	764	845	864	764	845	864
<i>R</i> ²	0.0214	0.0325	0.0423	0.5715	0.4865	0.2296	0.2630	0.2968	0.2713

Table 3.13 The test of signal effect of D&O insurance information: D&O coverage

Following the previous test, this table reports the result of bootstrapping. t statistics is reported in parentheses. An asterisk denotes statistical significance at the 5% level, two asterisks indicate significance at the 1% level, and three asterisks indicate significance at 0.1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2008	2009	2010	2008	2009	2010	2008	2009	2010
	Shares held by foreign natural person			Shares held by foreign juristic person			Shares held by foreign financial juristic person		
Insurer1	0.103 (0.90)	0.113 (1.00)	0.0884 (0.79)	-0.930 (-0.75)	-0.900 (-0.86)	-2.568* (-2.19)	0.268 (1.65)	0.230 (1.62)	0.00897 (0.09)
Insurer2	-0.0844 (-0.35)	-0.0382 (-0.19)	0.315 (0.74)	-5.887 (-1.22)	1.168 (0.26)	1.913 (0.41)	-0.308 (-1.63)	0.234 (0.61)	0.154 (0.30)
Insurer3	1.107 (1.24)	0.962 (1.29)	0.761 (1.47)	12.24* (2.49)	12.85* (2.20)	20.53 (1.95)	1.095 (1.29)	1.070 (1.28)	1.960 (1.41)
Insurer4	-0.244 (-1.51)	-0.340* (-2.48)	-0.278 (-1.16)	7.134 (0.94)	-6.862* (-1.96)	-2.430 (-0.32)	0.443 (0.52)	-0.289 (-1.15)	-0.176 (-0.33)
Insurer5	-0.0644 (-0.46)	-0.0832 (-0.76)	0.402 (1.03)	3.311 (0.88)	3.522 (1.20)	2.374 (0.79)	0.259 (0.61)	0.196 (1.06)	-0.0527 (-0.25)
Log of capital	-0.0137 (-0.54)	0.00306 (0.10)	-0.0653 (-1.49)	5.485*** (13.53)	5.764*** (14.80)	2.550** (2.72)	0.260*** (5.34)	0.291*** (8.67)	0.246*** (4.33)
ROE	-0.00264 (-0.24)	-0.00723 (-1.50)	0.00946* (2.45)	0.0210 (0.10)	-0.0345 (-1.32)	0.132* (2.13)	0.00542 (0.12)	-0.00221 (-0.97)	0.00714 (1.88)
Log of remuneration	0.0248 (1.18)	0.0596** (2.62)	0.00546 (1.14)	3.015*** (4.63)	0.758 (1.71)	-0.0316 (-0.48)	0.176** (2.58)	0.138*** (5.12)	-0.0217*** (-4.20)
Director	-0.0337** (-2.78)	-0.0281* (-2.08)	-0.00563 (-0.38)	-0.742** (-3.07)	-0.974*** (-4.75)	-0.0361 (-0.11)	-0.0953** (-2.78)	-0.112*** (-4.97)	-0.0897** (-2.91)
Independent director	0.0229 (0.92)	0.0303 (0.80)	0.0112 (0.48)	1.206** (3.21)	1.266** (3.18)	1.809*** (3.58)	0.0332 (0.96)	0.0749 (1.83)	0.0774 (1.71)

Table 3.13 (cont.)

Controlled director	0.0489 (1.02)	0.0215 (0.50)	-0.0133 (-0.30)	0.979* (2.38)	0.713* (1.97)	-0.382 (-0.75)	0.111* (2.03)	0.0472 (1.30)	-0.0161 (-0.33)
Shares held by director	-0.000491 (-0.16)	-0.00360 (-1.58)	-0.00678* (-2.14)	0.0510 (1.25)	0.101** (2.72)	-0.0611 (-1.27)	-0.00913*** (-3.46)	-0.00323 (-1.13)	-0.00923*** (-3.33)
Shares held by major shareholder	0.00381 (0.87)	0.00336 (0.99)	0.00976* (2.04)	0.409*** (8.25)	0.314*** (6.64)	0.361*** (4.82)	0.0101* (2.06)	0.0140*** (3.88)	0.0146*** (3.46)
Duality of CEO and COB	-0.00462 (-0.04)	-0.0398 (-0.46)	-0.0865 (-1.00)	1.152 (1.14)	3.496*** (3.39)	1.438 (1.05)	-0.0611 (-0.54)	0.408*** (4.05)	0.381*** (3.51)
Internal risk	-0.0862 (-1.17)	-0.0395 (-0.53)	0.0169 (0.30)	-1.464* (-2.20)	-0.860 (-1.39)	-1.001 (-1.36)	-0.0150 (-0.23)	-0.0137 (-0.21)	0.0637 (1.16)
Debt-asset ratio	0.0000546 (0.54)	0.0000537 (0.58)	0.000221 (1.77)	-0.00256 (-1.67)	-0.00316 (-1.52)	-0.00131 (-0.54)	0.0000391 (0.22)	-0.000210 (-1.26)	-0.000331 (-1.28)
Significant litigation	0.0594 (0.68)	-0.0230 (-0.30)	-0.0358 (-0.82)	-0.441 (-0.64)	-0.491 (-0.81)	-0.610 (-1.23)	-0.164** (-2.92)	-0.106* (-2.07)	-0.0820* (-1.98)
Constant	0.394 (0.82)	-0.402 (-0.74)	1.738 (1.79)	-124.8*** (-15.61)	-92.70*** (-12.85)	-50.28* (-2.51)	-5.760*** (-6.51)	-5.849*** (-7.96)	-4.375*** (-3.61)
<i>N</i>	764	845	864	764	845	864	764	845	864
<i>R</i> ²	0.0214	0.0325	0.0423	0.5715	0.4865	0.2296	0.2630	0.2968	0.2713

Table 3.14 Total Variance Explained

This and following tables present the result of principal component analysis of the dataset in chapter 2. This table presents the total variance explained by the components extracted by principal component analysis from 2008 to 2010. In 2008, the top 7 components explain 61.485 % variance. In 2009, the top 7 components explain 63.009 % variance. In 2010, the top 6 components explain 56.403 % variance.

component	2008						2009						2010					
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Initial Eigenvalues			Extraction Sums of Squared Loadings			Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.353	14.705	14.705	2.353	14.705	14.705	2.42	15.126	15.126	2.42	15.126	15.126	2.256	14.1	14.1	2.256	14.1	14.1
2	1.667	10.421	25.126	1.667	10.421	25.126	1.763	11.019	26.145	1.763	11.019	26.145	1.728	10.801	24.901	1.728	10.801	24.901
3	1.539	9.619	34.744	1.539	9.619	34.744	1.396	8.723	34.868	1.396	8.723	34.868	1.405	8.779	33.679	1.405	8.779	33.679
4	1.119	6.996	41.74	1.119	6.996	41.74	1.343	8.391	43.259	1.343	8.391	43.259	1.325	8.281	41.96	1.325	8.281	41.96
5	1.098	6.861	48.601	1.098	6.861	48.601	1.135	7.091	50.35	1.135	7.091	50.35	1.224	7.649	49.609	1.224	7.649	49.609
6	1.048	6.548	55.149	1.048	6.548	55.149	1.025	6.408	56.758	1.025	6.408	56.758	1.087	6.794	56.403	1.087	6.794	56.403
7	1.014	6.336	61.485	1.014	6.336	61.485	1	6.251	63.009	1	6.251	63.009	0.983	6.145	62.547			
8	0.965	6.029	67.514				0.969	6.058	69.067				0.953	5.954	68.501			
9	0.943	5.894	73.408				0.859	5.37	74.438				0.897	5.609	74.111			
10	0.867	5.421	78.829				0.83	5.185	79.623				0.844	5.274	79.384			
11	0.724	4.525	83.354				0.8	5.001	84.624				0.7	4.378	83.762			
12	0.709	4.433	87.787				0.641	4.003	88.628				0.663	4.144	87.907			
13	0.642	4.012	91.799				0.568	3.549	92.177				0.588	3.676	91.583			
14	0.557	3.483	95.282				0.486	3.038	95.214				0.512	3.198	94.781			
15	0.453	2.832	98.114				0.428	2.676	97.891				0.482	3.01	97.792			
16	0.302	1.886	100				0.338	2.109	100				0.353	2.208	100			

Table 3.15 Component Score Coefficient Matrix

This table presents the component score coefficient matrix from 2008 to 2010.

year	2008							2009							2010					
Component	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6
Log of capital	0.838	0.174	-0.067	-0.176	0.003	-0.015	-0.07	0.341	0.092	-0.022	-0.02	0.048	-0.046	-0.01	0.348	0.14	0.091	-0.03	0.037	0.061
Industry of firms	-0.072	-0.235	0.671	-0.164	0.176	0.237	0.075	-0.042	-0.152	-0.083	0.578	0.075	-0.01	0.056	-0.04	-0.175	-0.049	0.503	0.328	-0.002
ROE	0.015	0.031	0.256	0.543	-0.161	-0.237	0.032	-0.002	-0.025	0.229	-0.059	-0.099	0.644	0.242	0.076	0.154	-0.289	0.202	-0.424	-0.002
Log of remuneration	0.702	0.222	0.286	-0.059	-0.202	-0.085	0.035	0.3	0.148	-0.081	0.108	-0.069	0.009	0.162	0.272	0.217	-0.016	0.056	0.05	-0.171
Director	0.447	-0.001	-0.252	0.18	-0.221	0.401	0.196	0.226	-0.008	-0.295	-0.153	0.108	-0.073	0.331	0.259	0.048	-0.201	-0.19	0.232	0.003
Independent director	-0.06	-0.39	0.456	0.092	-0.2	0.333	0.338	0.024	-0.255	-0.179	0.304	0.062	-0.027	0.107	0.088	-0.252	-0.186	0.227	0.208	0.168
Controlled director	-0.206	0.71	0.077	-0.067	-0.291	-0.138	0.108	-0.071	0.397	-0.196	0.013	0.028	0.072	0.302	-0.105	0.403	-0.105	0.005	0.23	-0.14
Shares held by director	0.032	-0.229	-0.253	0.114	-0.562	-0.103	0.372	-0.015	-0.193	-0.272	-0.362	0.084	0.055	-0.408	0.019	-0.154	-0.335	-0.346	-0.091	0.161
Shares held by major shareholder	-0.014	0	-0.334	0.543	0.454	-0.204	0.255	-0.015	0.039	0.52	-0.079	-0.105	-0.113	0.2	-0.082	-0.032	0.41	-0.024	-0.341	0.006
Duality of CEO and COB	-0.223	0.376	0.081	-0.01	0.283	0.43	0.166	-0.123	0.205	0.065	0.157	0.382	-0.023	-0.388	-0.157	0.144	0.128	0.095	0.128	0.456
Internal risk	-0.211	0.792	0.062	-0.047	-0.05	0.103	0.213	-0.095	0.427	-0.139	0.023	0.144	0.08	-0.093	-0.149	0.406	-0.031	-0.016	0.164	0.171
Debt-asset ratio	0.419	-0.072	-0.489	-0.277	0.149	0.216	-0.035	0.117	-0.077	0.161	-0.222	0.497	0.118	-0.041	0.067	-0.083	0.273	-0.36	0.302	0.345
Shares of foreign natural person	0.684	0.049	0.241	0.166	0.058	-0.006	0.062	-0.004	0.083	0.142	-0.065	-0.193	-0.654	-0.028	0.01	0.006	0.222	-0.095	0.018	-0.465
Shares of foreign juristic person	0.397	0.127	0.377	0.134	0.344	-0.242	0.021	0.283	0.036	0.123	0.097	-0.01	-0.045	-0.312	0.273	0.013	0.181	0.1	-0.11	0.157
Shares of foreign financial person	0.076	0.165	-0.128	0.474	0.032	0.522	-0.189	0.173	0.1	0.172	0.225	-0.102	0.22	-0.393	0.147	0.073	0.239	0.302	-0.052	0.193
Prior significant litigation	0.063	-0.064	-0.136	-0.245	0.277	-0.105	0.72	0.009	-0.057	0.185	0.062	0.602	-0.178	0.281	0	-0.077	0.14	0.007	0.32	-0.422

Table 3.16 Component Matrix of 2008: Ranked by significance in component 1

This table contains the component matrix of 2008 ranked by significance in component 1. Component 1 explains the largest part of all variance, which is 14.705%. In component 1, the proxy variable of signal effect of D&O insurance, shares of foreign juristic person, ranks as third among all variables. This result implies the importance of signal effect of D&O insurance.

Component	1	2	3	4	5	6	7
Log of capital	.838	.174	-.067	-.176	.003	-.015	-.070
Log of remuneration	.702	.222	.286	-.059	-.202	-.085	.035
Shares of foreign juristic person	.684	.049	.241	.166	.058	-.006	.062
Director	.447	-.001	-.252	.180	-.221	.401	.196
Shares of foreign financial juristic person	.397	.127	.377	.134	.344	-.242	.021
Internal risk	-.211	.792	.062	-.047	-.050	.103	.213
Controlled director	-.206	.710	.077	-.067	-.291	-.138	.108
Industry of firms	-.072	-.235	.671	-.164	.176	.237	.075
Debt-asset ratio	.419	-.072	-.489	-.277	.149	.216	-.035
Independent director	-.060	-.390	.456	.092	-.200	.333	.338
Shares held by major shareholder	-.014	.000	-.334	.543	.454	-.204	.255
ROE	.015	.031	.256	.543	-.161	-.237	.032
Shares held by director	.032	-.229	-.253	.114	-.562	-.103	.372
Shares of foreign natural person	.076	.165	-.128	.474	.032	.522	-.189
Duality of CEO and COB	-.223	.376	.081	-.010	.283	.430	.166
Prior significant litigation	.063	-.064	-.136	-.245	.277	-.105	.720

Table 3.17 Component Matrix of 2009: Ranked by significance in component 1

This table contains the component matrix of 2009 ranked by significance in component 1. Component 1 explains the largest part of all variance, which is 15.126%. In component 1, the proxy variable of signal effect of D&O insurance, shares of foreign juristic person, ranks as third among all variables. This result implies the importance of signal effect of D&O insurance.

Component	1	2	3	4	5	6	7
Log of capital	.826	.161	-.030	-.027	.055	-.047	-.010
Log of remuneration	.726	.262	-.113	.145	-.079	.010	.162
Shares of foreign juristic person	.684	.063	.172	.130	-.011	-.046	-.312
Director	.548	-.014	-.412	-.206	.122	-.075	.331
Shares of foreign financial juristic person	.419	.177	.239	.303	-.116	.225	-.393
Internal risk	-.231	.753	-.195	.030	.163	.082	-.093
Controlled director	-.172	.699	-.273	.017	.032	.074	.302
Independent director	.058	-.449	-.250	.408	.070	-.028	.107
Shares held by major shareholder	-.035	.068	.726	-.106	-.120	-.116	.200
Industry of firms	-.100	-.268	-.115	.775	.085	-.010	.056
Shares held by director	-.037	-.341	-.379	-.486	.095	.056	-.408
Shares held by director	.022	-.100	.258	.083	.683	-.182	.281
Debt-asset ratio	.282	-.136	.225	-.298	.564	.121	-.041
Duality of CEO and COB	-.298	.362	.091	.210	.434	-.024	-.388
Shares of foreign natural person	-.011	.146	.198	-.087	-.219	-.671	-.028
ROE	-.006	-.045	.320	-.079	-.113	.661	.242

Table 3.18 Component Matrix of 2010: Ranked by significance in component 1

This table contains the component matrix of 2010 ranked by significance in component 1. Component 1 explains the largest part of all variance, which is 14.1%. In component 1, the proxy variable of signal effect of D&O insurance, shares of foreign juristic person, ranks as second among all variables. This result implies the importance of signal effect of D&O insurance.

Component	1	2	3	4	5	6
Log of capital	.786	.242	.128	-.039	.046	.067
Shares of foreign juristic person	.616	.023	.255	.132	-.135	.170
Log of remuneration	.614	.375	-.023	.074	.061	-.185
Director	.584	.083	-.283	-.252	.283	.003
Internal risk	-.336	.702	-.043	-.021	.201	.186
Controlled director	-.236	.697	-.148	.007	.281	-.152
Independent director	.199	-.436	-.261	.301	.254	.183
Shares held by major shareholder	-.184	-.056	.576	-.032	-.417	.006
Shares held by director	.042	-.266	-.471	-.458	-.111	.175
Industry of firms	-.091	-.302	-.069	.667	.402	-.002
Debt-asset ratio	.152	-.144	.383	-.476	.369	.375
Shares of foreign financial juristic person	.331	.126	.336	.400	-.064	.210
ROE	.171	.266	-.405	.267	-.519	-.002
Shares of foreign natural person	.023	.010	.312	-.125	.023	-.506
Duality of CEO and COB	-.354	.249	.180	.126	.156	.496
Prior significant litigation	.000	-.133	.197	.009	.392	-.459

CHAPTER 4

IMPLICATIONS AND FINDINGS

4.1 Empirical findings and relevant discussions

Following the empirical test of the monitoring hypothesis and the signal hypothesis in previous chapters, qualitative analysis will be processed in this chapter. This chapter will try to find more substantial reasons why monitoring hypothesis cannot functions well, and why signal hypothesis is implied. The focus will be on the differences between legal environments in Taiwan and the United States. More substantial reasons to further support the previous empirical results will be developed.

4.1.1 Discussion about the monitoring hypothesis

4.1.1.1 Litigation system

Shareholders' litigation and securities litigation are important sources of litigation risk for corporations and directors,³⁹⁵ but these practices are not so popular in Taiwan. In the United States, shareholders' litigation can be divided into two forms, direct suit and derivative suit. Direct suit is used to redress harms inflicted on the shareholders directly. In contrast, derivative suit³⁹⁶ enables shareholders to obtain redress for harms inflicted on the corporation, typically by corporate management.³⁹⁷ The prevalence of shareholders' litigation and securities litigation³⁹⁸ causes directors and corporations to be at high risk to

³⁹⁵ For more discussion about empirical studies on the prevalence and effects of shareholder suits, see Curt Cutting, *Turning Point for Rule 10b-5: Will Congressional Reforms Protect Small Corporations*, 56 OHIO ST. L.J. 555, 564 (1995).

³⁹⁶ In the United States, derivative suits are based on the common law principles, and can be traced back to a case in 1882, see *Hawes v City of Oakland*, 104 US 450 (1882).

³⁹⁷ See *Jones v. H.F. Ahmanson & Co.*, 460 P.2d 464, 470 (Cal. 1969).

³⁹⁸ See Curt Cutting, *supra* note 395, at 564.

be sued. This provides substantial incentive to purchase D&O insurance,³⁹⁹ and thus to develop insurers as external monitors. However, the maturity and popularity of shareholders' litigations in Taiwan are not the same as the United States.

In Taiwan, there is no specific rule for direct suit and thus standard tort law will be applied.⁴⁰⁰ Derivative suits were established in 1966 in Article 214 in Taiwanese Company Law.⁴⁰¹ Shareholders who have been continuously holding 3% or more of the total number of the outstanding shares of the corporation over one year may request in writing the supervisors of the corporation to institute, for the corporation, an action against a director of the corporation. In case the supervisors fails to institute an action within 30 days after having received the request, then the shareholders filing such request may institute the action for the corporation.⁴⁰²

However, some flaws in the legislation decrease the incentive for filing derivative litigation. When suing shareholders win the lawsuits, the benefits belong to corporations instead of shareholders.⁴⁰³ In Taiwan, where a lawsuit is found by a final judgment to be based on facts apparently true, the defendant director shall be liable to compensate the shareholders who instituted the action for the loss or damage resulting from such an

³⁹⁹ Once corporations buy D&O insurance, the risk of shareholder litigation shifts, in whole or in part, to a third-party insurer. *See* Sean J. Griffith, *supra* note 51, at 1173.

⁴⁰⁰ Taiwanese Company Law art. 23, § 2 (2009). "If the responsible person of a company has, in the course of conducting the business operations, violated any provision of the applicable laws and/or regulations and thus caused damage to any other person, he/she shall be liable, jointly and severally, for the damage to such other person."

⁴⁰¹ This system comes from the derivative suit in the United States. *See* Taying Liaow, *Examining Corporate Management and Directors' Liability: A Review of Stockholders' Derivative Suits under Taiwan's Company Law*, 37 SOCIOECON. L. AND INST. REV. 103, 107 (2006).

⁴⁰² Taiwanese Company Law art. 214 (2009).

⁴⁰³ A similar situation also takes place in Japan. The shareholders in Japan have less reason than shareholders in the United States to bring suit, because even the winners do not result in increases in shareholder wealth. *See* Mark D. West, *Why Shareholders Sue: The Evidence from Japan*, 30 J. LEGAL STUD. 351, 381 (2001).

action.⁴⁰⁴ However, whether attorney fees and litigation fees are included in this compensation or not is still controversial. Hence, there are weak incentives for shareholders to file such suit.

In addition, unlike the United States, contingency fees are not allowed in Taiwan. It is obvious that incentive for litigation would be much less. What is more, shareholders are liable if shareholder litigation has no apparent basis. When the suing shareholders lose the lawsuits and thus cause damage to the corporations, the suing shareholders shall be liable for indemnifying the corporation for such damage.⁴⁰⁵ When a lawsuit is instituted and is found by a final judgment to be based on facts apparently untrue, the shareholders who instituted the action shall be liable to compensate the defendant director for loss or damage resulting from such an action.⁴⁰⁶ With risk of loss and weak beneficial incentive, it is difficult to expect shareholders to ignore these potential liabilities to file a suit. In the end, this legislation not only decreases the incentives to file a suit, but also limits the development of shareholders' litigation. All these factors increase the difficulty of litigation and the litigation risk of directors and officers.

Furthermore, Hirschman's exit-voice paradigm⁴⁰⁷ may shed more light on this issue. In this model, participants can choose to exit from the organization, or stay and voice their dissents.⁴⁰⁸ In corporate law, "voice" refers to the rights of shareholders in firms' decision making, and "exit" denotes that the dissenting shareholder may exit corporate by

⁴⁰⁴ Taiwanese Company Law art. 215, § 2 (2009).

⁴⁰⁵ Taiwanese Company Law art. 214, § 2 (2009).

⁴⁰⁶ Taiwanese Company Law art. 215, § 1 (2009).

⁴⁰⁷ See ALBERT O. HIRSCHMAN, EXIT, VOICE, AND LOYALTY: RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES 30 (1970).

⁴⁰⁸ See Salil K. Mehra & Meng Yanbei, *Against Antitrust Functionalism: Reconsidering China's Antimonopoly Law*, 49 Va. J. Int'l L. 379, 428 (2009).

appraisal, buyout or other mechanisms.⁴⁰⁹ Anglo-American countries tend to emphasize “voice”, but European regimes tend to emphasize “exit”.⁴¹⁰ Such difference may cause different emphasis on the duty of director and litigation, and then affect the development of D&O insurance. This may explain the discrepant development of D&O insurance in the United States and Taiwan.

4.1.1.2 Ownership structure

The difference in the development of D&O insurance in Taiwan and the United States may be also caused by divergence of ownership structure. Generally, Anglo-American countries have dispersed ownership structure.⁴¹¹ In contrast, concentration of ownership in public companies is prevalent in East Asia, including Taiwan.⁴¹² In such circumstance,⁴¹³ because firms is generally under the control of controlling shareholders, minor shareholders are less likely to file a litigation,⁴¹⁴ and controlling shareholders have less incentive to lead a litigation against directors who are nominated by themselves. This causes less popularity of shareholder litigation in Taiwan, and thus the incentive based on real demand to purchase D&O insurance is even less. Concentrated ownership structure provides explanation for limited litigation risk, and implies there may be reasons other

⁴⁰⁹ See Katharina Pistor et al., *The Evolution of Corporate Law: A Cross-Country Comparison*, 23 U. PA. J. INT'L ECON. L. 791 (2002).

⁴¹⁰ See Janis Sarra, *Corporate Governance in Global Capital Markets, Canadian and International Developments*, 76 TUL. L. REV. 1691, 1721-3 (2002).

⁴¹¹ See Anke Weber, *An Empirical Analysis of the 2000 Corporate Tax Reform in Germany: Effects on Ownership and Control in Listed Companies*, 29 INT'L REV. L. & ECON. 57, 57 (2009).

⁴¹² See Wallace Wen-Yeu Wang & Carol Yuan-Chi Pang, *supra* note 96, at 83-4. Yu-Hsin Lin, *Overseeing Controlling Shareholders: Do Independent Directors Constrain Tunneling in Taiwan?*, 12 SAN DIEGO INT'L L.J. 363, 368-9 (2011).

⁴¹³ In addition, Rafael La Porta elaborates the competing ownership structure, dispersed and concentrated, and its correlation to investor protection. See Rafael La Porta et al., *Corporate Ownership around the World*, 54 J. FIN. 471, 511 (1999).

⁴¹⁴ See Marco Ventoruzzo, *Freeze-Outs: Transcontinental Analysis and Reform Proposals*, 50 VA. J. INT'L L. 841, 882-3 (2010). Also see George T. Washington, *The Corporation Executive's Living Wage*, 54 HARV. L. REV. 733, 763-4 (1941).

than substantial demand for D&O insurance purchase in Taiwan.

Also, cross shareholding between D&O insurer and insured may cause limited monitoring function of D&O insurance in Taiwan. For example, in 2010, Taiwan Life purchased D&O insurance from TLG Insurance, which is 100% invested by Taiwan Life Financial Group.⁴¹⁵ In such case, it may be not easy to expect D&O insurer will exert monitoring function which is proposed in literature.

4.1.1.3 Burden of proof

In the United States, the “business judgment rule” is a limited presumption of correctness in corporate directors’ decisions.⁴¹⁶ Unless corporate directors acted fraudulently, illegally, oppressively, or in bad faith, they are protected by the rule no matter how poor their business judgment is.⁴¹⁷ Normally, the business judgment rule protects directors from shareholder suits for corporate losses.⁴¹⁸ In contrast, plaintiffs have to collect evidence to overrule this assumption to sue directors.

In the United States, because litigation is prevalent and almost all corporations have D&O insurance, a majority of suits are closed by settlement. For plaintiffs, the risk of wasting time and money serve as strong incentives for them to settle. Since defendants usually have D&O insurances, if plaintiffs choose to settle within the coverage, plaintiffs can get compensation in the short time rather than spending more time in litigation. For plaintiffs’ attorneys, their primary concern is compensation,⁴¹⁹ and not whether the case is settled or litigated. For corporations and directors, with the protection of insurance, they have no incentive to litigate or to decrease compensation. Settlement is a good way

⁴¹⁵ Market Observation Post System, http://emops.twse.com.tw/emops_all.htm (last visited Jan. 15, 2013).

⁴¹⁶ See *Aerospace Accessory Service, Inc. v. Abiseid*, 943 So. 2d 866 (Fla. Dist. Ct. App. 3d Dist. 2006).

⁴¹⁷ See *In re Bal Harbour Club, Inc.*, 316 F.3d 1192 (11th Cir. 2003).

⁴¹⁸ See William Scott Biel, *Whistling past the Waste Site: Directors' and Officers' Personal Liability for Environmental Decisions and the Role of Liability Insurance Coverage*, 140 U. PA. L. REV. 241, 247 (1991).

⁴¹⁹ See John C. Coffee, *supra* note 14, at 1581.

for them to remove themselves from the situation. For insurers, they usually like to settle within coverage, rather than spending more time on litigation and suffering more uncertain outcomes.⁴²⁰ This also leads to the prevalence of litigation and D&O insurance. However, there is nothing like the business judgment rule to balance liability of directors and corporate management in Taiwan. This causes the liability of directors to be more uncertain. In Taiwan, claims against directors or the responsible person⁴²¹ of a corporation is based on Article 23⁴²² of Company Law, which is one form of tort liability.⁴²³ In this type of litigation, it is difficult for plaintiffs to prove all elements including damages, causation, and breach of duty of loyalty and so on.⁴²⁴

4.1.1.4 Collective action

Class action⁴²⁵ lawsuits remain rare in Taiwan. As mentioned above, the Securities and Futures Investors Protection Center (SFIPC) in Taiwan was established to protect

⁴²⁰ See Bernard Black, Brian Cheffins & Michael Klausner, *Outside Director Liability*, 58 STAN. L. REV. 1055, 1100-02 (2006).

⁴²¹ In Taiwanese Company Law, “responsible persons” denotes shareholders conducting the business or representing the company in case of an unlimited company or unlimited company with limited liability shareholders; directors of the company in case of a limited company or a company limited by shares. See Taiwanese Company Law art. 8, § 1 (2009).

⁴²² “The responsible person of a company shall have the loyalty and shall exercise the due care of a good administrator in conducting the business operation of the company; and if he/she has acted contrary to this provision, shall be liable for the damages to be sustained by the company there-from. If the responsible person of a company has, in the course of conducting the business operations, violated any provision of the applicable laws and/or regulations and thus caused damage to any other person, he/she shall be liable, jointly and severally, for the damage to such other person.” Taiwanese Company Law art. 23 (2009).

⁴²³ See WALLACE WEN-YEU WANG, *supra* note 93, at 183.

⁴²⁴ The similar situation also occurs in China. In China, if a director, supervisor or the senior officer causes detriment to the company while performing his duties in violation of laws, administrative regulations or the articles of association, he shall be liable for the loss so caused. See Company Law art. 150 (2005) (P.R.C.). Plaintiffs have to prove the violations, damages, causations...etc. This will cause shareholders and investors to have weak incentives to file suits. With low risk of losing suits, corporations and directors also have fewer incentives to concede or settle, either. As consequence, corporations and directors have fewer incentives to purchase D&O liability insurance. This not only damages the development of D&O liability insurance, but also decreases the possibility that insurers function as outside monitors.

⁴²⁵ For more discussion about class action in Taiwan, see Kuan-Ling Shen, *Class Action in Taiwan: A New System Created Using the Theory of “Right of Procedure Options”*, 5 NAT’L TAIWAN U. L. REV. 39,66 (2010).

investors and assist them in filing collective action lawsuits. The SFIPC processed about 80 class action lawsuits from 1998 through 2010, a much smaller number than in the United States.⁴²⁶ Weak and underdeveloped class action lawsuits do not have the same deterrence effect on directors as do better-organized efforts.

4.1.1.5 Empirical evidence

In practice, investors in Taiwan are not used to suing directors.⁴²⁷ When shareholders are dissatisfied with directors or companies, they tend to “vote by foot”⁴²⁸ – they just sell their stocks and leave. These activities decrease the willingness of shareholders to file suits against companies and directors. In this way, the threat faced by directors and officers is actually limited.

The weakness of litigation risk can be found in more evidence. For example, from the cases concerning company law and security law in Taiwan from 1993 to the present, some clues about litigation risks of directors and officers can be found. During these 17 years, the numbers of the cases concerning company law and security range from 2,000-4,000. The cases about company suing director or auditor do not increase significantly as well. In this period, Taiwan loosened the requirement of shareholder litigation, established Securities and Futures Investors Protection Center, and started to promote D&O insurance, but litigation cases did not increase significantly in response. This implies that the litigation risks of directors and officers are similar in the past 17 years. This information can be found in Table 4.1.

⁴²⁶ About the statistics of class action in the United States, see Stanford Law School Securities Class Action Clearinghouse, <http://securities.stanford.edu/> (last visited Jan. 15, 2013).

⁴²⁷ In contrast to the United States, there are comparatively fewer cases in which shareholders file suits against directors for the breach of duties in Taiwan or China. See Taying Liaow, *supra* note 401, at 106.

⁴²⁸ See Ning Ma, *D&O Insurance and Corporate Governance*, 23 J. GUANGXI ADMIN. CADRE INST. POL. & L. 89, 90 (2008).

4.1.2 Discussion about the hypothesis

Several implications can be drawn from the analyses above. First of all, the previous section shows that litigation risk is limited and seems to not have increased significantly in recent years. However, many firms are still willing to purchase D&O insurance. Combining this evidence with the previous empirical findings that D&O insurance purchase is positively related to the qualities of corporate governance, foreign investment and market value of insured firms, the signal hypothesis is further suggested. Since the purchase of D&O insurance is a positive and efficient signal, good firms which usually emphasize corporate governance are more willing to purchase D&O insurance, in spite of the premium and low litigation risk.

Of course, it is also possible that good firms purchase D&O insurance just out of their custom, instead of any anticipation of its signal effect, or they just have more financial resources and thus result in more insurance purchase. However, facing the evidence that litigation risk is still low in recent years, such arguments are less possible and do not complete conflict with the argument of signal hypothesis.

If the litigation risk is low, then firms would have less demand to have insurance coverage. If they keep on or even increase insurance purchase, there must be some consideration more than substantial reimbursement. Especially for the firms with good qualities and high market values, they should be more cautious about controlling unnecessary cost and thus to improve the management. The cost for redundant insurance purchase should not be an exception. Hence, the signal effect of insurance is a reasonable and possible explanation.

Also, encouragement from the Taiwanese authority may provide another clue. Even though the history of D&O insurance in Taiwan is comparatively short⁴²⁹ and the prevalence is also less than in the United States or Canada, Taiwanese authority endeavors to promote D&O insurance and even regards it as an index of corporate governance in recent years. This provides more grounds for signal hypothesis. Firms with superior corporate governance and market value usually care more about risk management, corporate governance and their reputations. Thus, they are likely to respond to the government's suggestion to purchase D&O insurance, even though their risk of litigation is comparatively low.

Another possible concern would be why other firms do not also purchase D&O insurance to improve their reputation, attract investment and even raise their stock price? Why does not every firm purchase as much D&O insurance as possible? As mentioned in Chapter 2, there is no evidence proving that asymmetric information exists in the Taiwanese market. In addition, underwriting of insurers also functions diligently. Insurance applicants choose specific insurers to contract with and insurers also choose proper applicants to contract with. This implies insurance applicants cannot have unlimited choice of insurers and coverage. All applicants are subject to the consent of insurers. For those who have no coverage or sufficient coverage, the reason may be that they cannot obtain it from insurers. Hence, this can explain why every firm cannot purchase as much D&O insurance as possible to convey positive signal to the market.

4.1.3 Summary

⁴²⁹ The first D&O insurance policy was issued in 1997. *See* Taiwan Insurance Institute, <http://insprod.tii.org.tw/database/insurance/index.asp> (last visited Jan. 15, 2013).

The previous two chapters empirically test the monitoring and signal hypothesis. Generally, the positive association between D&O insurance and qualities of insured firms is supported. The signal hypothesis, which can explain the situation of the Taiwanese market, might be a possible explanation. This chapter offers more substantial reasons to support theory. This dissertation finds that both legal environment and litigation system play important roles in this issue. D&O insurance may be useful in conveying a positive signal than eliminating litigation risk. This characteristic is worthy of more notice, no matter in theory, in research, in practice, or in legislative consideration.

4.2 Recommendations

Based on findings and discussions above, following recommendations are presented for more consideration and research in the future.

4.2.1 Improving D&O insurance and regulation

The empirical result in this dissertation indicates that there is a relationship between the purchase of D&O insurance and the quality of corporate governance in Taiwan. If the monitoring function of insurers is expected to develop more in the future, in the long-term the litigation systems and relevant regulations should be improved first. Many details in the regulations and insurance policies in Taiwan are not as complete as the United States. For example, some inconsistencies and conflicts in insurance policies also cause confusion.⁴³⁰ These not only influence the compensation for directors and corporations, but also the incentives to purchase D&O insurance. Also, the signal effect

⁴³⁰ See Shih-Ning Lu, *Comments on Directors' and Officers' Insurance in Taiwan*, 43 TAIWAN L. J. 157, 180 (2003).

of D&O insurance implies that investors in the market may rely on such information. Thus, the underwriting of insurers and the relevant regulation would be more important. Compared with the United States, the authorities concerned in Taiwan have less experience in supervising the insurer due to the relatively short history of the development of D&O insurance. Even though the evidence proves that no adverse selection and asymmetric information problem exist in the current market, relevant regulation will be necessary if these problems occur.

4.2.2 Compulsory insurance is improper in current Taiwan

Even though D&O insurance can convey the signal about the quality of insured firms, this study proposes that compulsory D&O insurance is unreasonable in Taiwan. As seen in the previous analysis, the litigation risk to directors and officers is not that high in Taiwan. The main purpose of insurance is indemnifying the loss of the insured.⁴³¹ If firms have no risk of being sued and no demand for indemnification, it is unpersuasive to require them to buy insurance just because of other reasons. Otherwise, that might conflict with the main purpose of insurance.

In other words, underwriting information and D&O insurance details may be important to the market, shareholders and investors, but it is unreasonable to inversely mandate that firms purchase D&O insurance. If that financial information is necessary severely, it may be proper to ask firms disclose that information directly, rather than asking them to purchase insurance first and then requesting them to disclose. Hence, this research argues that compulsory D&O insurance rule in Taiwan is suspicious.

⁴³¹ See 44 C.J.S. Insurance § 2.

4.2.3 Limitation on insurance is unnecessary in current Taiwan

In the United States, the D&O insurance significantly decreases the deterrence effect of the securities litigation,⁴³² some people such as Janet Cooper Alexander suggest making penalties uninsurable, limiting insurance coverage and thus letting directors pay for themselves to maintain the deterrence effect.⁴³³ Similarly, Narjess Boubakri and Nabil Ghalleb test the Canadian market and find that the problem of asymmetric information and moral hazard is obvious.⁴³⁴ Insurer cannot distinguish opportunistic risk or charge higher premiums to those who have high opportunistic risk. Their evidence also shows that mandatory reporting is not helpful.⁴³⁵ Under such circumstances, regulation and limitation are recommended by them.⁴³⁶

However, the situation in Taiwan is completely different. The maturity and popularity of D&O insurance are far less than in the United States and Canada. Needless to say the problem where D&O insurance over rampant and thus decrease the function of litigation. It should be unnecessary and unpersuasive to limit the coverage of D&O insurance to maintain deterrence in current Taiwan. Of course, deductible is helpful for mitigating moral hazard, but compulsory deductibles or limitations on coverage are too much for Taiwan. According to the previous analysis, it is found that the Taiwanese market is close to being homogenous and no evidence supports the existence of asymmetric information and moral hazard. Hence, imposing some limitations on D&O insurance transaction are unnecessary in current Taiwan.

⁴³² See Tom Baker & Sean J. Griffith, *supra* note 74, at 831.

⁴³³ See Janet Cooper Alexander, *Rethinking Damages in Securities Class Actions*, 48 STAN. L. REV. 1487, 1515 (1996).

⁴³⁴ See Narjess Boubakri & Nabil Ghalleb, *supra* note 150, at 30.

http://69.175.2.130/~finman/Reno/Papers/Does_Mandatory_Disclosure_Curb_Management_Opportunism.pdf.

⁴³⁵ *Id.*, at 30.

⁴³⁶ *Id.*

4.3 Implications for future research

4.3.1 The development of D&O insurance in corporate governance in Taiwan

Regarding the prospect of the role of D&O insurance in corporate governance in Taiwan, the possible development could be divergent. For example, D&O insurance could be more prosperous because of the improvement of government and its signal effect. However, when transparency of corporate governance is improved and more mature, D&O insurance would be less important, especially for the purpose of singling. Also, if litigation risk increases, insurance premium will also increase to mitigate the loss of insurer. Due to the increasing premium, firms may try to find other substitutes for D&O insurance. Thus, the prospect of D&O insurance might be suspicious.

A specific answer for this issue still needs for more exploration in the future, but this research may tentatively suggest that the future of D&O insurance might be perceived by the development of litigation system, like shareholder and collective litigation. As mentioned earlier, shareholder litigation does not function actively in Taiwan, and the litigation led by minority shareholder or individual investor is difficult. In this way, the role of Securities and Futures Investors Protection Center would be more important. However, such non-profit organization (NPO) has the purpose to pursue public interest, and maximize social welfare instead of personal welfare.⁴³⁷ NPO usually files lesser litigations than the system led by private attorney.⁴³⁸ Furthermore, the Securities and Futures Investors Protection Center is not perfect yet. Its transparency and independence

⁴³⁷ See Curtis J. Milhaupt, *Nonprofit Organizations as Investor Protection: Economic Theory and Evidence from East Asia*, 29 YALE J. INT'L L. 169, 202 (2004).

⁴³⁸ *Id.*, at 175. Also see Yu-Hsin Lin, *supra* note 293, at 179-80.

of this protection center has been argued and revolution for this is suggested.⁴³⁹ For example, the reasons for the decisions and settlement terms should be published,⁴⁴⁰ and the appointment of board should be more independent from the involvement of the authorities.⁴⁴¹

Hence, observing the development of litigation system might be a breakthrough point for following research about D&O insurance in corporate governance. If the litigation system is still limited in the future, then the demand for substantial reimbursement from insurance would be not that necessary. Thus, the signal or addressing function might be an important consideration in D&O insurance purchase. In this case, if there is other mechanism improving the transparency of corporate governance, D&O insurance will lose its advantage easily. In contrast, if litigation system is indeed improved, this may cause more litigation risks and more demands for insurance compensation. Thus, even though corporate governance is even more transparent in the future, the basic function for reimbursement might still support the survival of D&O insurance. Conversely, high litigation risk might also cause rising premiums and then make D&O insurance less attractive. It is also possible that insurers are not willing to offer insurance for such high risk. Thus, evaluating the development of litigation system might provide more clues for the future of D&O insurance.

4.3.2 Monitoring function from the plaintiff

As noted in introduction, this research tests the monitoring and alternative hypothesis. For the former, this study follows major literature to focus on the mechanisms from

⁴³⁹ See Wallace Wen-Yeu Wang & Jian-Lin Chen, *supra* note 99, at 150-1.

⁴⁴⁰ *Id.*, at 151.

⁴⁴¹ *Id.*

insurer, like the offering of D&O insurance, insurance coverage, identity of insurer and so on. However, it is also possible for some monitoring effect which comes from plaintiff and its attorney. In the litigation where plaintiff sues the management of insured firm, D&O insurance provides incentive for the plaintiff and his attorney to monitor the insured firm, to collect more evidence, and then to increase the probability to win the case. The previous empirical works does not include the test for this effect, but some thoughts in this research may be helpful for the following study on this issue.

A possible hypothesis for future research is that the monitoring function from the plaintiff is suspicious, or lesser than the monitoring function from the insurer. Like the analysis in previous section, the litigation system in Taiwan which is not identical to the United States might be a major concern. Litigation led by minority shareholder is still not prosperous, and class action is majorly led by Securities and Futures Investors Protection Center. Such non-profit organization has public interest purpose, which can be found in the criteria in choosing case and avoiding frivolous suits.⁴⁴² Also, Securities and Futures Investors Protection Center recruits full-time attorney with salary for litigation service,⁴⁴³ and contingency fee is not allowed in Taiwan. This provides less possibility for the monitoring effect which comes from the eagerness of attorney to win more compensation form D&O insurance coverage. Thus, the observation of litigation system might shed light on the future research about the monitoring effect from plaintiff in D&O insurance.

4.3.3 General model for other jurisdictions

⁴⁴² Securities and Futures Investors Protection Center currently focuses on four types of cases, including making false financial statements, producing false prospectuses, influencing share prices illegally, and insider trading. <http://www.sfipc.org.tw/english/service/03-2.asp> (last visited Jan. 15, 2013).

⁴⁴³ <http://www.sfipc.org.tw/main.asp> (last visited Jan. 15, 2013).

The finding in this paper may also provide a possible theory for other jurisdictions. Like Taiwan, many jurisdictions in East Asia also have the problem of concentrated owner structure, including Thailand, Indonesia, Malaysia, Singapore,⁴⁴⁴ South Korea, Japan,⁴⁴⁵ and Hong Kong.⁴⁴⁶ This may affect these countries' prevalence of shareholder litigation and thus litigation risk of directors. Hence, theory about D&O insurance in Taiwan, explaining the divergence about litigation risk and D&O insurance, may possibly apply to these jurisdictions. It is worth of more researches in the future to find whether the theory in this paper can be generalized to apply to other jurisdictions.

⁴⁴⁴ See Nisha Kanchanapoomi, Note, *Accelerating Corporate Governance Reform in Thailand: The Benefits of Private Reform Mechanisms*, 15 S. CAL. INTERDISC. L.J. 165, 185 (2005).

⁴⁴⁵ See Curtis J. Milhaupt, *Nonprofit Organizations as Investor Protection: Economic Theory and Evidence from East Asia*, 29 YALE J. INT'L L. 169, 189-90 (2004).

⁴⁴⁶ See Michael H. Lubetsky, *Cultural Difference and Corporate Governance*, 17 TRANSNAT'L L. & CONTEMP. PROBS. 187, 200 (2008).

FIGURES AND TABLES

Table 4.1: Types of Civil Cases Terminated in the First Instance (District Courts)

Year	Company law						Security law
	Withdrawal of shareholders meeting resolutions	Invalidation of shareholders meeting resolutions	Company suing director or auditor	Exclusion judgment	other	Subtotal	
1993	24	26	4	0	2339	2393	
1994	47	23	7	0	2712	2789	
1995	68	20	7	0	3617	3712	
1996	54	14	0	0	2880	2948	
1997	50	28	0	0	4052	4130	
1998	66	33	1	0	3956	4056	
1999	41	32	2	0	2 908	2983	
2000	73	23	1	0	2349	2446	
2001	57	25	1	0	1457	1540	3
2002	60	39	5	1380	208	1692	-
2003	63	42	2	1414	213	1734	4
2004	52	41	7	1813	198	2111	26
2005	54	37	4	1662	188	1945	33
2006	60	42	6	2011	173	2292	11
2007	36	56	10	2495	211	2808	7
2008	52	51	18	2039	270	2430	6
2009	45	30	15	1182	380	1652	32
2010						2192	19

Source: Judicial Yuan, <http://www.judicial.gov.tw/juds/index1.htm> (last visited Jan. 15, 2013).

CHAPTER 5

CONCLUDING REMARKS

This study seeks to analyze the relationship between D&O insurance and the corporate governance of insured companies in Taiwan, and find out the theory which can explain the situation in Taiwan. The monitoring hypothesis suggests that D&O insurers work as outside monitors who promote corporate governance. Given this purpose of monitoring, D&O insurance and other monitoring mechanisms all have monitoring functions. Hence, D&O insurance and other monitoring mechanisms are substitutes for each other. Companies which have better corporate governance have less demand for D&O insurance. This research uses empirical methods and comparative law analysis to examine the situation in Taiwan, and finds that the monitoring hypothesis is not fully supported. Actually, firms with good corporate governance tend to purchase more D&O insurance, while firms with poor corporate governance are less likely to do so. In contrast, empirical evidence shows a positive association between D&O insurance purchase and the qualities of corporate governance, foreign investment and market value of insured firms. Combined with empirical results and doctrinal analysis, the signal hypothesis may be implied. More complete empirical test is expected in following research, especially when more data will be available. This study also tests the problems of moral hazard and adverse selection. No evidence for these problems is found. Based on these findings, this study recommends improving the regulations and policies of D&O insurance in Taiwan. However, the mandatory insurance or even limitation on D&O insurance has been shown to be unnecessary in contemporary Taiwanese market.

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