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管理人員法律責任是否影響公司多角化？

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摘要

本文檢測董監及重要職員責任保險（D&O 保險）對公司多角化與公司價值的影響。D&O 保險促使管理人員承擔風險並降低多角化，然而，D&O 保險亦可能促使管理人員侵佔公司利益進而建立企業帝國。由於較高的 D&O 保險能保護管理人員來自市場的懲戒，並惡化管理人員機會主義的代理問題，本文認為管理人員可能採取較高程度的多角化並傷害公司價值。本文以 2008-2014 年之 1,332 家臺灣上市公司為樣本，研究發現超額 D&O 保險與較高的多角化程度有關，特別是無關多角化。再則，本文發現公司多角化，特別是無關多角化，會降低有超額 D&O 保險之公司的價值。本文的結果證實在台灣的背景下，D&O 保險會影響公司多角化與公司價值。因此，D&O 保險對股東而言，在制定投資決策上是一項有用的資訊來源。而本研究亦提供政策制定者在管理 D&O 保險與相關揭露上有更深入的了解。

關鍵詞：公司治理、D&O 保險、公司多角化、股東價值

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Does Managerial Legal Liability Affect Corporate Diversification?

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ABSTRACT

We examine the effect of directors' and officers' liability insurance (D&O insurance) on corporate diversification and firm value. D&O insurance can encourage managers to take risks and lower diversification, but it can also entrench managers and lead to empire building. Because higher D&O insurance coverage shields managers from market discipline and exacerbates agency problems associated with managerial opportunism, we argue that managers are more likely to exhibit higher levels of diversification that destroy shareholders' value. Using archival data from a sample of 1,332 Taiwanese listed firms in the period 2008-2014, we find that excess D&O insurance coverage is associated with higher levels of corporate diversification, more specifically, unrelated diversification. In addition, we find that corporate diversification, and unrelated diversification in particular, reduces firm value for firms with excess D&O coverage. Our results show that, in the context of Taiwan, D&O insurance affects diversification and firm value. Therefore, D&O insurance is a useful source of information for shareholders when they make investment decisions. In addition, this study offers insights for policy makers who are interested in regulating D&O insurance and its related disclosures.

Keywords: *Corporate Governance, D&O Insurance, Corporate Diversification, Shareholders' Value.*

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1. INTRODUCTION

Many firms purchase directors' and officers' liability insurance (D&O insurance) to protect their directors and officers against lawsuits that allege breach of managerial duties (Core 1997).[1] For lawsuits against an individual director or officer, D&O insurance reimburses defense costs and pays claimed losses.[2] D&O insurance thus allows managers to face a lower litigation risk, which, in theory, allows risk-averse managers to take appropriate risks to maximize shareholder value (Core 1997). However, an unintended consequence is that D&O insurance can allow managers to become entrenched because they are shielded from shareholder lawsuits (Bhagat, Brickley, and Coles 1987; Boyer and Delvaux-Derome 2002; Baker and Griffith 2007). Research suggests that once managers become entrenched, they tend to adopt diversification (e.g., acquisition) as part of their empire-building efforts in order to obtain private gains at the expense of shareholders (Jensen 1986a, 1993b; Bebchuk and Fried 2006). Research also indicates that excess or higher D&O insurance coverage provides more incentives for managers to pursue opportunistic behavior.[3] Thus, we examine whether firms with excess D&O coverage tend to pursue higher levels of diversification, which in turn destroy shareholder value.

The impact of diversification on firm value has been widely studied and debated. Several studies document a diversification discount (Denis, Denis, and Sarin 1997; Denis, Denis, and Yost 2002; Laeven and Levine 2007), whereas others offer evidence of a diversification premium (Elsas, Hackethal, and Holzhauser 2010; Kuppuswamy and Villalonga 2015). Research also indicates that the agency problem is an essential factor in value-reducing diversification (Denis et al. 1997; Lins and Servaes 2002). Because excess D&O insurance coverage reduces the deterrent effect of litigation risk and exacerbates agency problems, we argue that managers of firms with excess D&O coverage may pursue more diversification, which destroys firm value. In addition, research has concluded that diversification strategies, especially unrelated diversification, enables managers to extract private benefits (Amihud and Lev 1981; Aggarwal and Samwick 2003). We thus argue that excess D&O coverage may encourage managers to engage in more unrelated diversification, and may also reduce shareholder value.

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[1] D&O insurance covers situations in which a director or officer commits fraudulent or illegal activities unknowingly, but does not violate his/her responsibility to the shareholders and the firm. The D&O insurance policy typically not only covers damages, settlements, judgments, and litigation expenses, but extensions are available that provide coverage for firms in securities and employment mismanagement claims. However, the policy does not cover liability involving willful misconduct, self-dealing, bad faith, knowing violation of security laws, personal profit, or dishonesty.

[2] Two types of D&O insurance are common: corporate coverage that reimburses the firm when it indemnifies a director or senior executive for the costs of a suit; and personal coverage that provides direct payment to a director or senior executive when the firm is not able to indemnify him or her (See section 2 for more details).

[3] For example, less disclosure of bad news management forecasts (Wynn 2008), less conservative financial reporting (Chung and Wynn 2008), and poor investment decisions (Lin, Officer, and Zou 2011).

We test our hypotheses on a sample of Taiwanese listed firms. Taiwan provides an ideal setting to study the impact of D&O insurance on diversification for several reasons. First, data on D&O insurance coverage are only publicly disclosed in a few countries, such as Taiwan and Canada. In response to an increase in the number of shareholder claims against firms, the Taiwanese Securities and Futures Bureau (TSFB) announced a new ruling in 2002: the *Corporate Governance Best-Practice Principles for Listed Companies*. This ruling stipulates that firms must disclose the details of their D&O insurance coverage amounts. Second, studies on D&O insurance have mainly used Canada, a developed country, as a research setting due to data availability. By contrast, Taiwan is an emerging economy and its capital market is not as efficient as that of Canada or the U.S. Corporate diversification may produce beneficial effects on firm value via the creation of a more efficient internal capital market. Conglomerates that have made both related and unrelated diversification dominate the Taiwanese market. Therefore, whether diversification will destroy firm value in Taiwan remains an open question.

We follow previous research and use excess (unexpected) D&O coverage to capture managers' opportunistic incentives.[4] Based on a sample of 1,332 Taiwanese listed firms from 2008 to 2014, we find that firms with excess D&O insurance coverage pursue higher levels of diversification, specifically, unrelated diversification. We also find that diversification, and unrelated diversification in particular, is value destroying when firms have excess D&O coverage. Our results indicate that the agency problems associated with excess D&O coverage motivate managers to engage in more diversification activities that will lower shareholder wealth. We also find that excess D&O coverage motivates managers to act in a matter that is not in the best interests of shareholders rather than engage in fraudulent or illegal activity. At the same time, these findings are consistent with studies showing that excess D&O coverage acts as an informative signal of managerial opportunism (e.g., less transparent disclosures and poor investment decisions). Our results are robust to several alternative measures of D&O insurance coverage and firm value and remain when we control for self-selection biases related to the purchase choice of D&O insurance and the endogeneity of diversification.

This study contributes to the existing literature in the following ways. First, corporate governance and decision making are two important topics in management accounting literature. We document how corporate governance mechanisms, such as D&O insurance, affect managerial decisions on corporate diversification. Second, research has examined the consequences of D&O insurance (Wynn 2008; Chung and Wynn 2008; Lin et al. 2011; Lin et al. 2013). We add to this line of research by showing that firms with abnormally high D&O insurance coverage tend to pursue more diversification, especially unrelated

[4] Evidence in Chalmers, Dann, and Harford (2002), Chung and Wynn (2008), Lin, Officer, Wang, and Zou (2013), among others, suggests excess D&O coverage is associated with opportunistic *ex post* outcomes.

diversification. This finding suggests that D&O insurance does not encourage risk-taking behaviors but instead motivates empire building. Third, previous work has established that entrenched managers are likely to make value-decreasing investment decisions (Jensen 1986; Morck, Shleifer, and Vishny 1990). Lin et al. (2011) show that managers who are protected from higher levels of D&O insurance coverage make poor merger and acquisition (M&A) decisions that lead to lower returns for their shareholders. Because M&A is an implementation instrument for firms' diversification strategy that enables firms to fulfill their various objectives, our results may extend previous work and provide a general conclusion regarding the economic consequences of diversification accompanying D&O insurance. Finally, we shed light on the debate over whether diversification creates value. We find that excess D&O insurance coverage leads to value-destroying diversification. Therefore, our evidence suggests that whether diversification creates value depends on the managerial motivation for diversification.

The remainder of this paper proceeds as follows. Section 2 reviews the institutional background, discusses the literature and develops the main hypotheses. Section 3 presents the research design. Section 4 presents the data and discusses the results of empirical tests, and Section 5 concludes the paper.

2. INSTITUTIONAL BACKGROUND, LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Shareholder Litigation and D&O Insurance

Shareholder activism and shareholder litigation are important corporate governance mechanisms that shareholders use to ensure return on their investment (Brealey, Myers, and Allen 2010). Claims are regularly brought against corporate officials on a wide variety of legal grounds, including allegations of breach of fiduciary duty or violations of securities law. These lawsuits are expensive to defend, and may expose individual managers to significant personal liability. Therefore, the threat of shareholder litigation operates as an effective governance constraint that deters directors and officers from misbehaving (Shleifer and Vishny 1997). According to a report by Cornerstone Research (2006), publicly traded firms have a 2% chance of being sued in a shareholder class action in any given year and the average settlement value for such claims exceeded $24 million in 2005.

There are three main types of shareholder lawsuits: direct, derivative, and securities law claims. Direct lawsuits are initiated by shareholders on their own behalf. Direct claims are typically brought as class action lawsuits challenging board conduct in the context of acquisition transactions. Derivative actions are brought by shareholders on the corporation's behalf to recover damages caused by a manager's breach of duty. Derivative

lawsuits exert an important constraint on managerial agency costs (Core 1997). In securities litigation lawsuits, shareholders claim that managers have either misrepresented financial information or provided inadequate corporate disclosures. Securities litigation is by far the greatest liability threat to corporations and their managers.

Firms typically protect their executives from legal expenses and liability exposures through indemnification and D&O insurance. Corporate indemnification is the directors' and officers' first line of liability protection. This statutorily authorized protection is usually embodied in corporate documents such as articles of incorporation or by-laws, and generally encompasses the rights to both advancement of defense expenses and indemnification. Indemnification often extends to the maximum extent permitted by law and thus is theoretically unlimited. However, indemnification is practically limited by the firm's financial resources. In addition, there are limitations on a corporation's ability to indemnify individuals found liable in shareholders' derivative suits. D&O insurance provides protection for firm officials when corporate indemnification is not available, whether due to insolvency or legal prohibition. D&O insurance also provides a mechanism for corporations to be reimbursed when they do indemnify their executives.

Based on our discussions with D&O insurance industry professionals, we find that the D&O insurance policies (e.g., coverage provisions and exclusions) in Taiwan are similar to those in Canada and the U.S. There are three types of coverage in D&O insurance: Side A, Side B, and Side C. The coverage provision in which the D&O insurance policy provides individuals with insurance protection when indemnification is not available is commonly referred to as Side A coverage (Baker and Griffith 2007). The D&O insurance policy's provision for reimbursement of a firm's indemnification obligations is referred to as Side B coverage (Baker and Griffith 2010). In more recent years, many D&O insurance policies have also incorporated a Side C coverage, which provides insurance protection for the corporate entity's own liability exposures (O'Leary 2007). Among all D&O insurance policies for public firms, this Side C protection is usually limited to just the firm's liabilities under the securities laws.

Side A coverage is essentially catastrophic protection for the individual executives. It provides a way to ensure that litigation protection is still available to them even if the firm is financially unable to indemnify them or legally prohibited from doing so. Coverage B and C essentially operate as balance sheet protection for the firm. Coverage B also provides a way for firms to contractually transfer their indemnification obligations to the insurer (subject to all of the policy's terms and conditions). Many firms find that the amount of insurance available in a single policy of D&O insurance is insufficient. Thus, they purchase additional limits of liability through excess D&O insurance policies as part of a tower of insurance arranged in various layers. For example, because of the importance

of this insurance protection, some firms choose to buy additional amounts of insurance that provide additional limits of liability for Side A coverage in the form of Excess Side A insurance (O'Leary 2007).

According to a Towers Watson survey (2013), nearly all U.S. publicly traded firms purchase D&O insurance. However, there is no standard D&O insurance policy. Each D&O insurance carrier has forms that differ from those of their competitors and most policies are generally the subject of extensive negotiations. D&O insurance premiums vary with limits, exclusions, and other conditions. Many D&O insurance buyers are very sensitive to the cost of the insurance, as D&O insurance is often perceived as expensive. Therefore, the premiums that firms pay for D&O insurance are a good measure of the financial significance of the scope of coverage.

2.2 The role of D&O Insurance in Corporate Governance

As described above, D&O insurance serves as a contractual mechanism to spread the risk of shareholder litigation. It transfers the risk from individual directors and officers to the corporation they manage, and then to a third-party insurer. The ultimate goal is to prevent individual managers from becoming saddled with personal liability for causing corporate losses. Holderness (1990) suggests that by purchasing D&O insurance, shareholders complement existing monitoring mechanisms in a number of ways. Researchers have identified the following positive roles of D&O insurance in corporate governance.

First, prior to issuing an insurance policy, D&O insurers are expected to undertake a thorough examination of the individuals for whom insurance protection is sought (Boyer and Delvaux-Derome 2002). D&O insurers act as gatekeepers of corporate governance (Chalmers et al. 2002). Specifically, D&O insurers screen and monitor corporate governance risks. They charge lower D&O premiums to client firms with better corporate governance. In this way, D&O insurers can maintain the profitability of their risk pools. Thus, D&O insurers help to ensure that directors pursue the interests of shareholders. Furthermore, D&O insurer monitoring also occurs during the litigation process. Claims or notifications made under the D&O policy provide the insurer with an opportunity to undertake a comprehensive examination of the specific aspects of the directors' administration giving rise to the dispute. Second, the firm purchase of D&O insurance attracts risk-averse individuals to their boardrooms and executive suites (Core 1997). D&O insurance is particularly important for outside directors whose compensation pales in comparison with potential litigation costs. Because of the chance that a publicly traded firm cannot indemnify directors and officers in the event of a shareholder lawsuit, risk-averse directors and officers require D&O insurance coverage as a condition of service. Indeed, there is evidence that personal liability without insurance adversely affects a firm's

ability to attract suitable appointees, and the problem is particularly acute in the recruitment of outside directors (Priest 1987; Daniels and Hutton 1993). D&O insurance thus promotes internal monitoring by facilitating the recruitment of outside directors whose independence from firm management is more likely to make them objective guardians of shareholder welfare. Third, D&O insurance is part of an optimal incentive mix to motivate managers to take risks by protecting directors and officers (Core 1997; Egger, Radulescu, and Rees 2011). Studies have shown that directors and officers are risk averse (Jensen and Meckling 1976; Hall and Murphy 2002). Without D&O insurance, conservative managers tend to avoid risks, even though risk avoidance is not in the best interests of shareholders (Jensen 1986).

Critics of D&O insurance, however, claim that it weakens the effectiveness of shareholder litigation as a managerial control device (Wynn 2008; Chung, Wynn, and Yi 2013; Chen, Li, and Zou 2016). When directors and officers are not threatened by active shareholder monitoring and litigation, they tend to become entrenched (Jensen 1993). Entrenched managers may seek more protection so as to prioritize their own interests instead of those of the shareholders. Bebchuk and Fried (2006) document that CEO compensation is higher at firms with more entrenched managers. Therefore, it is reasonable to expect that if managers are more entrenched, they will purchase more D&O insurance. However, Oesterle (1989) indicates that to the extent that market mechanisms such as, takeover market, encourage managers to work in the interests of shareholders, D&O insurance may not necessarily have adverse effects on a given firm. In addition, the possibility of nuisance suits against directors often requires large personal defense costs. Therefore, in addition to corporate indemnification, D&O insurance should be available to directors (Oesterle 1989).

2.3 D&O Insurance and Corporate Diversification

D&O insurance is likely to encourage risk taking because it protects directors and officers from shareholder lawsuits (Core 1997). Corporate Diversification (i.e., adding new lines of business to a firm) is similar to portfolio diversification and thus reduces a firm's risk (Brealey et al., 2010). Therefore, firms carrying higher D&O insurance may tend to exhibit a low degree of diversification. However, D&O insurance insulates managers from the threat of lawsuits and personal financial liability stemming from their decisions on behalf of the firm and thus reduces managerial incentives to act in the best interest of their shareholders (Core 1997; Boyer and Delvaux-Derome 2002). Research indicates that higher or excess level of D&O insurance coverage constrains the role of shareholder litigation as a disciplining mechanism of managerial actions, and, therefore, allows managers to act opportunistically. So higher D&O insurance coverage creates a severe host

of moral hazard and agency problems (Chalmers et al. 2002; Chung and Wynn 2008; Baker and Griffith 2010; Lin et al. 2011; Li and Liao 2014).

According to the agency theory, entrenched managers are inclined to make investment strategies that maximize their own welfare at the expense of outside shareholders (Jensen and Meckling 1976). Corporate diversification is a typical way for entrenched managers to pursue private benefits (Shleifer and Vishny 1989). For example, managers diversify to increase firm size and to benefit from the power and prestige of running a larger firm (Jensen 1986; Stulz 1990). Managers also can utilize diversification to entrench themselves and extract rents from shareholders by engaging in manager-specific investments (Shleifer and Vishny 1989). In addition, the asymmetric information and complexity derived from diversification motive and complexity derived from diversification motive entrenched managers to engage in accounting-manipulation strategies (Rodríguez-Pérez and Hemmen 2010).

In addition, related and unrelated diversification strategies can lead to varying degrees of risk and return (Berger and Ofek 1995). Research shows that managers motivated by self-interest (e.g., power, salary compensation) are inclined to pursue unrelated diversification strategies (Amihud and Lev 1981; Jensen 1986; Aggarwal and Samwick 2003). That is, unrelated strategy seems to provide managers with more discretion to act opportunistically. Because excess D&O insurance coverage gives managers strong incentives to take actions that benefit themselves at the expense of outside shareholders, firms with excess D&O coverage may pursue a higher level of diversification. Specifically, they may be more likely to make strategies on unrelated diversification. Therefore, we propose the following hypothesis:

Hypothesis 1: Excess D&O insurance coverage is positively associated with corporate diversification, especially unrelated diversification.

2.4 D&O Insurance, Corporate Diversification and Firm Valuation

Examination of the effect of corporate diversification on firm value has produced mixed results.[5] Corporate diversification can improve firm value in several ways. First, it enables a firm to enhance its capital-raising ability and reduce capital costs because earnings streams from diversified divisions are unrelated, stabilizing cash flows (Lewellen 1971). Second, it helps to alleviate the problem of under-investment through an efficient asset allocation by creating an internal capital market (Stulz 1990). Third, a diversified firm can operate efficiently through coordinating specialized divisions (Chandler 1977). Fourth, related diversification is beneficial to using strategic assets and building scale

[5] See for example, Lang and Stulz (1994), Denis et al. (1997), Denis et al. (2002), Campa and Kedia (2002), Villalonga (2004), Laeven and Levine (2007), Schmid and Walter (2009), and Kuppuswamy and Villalonga (2015).

economies (Markides and Williamson 1994). Corporate diversification may also destroy firm value. First, a multidivisional firm may encounter greater information asymmetry costs related to increased information asymmetry between headquarters and the individual divisions (Harris, Kriebel, and Raviv 1982). Second, diversified firms may postpone the withdrawal of failed segments by allowing cross-subsidization (Meyer, Milgrom, and Roberts 1992). Diversified firms may invest in negative NPV projects through poor use of increased free cash flow and capital-raising capacity (Jensen 1986; Stultz 1990).

Research indicates that, for firms with severe agency problems, managers are prone to follow their own objectives and pursue self-serving low-value or value-destroying acquisitions at the expense of shareholders. Jensen (1986), for example, observes that entrenched managers appear to use free cash flows for non-optimal projects rather than redistributing them to the outside owners, while Morck et al. (1990) find that they may overpay when making acquisitions with substantial private benefits of control. Since D&O insurance coverage shields officers and directors from personal liability for breaches of the duty of care, they tend to work recklessly and negligently, or make decisions that are harmful to shareholder interests, such as making poor M&A decisions (Lin et al. 2011) or implementing inefficient investment decisions (Li and Laio 2014). That is, D&O insurance indeed exacerbates the agency problem and results in a reduction of shareholder wealth (Wang and Chen 2016). While existing literature documents mixed evidence on the valuation effect of corporate diversification, the agency problem is actually an essential cause of value-reducing diversification (Shleifer and Vishny 1989; Denis et al. 1997; Lins and Servaes 2002; Best, Hodges, and Lin 2004; Hoechle, Schmid, Walter, and Yermack 2012). Thus, we argue that excess D&O insurance coverage will lead managers to engage in value-reducing diversification strategies.

In addition, research suggests that entrenched managers are prone to engage in unrelated acquisitions with no clear-cut financial benefit in order to explore their comparative advantage (Shleifer and Vishny 1989) or to diversify their investment in firm-specific human capital (Amihud and Lev 1981; Hanson and Song 1996), but end up destroying outside shareholders' value. Thus, over-insured managers may have more incentives to engage in value-destroying unrelated diversification. Based on the above discussion, we posit the following hypothesis:

Hypothesis 2: Excess D&O insurance coverage is negatively associated with the value of corporate diversification, especially unrelated diversification.

3. Methodology

3.1 Variable Measurement

3.1.1 Measurement of diversification

Our measure of total diversification is based on the entropy concept (Jacquemin and Berry 1979), which is commonly used in industrial organization research. The entropy measure of total diversification (*DIV*) is calculated as $\Sigma_{i=1}^{n} P_i \times \ln(1/P_i)$, where P_i is the percentage of industry segment i in a firm's sales, and $\ln(1/P_i)$ is the weight for each industry segment i, which is the logarithm of the inverse of its sales.[6] This measure is useful because it takes into account both the number of industry segments in which a firm operates and the importance of each industry segment to its total revenues. Jacquemin and Berry (1979) and Palepu (1985) indicate that the measure of total diversification can be decomposed into related and unrelated components of diversification. *DR* is the related diversification index arising from operating in different industry segments within an industry group, and *DU* is the unrelated diversification index arising from operating in different industry groups.[7]

The related diversification measure, DR_j is calculated as $\Sigma_{i=j}^{n} P_{ji} \times \ln(1/P_{ji})$, where P_{ji} is the percentage of industry segment i of industry group j in the total sales of the industry group. The total related diversification measure, *DR*, is a function of DR_j. It is calculated as $\Sigma_{j=1}^{n} DR_j \times P_j$, where P_j is the percentage of the jth industry group sales in the total sales of the firm. The unrelated diversification, *DU*, is calculated as $\Sigma_{j=1}^{n} P_j \times \ln(1/P_i)$.[8] The Appendix presents an illustration of the classification and calculation of diversification index.

3.1.2 Measurement of excess D&O insurance coverage

To explain the effects of excess (unexpected) D&O insurance coverage, we follow the literature (Wynn 2008; Chung and Wynn 2008) and define excess D&O coverage, *EXDOCOV*, as the residual from the regression of D&O coverage on its determinants. The estimated model is as follows:

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[6] Large value for the entropy measure represents greater diversification. Also, single-segment firms with entropy measures equal to zero.

[7] Following Young (2008), we identify the industry segments and industry groups by using industry classification codes retrieved from Taiwan Industry Economics Service.

[8] We use the following hypothesis numerical example to show the behavior of the diversification index.

Sales								
	Group 1		Group 2			Diversification		
Total	Segment 1	Segment 2	Segment 1	Segment 2	Segment 3	Total	Related	Unrelated
100	100	0	0	0	0	0	0	0
100	90	5	5	0	0	0.24	0.20	0.05
100	80	10	5	5	0	0.67	0.35	0.33
100	70	10	10	5	5	0.87	0.37	0.50
100	60	10	10	10	10	1.23	0.62	0.61
100	20	20	20	20	20	1.61	0.94	0.67

$$DOCOV_{i,t} = \alpha_0 SIZE_{i,t} + \alpha_1 LEV_{i,t} + \alpha_2 CROSS_{i,t} + \alpha_3 OUTDIR_{i,t} + \alpha_4 OUTOWN_{i,t} + \alpha_5 RETVOL_{i,t} + \alpha_6 HITECH_{i,t} + \alpha_7 CASH_{i,t} + Industry\ and\ Year\ dummies + \varepsilon_{i,t}. \quad (1)$$

where, for firm *i* and year *t*: *DOCOV* is the D&O coverage limit scaled by lagged total assets. *SIZE* is the natural logarithm of total assets. *LEV* is the ratio of total debt to total assets. *CROSS* is a dummy variable that takes the value of one if the firm is cross-listed in exchanges outside of Taiwan, and zero otherwise. *OUTDIR* is the percentage of outside directors and supervisors on the board. *OUTOWN* is the percentage of common shares hold by outside blockholders. *RETVOL* is the natural logarithm of annualized variance of daily return over the current fiscal year. *HITECH* is a dummy variable, which takes the value of one if the firm is classified as a high-tech firm, and zero otherwise. *CASH* is the sum of cash, cash equivalents and short-term investments scaled by lagged total assets.

3.2 Model Specification

To test Hypothesis 1, we specify the following regression model linking the level of diversification with excess D&O insurance coverage and other control variables:

$$DIV_{i,t}(DR_{i,t}, or\ DU_{i,t}) = \beta_0 + \beta_1 EXDOCOV_{i,t} + \beta_2 ECOMP_{i,t} + \beta_3 CEOOWN_{i,t} + \beta_4 OUTOWN_{i,t} + \beta_5 OUTDIR_{i,t} + \beta_6 BOARD_{i,t} + \beta_7 DUAL_{i,t} + \beta_8 INST_{i,t} + \beta_9 FAM_{i,t} + \beta_{10} SIZE_{i,t} + \beta_{11} LDMKV_{i,t} + \beta_{12} CR_{i,t} + \beta_{13} ROA_{i,t} + \beta_{14} RDEXP_{i,t} + \beta_{15} CAPEXP_{i,t} + \beta_{16} AGE_{i,t} + Industry\ and\ Year\ dummies + \varepsilon_{i,t}. \quad (2)$$

where, for firm *i* and year *t*: *DIV* is the sum of the entropy measure of related diversification (*DR*) and unrelated diversification (*DU*). *EXDOCOV* is excess D&O insurance coverage. *ECOMP* is the ratio of equity compensation[9] to total compensation (salary, bonus, stock-based compensation). *CEOOWN* is the percentage of common shares held by the CEO. *BOARD* is the number of directors and supervisors. *DUAL* is a dummy variable that equals one if a CEO is also the chair of the board, and zero otherwise. *INST* is the percentage of common shares held by institutional investors. *FAM* is a dummy variable that equals one if the dominant shareholder is a family, and zero otherwise. *LDMKV* is the ratio of long-term debt to market value. *CR* is the ratio of current assets to current liabilities. *ROA* is the earnings before extraordinary items divided by lagged total assets. *RDEXP* is R&D expenditures divided by lagged total assets. *CAPEXP* is capital expenditures divided by lagged total assets. *AGE* is the number of years since the date of incorporation. Other variables are defined as above. Our primary test variable is the excess D&O coverage, *EXDOCOV*. If the abnormally high coverage leads to severe agency problems, which in

[9] Equity compensation is the sum of the value of the current year stock option grants (valued using the Black-Scholes method) and the market value of restricted stock granted during the fiscal year.

turn motivate managers to make a higher level of (unrelated) diversification, we will expect a positive coefficient on *EXDOCOV*.

We include several factors impacting corporate diversification are documented in previous studies. We control for CEO equity compensation (*ECOMP*), because the literature suggests that firms with more equity-based compensation are more likely to engage in more risk-taking activities and have higher performance (Coles, Daniel, and Naveen 2006; Gong and Li 2013). We also control for CEO ownership, blockholder ownership, and institutional ownership, which previous studies have found to be negatively related to corporate diversification (Hill and Snell 1988; Denis et al. 1997; Boyd, Gove, and Hitt 2005). We include board size (*BOARD*) and CEO dual chair (*DUAL*) because diversified firms are more likely to have larger boards of directors and CEO duality (Hermalin and Weisbach 1988; Kim, Al-Shammari, Kim, and Lee 2009). Further, research finds that firms with an outside-dominated board and/or a board controlled by family members are less likely to diversify (Zantout and O'Reilly-Allen 1996; Anderson and Reeb, 2003). We thus add the fraction of outside directors and supervisors on the board (*OUTDIR*) and a family firm dummy (*FAM*) to the regression.

In addition, we control for firm size (*SIZE*) and firm age (*AGE*), because larger and older firms generally have more resources and experience to access or establish business beyond their core industry (Anderson and Reeb, 2003; Jensen and Zajac 2004). We include return on assets (*ROA*) because firms with poor performance may be impelled to alter their diversification strategy (Wiersema and Bantel 1992). Further, firms with more internal funds are more likely to be diversified (Chatterjee and Wernerfelt 1991). We thus include the ratio of long-term debt to equity market value (*LDMKV*) and the current ratio (*CR*) in the regression.[10] We also include R&D and capital expenditures (*RDEXP* and *CAPEXP*) as control variables because these two types of expenditure could compete with diversification for funds. Finally, we control for industry and year fixed effects in the model. To test our hypothesis 2, we estimate the following regression model:

$$\begin{aligned} RET_{i,t+1} = {} & \gamma_0 + \gamma_1 DIV_{i,t}(DR_{i,t},\ or\ DU_{i,t}) + \gamma_2 EXDOCOV_{i,t} \\ & + \gamma_3 DIV_{i,t}(DR_{i,t},\ or\ DU_{i,t}) \times EXDOCOV_{i,t} + \gamma_4 ECOMP_{i,t} + \gamma_5 CEOOWN_{i,t} \\ & + \gamma_6 CEOOWN_{i,t}^2 + \gamma_7 OUTOWN_{i,t} + \gamma_8 OUTDIR_{i,t} + \gamma_9 FAM_{i,t} + \gamma_{10} SIZE_{i,t} \\ & + \gamma_{11} LEV_{i,t} + \gamma_{12} SG_{i,t} + \gamma_{13} RISK_{i,t} + Industry\ and\ Year\ dummies + \varepsilon_{i,t}. \end{aligned} \quad (3)$$

where, for firm *i* and year *t*: *RET* is the annual stock return of the firm.[11] RET_{t+1} is calculated as the natural log of the ratio of closing stock price at year *t*+1 divided by closing stock price at

[10] Following Chatterjee and Wernerfelt (1991), a low value of *LDMKV* and high values of *CR* imply that a firm has more internal funds.

[11] Following prior research (e.g., Jiambalvo, Rajgopal, and Venkatachalam 2002; Kohlbeck and Mayhew 2010; Zerni, Kallunki, and Nilsson 2010), we use annual stock return as a proxy for firm valuation.

year t.[12] $CEOOWN^2$ is the squared term of *CEOOWN*. *LEV* is the ratio of total debt to total assets. *SG* is the sales growth rate. *RISK* is the standard deviation of monthly stock returns for the prior 36 months. All other variables have been defined previously. Our second primary interest variable is the coefficient on the interaction term of (unrelated) diversification and excess D&O coverage, *DIV*×*EXDOCOV* (*DU*×*EXDOCOV*). If overly insured managers exhibit high levels of (unrelated) diversification that destroy firm value, we expect the coefficient on *DIV*×*EXDOCOV* (*DU*×*EXDOCOV*) to be negative.

We also include control variables that are related to financial performance. *ECOMP* is equity compensation and is positively related to firm value (Coles et al. 2006; Gong and Li 2013). Both *CEOOWN* and $CEOOWN^2$ are included because research finds a nonlinear relationship between CEO ownership and firm value (McConnell and Servaes 1990; Kole 1995); *OUTOWN* and *OUTDIR* are outside blockholdings and outside board independence. *OUTOWN* and *OUTDIR* positively affect firm value (Hoechle et al. 2012). *FAM* represents family firm. Family firms enjoy higher firm value than non-family firms (Anderson and Reeb 2003). Firm size (*SIZE*), is positively related to firm value (Berger and Ofek (1995). Financial leverage (*LEV*) is included because firms with high financial leverage can force top executives to forego profitable investment projects because of the constraints related to debt repayment (McConnell and Servaes 1990). *SG represents* potential growth opportunities which positively affect firm valuation (Lins 2003). *RISK* is included because higher risk profiles are detrimental to firm performance (Anderson and Reeb 2003). Finally, we include industry and year fixed effects.

4. Empirical Results

4.1 Sample Selection

Our original sample consists of all firms listed on the Taiwan Stock Exchange (TSE) from 2008 to 2014.[13] Data on diversification, D&O insurance, executive compensation, governance structure, and financial variables are derived from the Taiwan Economics Journal (TEJ) Data Bank. Table 1 outlines the sample selection process. We initially identify a total of 10,447 firm-years (1,513 firms) and eliminate 366 firm-years (53 firms) in financial and regulated industries because these firms have different financial reporting incentives. We then exclude 1,265 firm-years without details on D&O insurance. We also delete 13 firm-years due to missing data necessary to estimate excess D&O insurance coverage and 57 firm-years due to lack of sufficient data to calculate the diversification index. In addition, we eliminate 218 firm-years due to missing stock price data. Finally, we

[12] We use log returns instead of simple returns as the dependent variable because log returns have a smaller skewness than do simple returns. In addition, under most circumstances, they are equivalent to simple returns when price change is not too significant. Our results are qualitatively the same when we use simple returns in our analysis.

[13] Information regarding D&O insurance coverage limits is officially and publicly disclosed starting in 2008.

delete 508 firm-years with incomplete data for the control variables. The selection process yields a sample of 8,020 firm-years associated with 1,332 firms.

TABLE 1 Sample Selection Procedure

	Firm-years
Original sample in Taiwan Stock Exchange for the period 2008-2014	10,447
Less: firms in financial and regulated industries	(366)
Less: firms without D&O insurance details	(1,265)
Less: firms with insufficient data for excessive D&O liability insurance coverage	(13)
Less: missing diversification data	(57)
Less: missing stock price data	(218)
Less: missing values of other control variables	(508)
Final sample	8,020

Notes: This table presents the sample selection process.

4.2 Descriptive Statistics and Univariate Analysis

Table 2 presents descriptive statistics for the variables used in this study. To alleviate potential outlier effects, we winsorized all continuous variables at the 1st and 99th percentile. The average D&O coverage limit (*COVERAGE*) is $154.060 million. The mean D&O coverage limits (*DOCOV*) normalized by lagged asset are 4% and the mean excess D&O coverage (*EXDOCOV*) is -0.005. The stock return (*RET*) in the sample has a mean of 0.071 and a standard deviation of 0.486. We find that the mean (median) value of diversification (*DIV*) is 0.616 (0.623). The mean values of related and unrelated diversification (*DR* and *DU*) are 0.343 and 0.273[14], respectively. We also find that the mean value of the ratio of equity compensation to total compensation (*ECOMP*) is 0.288 (0.338), indicating that firms award nearly 30% of compensation in the form of stocks or stock options. For the governance characteristics, top executives (*CEOOWN*), outside blockholders (*OUTOWN*), and institutional investors (*INST*), on average, own 2%, 3%, and 36% of the shares outstanding, respectively. The mean board size (*BOARD*) is nine members, and outsiders (*OUTDIR*) hold an average of 13% of total board seats. About 32% and 63% of sample firms have CEO duality (*DUAL*) and are family firms (*FAM*).

[14] We note that mean related diversification (*DR*) is greater than mean unrelated diversification (*DU*) in our sample. As the classification of industry group and industry segment is followed by the definition of Taiwan Industry Economics Service and identified by artificial means, we admit that this classification process, however, may encompass a somewhat subjective bias. Nevertheless, we find in untabulated results that mean unrelated diversification is greater than related diversification in several manufacturing industries, such as food (TEJ industry code = 12; mean *DR* = 0.480; mean *DU* = 0.521), textiles (TEJ industry code = 14; mean *DR* = 0.251; mean *DU* = 0.374), electric machinery (TEJ industry code = 15; mean *DR* = 0.328; mean *DU* = 0.339), electrical and cable (TEJ industry code = 16; mean *DR* = 0.395; mean *DU* = 0.403), automobile (TEJ industry code = 22; mean *DR* = 0.212; mean *DU* = 0.291), and electron (TEJ industry code = 23; mean *DR* = 0.263; mean *DU* = 0.284), which is similar to the findings reported by Shyu and Chen (2009).

For firm-specific control variables, firm size (*SIZE*), the natural logarithm of asset size, has a mean of 15.196 and a median of 15.004. The mean value of long-term debt (*LDMKV*) accounts for 12.4% of equity market value. The mean debt-to-assets ratio (*LEV*) is 0.350,and the mean current ratio is 2.592. The mean sales growth rate (*SG*) is about 4%, and the mean firm risk (*RISK*) is 0.144. The mean R&D and capital expenditures represent 2.4% and 2.7% of total assets, respectively. The mean return on assets (*ROA*) is approximately 4%. The average firm age (*AGE*) is 27 years.

TABLE 2 Descriptive Statistics

Variables	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
COVERAGE	154.060	347.030	0.000	60.000	160.150
DOCOV	0.040	0.074	0.000	0.009	0.048
EXDOCOV	-0.005	0.045	-0.034	-0.009	0.016
RET	0.071	0.486	-0.235	0.011	0.302
DIV	0.616	0.488	0.140	0.623	0.973
DR	0.343	0.401	0.000	0.184	0.627
DU	0.273	0.349	0.000	0.019	0.570
ECOMP	0.288	0.183	0.122	0.329	0.437
CEOOWN	0.015	0.022	0.001	0.005	0.019
OUTOWN	0.032	0.043	0.000	0.018	0.043
OUTDIR	0.134	0.134	0.000	0.167	0.250
BOARD	9.310	2.035	8.000	9.000	10.000
DUAL	0.320	0.466	0.000	0.000	1.000
INST	0.356	0.221	0.175	0.321	0.516
FAM	0.627	0.484	0.000	1.000	1.000
SIZE	15.196	1.352	14.254	15.004	15.960
LEV	0.351	0.170	0.219	0.338	0.461
SG	0.042	0.390	-0.136	-0.002	0.137
RISK	0.144	0.063	0.101	0.133	0.173
LDMKV	0.124	0.233	0.000	0.016	0.148
CR	2.592	2.708	1.237	1.756	2.863
ROA	0.039	0.093	0.002	0.041	0.090
RDEXP	0.024	0.037	0.001	0.010	0.031
CAPEXP	0.027	0.044	0.002	0.009	0.030
AGE	27.267	12.342	17.000	25.000	36.000

Notes: This table reports descriptive statistics of key variables based on a sample of 8,020 observations. *COVERAGE* is D&O insurance coverage limits at the end of the fiscal year (in $ millions). *DOCOV* is D&O coverage limits scaled by lagged total assets. *EXDOCOV* is the residual derived from the regression of D&O insurance coverage on its determinants. *RET* is next year's stock return. *DIV* is the sum of the entropy measure of related diversification, *DR* and unrelated diversification, *DU*. *ECOMP* is the ratio of equity compensation to total compensation. *CEOOWN* is the percentage of stock owned by the CEO. *OUTOWN* is the percentage of stock owned by the outside blockholders. *OUTDIR* is the percentage of outside directors and supervisors that sit on the board. *BOARD* is the number of directors and supervisors on the board. *DUAL* is a dummy variable that equals one if the CEO of a firm is also its chairman, and zero otherwise. *INST* is the percentage of stock owned by institutional investors. *FAM* is a dummy variable that equals one if the dominant shareholder is a family, and zero otherwise. *SIZE* is the natural log of total assets. *LEV* is the ratio of total debt to total assets. *SG* is sales growth rate. *RISK* is the standard deviation of monthly return for the prior 36months. *LDMKV* is the ratio of long-term debt to the market value of equity. *CR* is the ratio of current assets to current liabilities. *ROA* is earnings before extraordinary items divided by lagged total assets. *RDEXP* is R&D expenditures scaled by lagged total assets. *CAPEXP* is capital expenditures scaled by lagged total assets. *AGE* is the number of years since the date of incorporation.

Table 3 compares summary statistics of stock return (*RET*), levels of total diversification (*DIV*), related diversification (*DR*), and unrelated diversification (*DU*) for high and low excess D&O coverage (*EXDOCOV*) groups classified by the sample median values of *EXDOCOV*. The mean value of stock return, *RET*, for the high *EXDOCOV* group is 0.062, whereas that for the low *EXDOCOV* group is 0.080. The difference of -0.018 is significant at the 10% level, suggesting that excess D&O coverage is negatively associated with firm value. In addition, the mean value of *DIV* (*DR*/*DU*) for the high *EXDOCOV* group is 0.651 (0.370/0.280), compared with a mean for the low *EXDOCOV* group of 0.580 (0.316/0.263), resulting in a difference of 0.071 (0.054/0.019), which is statistically significant at the 1% (or 5%) level. This indicates that firms with high D&O coverage are positively associated with a higher level of diversification.

TABLE 3 Univariate Statistics

	High *EXDOCOV* (*N* = 4,010)		Low *EXDOCOV* (*N* = 4,010)		Difference in	
Variables	Mean	Median	Mean	Median	Means (*t*-statistic)	Medians (*z*-statistic)
RET	0.062	0.007	0.080	0.017	-0.018*	-0.010*
					(-1.68)	(-1.82)
DIV	0.651	0.654	0.580	0.589	0.071***	0.065***
					(6.55)	(5.92)
DR	0.370	0.224	0.316	0.144	0.054***	0.008***
					(6.04)	(5.44)
DU	0.282	0.035	0.263	0.007	0.019**	0.028**
					(2.40)	(2.12)

Notes: This table presents a univariate comparison of firm value and diversification between high and low excess D&O insurance coverage (*EXDOCOV*). The high and low *EXDOCOV* groups are classified by the sample median of *EXDOCOV*. *EXDOCOV* is the residual derived from the regression of D&O insurance coverage on its determinants.Variables are defined in Table 2. Numbers in parentheses are *t*-statistics from *t*-tests (parametric) for the differences in means, and *z*-statistics from Wilcoxon tests (nonparametric) for the differences in medians. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 4 presents the Pearson correlations among our regression variables. We find that excess D&O insurance coverage (*EXDOCOV*) is positively correlated with diversification index (i.e., *DIV*, *DR*, and *DU*). We also find that *EXDOCOV* is negatively correlated with subsequent stock return (*RET*). In addition, the correlations between *EXDOCOV*, *DIV* (*DR* and *DU*), *RET*, and other regression variables are modes (mostly less than 0.5 in magnitude), indicating that multicollinarity is not a major concern in the interpretation of the empirical findings.

TABLE 4 Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1) *RET*																						
(2) *DIV*	0.025																					
(3) *DR*	0.021	**0.704**																				
(4) *DU*	0.010	**0.586**	**-0.159**																			
(5) *EXDOCOV*	**-0.043**	**0.064**	**0.054**	**0.030**																		
(6) *ECOMP*	**0.056**	**-0.069**	**-0.064**	**-0.024**	**0.045**																	
(7) *CEOOWN*	**0.042**	-0.018	**-0.039**	0.018	**0.026**	**0.068**																
(8) *OUTOWN*	**0.023**	-0.005	-0.005	-0.002	**-0.045**	**0.059**	-0.016															
(9) *OUTDIR*	**0.035**	**-0.094**	**-0.081**	**-0.037**	0.003	**0.171**	**0.107**	-0.019														
(10) *BOARD*	0.002	**0.091**	**0.101**	0.017	0.085	-0.003	-0.003	**0.102**	0.004													
(11) *DUAL*	0.002	0.002	-0.021	**0.026**	-0.016	0.001	**-0.023**	0.009	0.015	**-0.124**												
(12) *INST*	**0.036**	**-0.053**	0.017	**-0.092**	**0.083**	**0.043**	**-0.194**	**0.154**	-0.005	**0.165**	**-0.155**											
(13) *FAM*	-0.001	**-0.066**	**-0.045**	**-0.042**	**-0.131**	**-0.130**	**-0.183**	**-0.127**	**-0.169**	**-0.087**	0.007	-0.011										
(14) *SIZE*	**0.062**	**0.081**	**0.118**	-0.018	**0.115**	**0.088**	**-0.160**	**-0.043**	**-0.110**	**0.285**	**-0.155**	**0.414**	0.010									
(15) *LEV*	**-0.048**	**0.067**	**0.056**	**0.027**	0.017	-0.015	**-0.040**	**0.059**	**-0.070**	-0.018	-0.020	**0.058**	**0.028**	0.171								
(16) *SG*	**0.145**	-0.010	0.002	-0.017	-0.017	**0.033**	-0.001	0.013	0.004	-0.009	-0.001	**0.068**	0.008	**0.036**	**0.088**							
(17) *RISK*	**-0.051**	**0.080**	**0.075**	**0.028**	-0.007	**0.122**	**0.035**	**0.053**	**0.099**	**-0.111**	**0.044**	**-0.129**	**-0.047**	**-0.276**	**0.060**	**0.074**						
(18) *LDMKV*	**-0.119**	**-0.081**	**-0.093**	0.013	**0.046**	-0.022	**-0.086**	0.017	**-0.072**	**0.039**	-0.011	-0.004	**0.053**	**0.208**	**0.452**	**-0.056**	-0.012					
(19) *CR*	**0.023**	**0.045**	0.010	**0.053**	**-0.057**	0.007	**0.030**	0.002	**0.035**	**-0.054**	**0.037**	**-0.062**	**-0.077**	**-0.220**	**-0.521**	**-0.025**	**0.045**	**-0.174**				
(20) *ROA*	**0.130**	-0.009	**-0.028**	**-0.043**	**-0.072**	**0.032**	**0.077**	**-0.045**	**0.044**	**0.050**	**-0.068**	**0.207**	**-0.030**	**0.207**	**-0.192**	**0.294**	**-0.151**	**-0.209**	**0.038**			
(21) *RDEXP*	**0.024**	**-0.084**	**-0.058**	**-0.052**	**0.090**	**0.178**	**0.157**	**0.044**	**0.234**	**-0.044**	**0.040**	**-0.113**	**-0.220**	**-0.201**	**-0.193**	-0.001	**0.157**	**-0.171**	**0.171**	0.009		
(22) *CAPEXP*	**0.024**	**-0.024**	0.021	**-0.057**	0.004	**0.056**	**-0.026**	**0.048**	**0.096**	**0.047**	**-0.045**	**0.082**	-0.011	**0.059**	**0.042**	**0.110**	**0.062**	**0.134**	**-0.055**	**0.119**	0.021	
(23) *AGE*	-0.014	**0.195**	**0.160**	**0.092**	**-0.030**	**-0.232**	**-0.209**	**-0.037**	**-0.439**	**0.096**	**-0.045**	**0.037**	**0.259**	**0.272**	**0.063**	-0.017	**-0.273**	**0.081**	**-0.089**	0.013	**-0.347**	**-0.101**

Notes: This table provides Pearson correlations between selected variables. Variables are defined in Table 2. Bold figures indicate significance levels at less than the 5% level.

4.3 Results of Testing Hypothesis 1

Table 5 presents the multivariate regression results from estimating equation (2). Columns (1), (2), and (3) use total diversification, related diversification, and unrelated diversification dependent variables, respectively. We find that the coefficients of *EXDOCOV* in columns (1) and (3) are positive and significant at the 1% and 5% levels, respectively, while the coefficient of *EXDOCOV* in column (2) is positive, but not significant. This evidence supports our expectation that firms with excess D&O insurance coverage exhibit higher levels of diversification, and more specifically, a higher level of unrelated diversification.

The results of the control variables are generally consistent with the expectations. We find that firms with larger board size (*BOARD*) and lower institutional ownership (*INST*) tend to engage in more diversification activities. We also find that diversified firms are larger (*SIZE*) and older (*AGE*), and have more internal funds (*LDMKV*). Firms having high capital expenditures (*CAPEXP*) are more likely to spend less on diversification activities.

TABLE 5 Excessive D&O Insurance Coverage and Corporate Diversification

		DIV	*DR*	*DU*
		(1)	(2)	(3)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.215	-0.355**	0.118
		(-0.94)	(-2.10)	(0.83)
EXDOCOV	+	0.671***	0.349	0.338**
		(2.73)	(1.38)	(2.03)
ECOMP	−	-0.070	-0.069*	-0.004
		(-1.38)	(-1.87)	(-0.10)
CEOOWN	−	0.734	0.422	0.287
		(1.26)	(0.93)	(0.73)
OUTOWN	−	0.147	-0.020	0.166
		(0.54)	(-0.09)	(0.97)
OUTDIR	−	0.030	0.005	0.036
		(0.31)	(0.07)	(0.55)
BOARD	+	0.014**	0.012**	0.003
		(2.33)	(2.48)	(0.79)
DUAL	+	0.029	0.012	0.017
		(1.24)	(0.66)	(1.07)
INST	−	-0.173***	-0.054	-0.118***
		(-2.85)	(-1.11)	(-2.70)
FAM	−	0.031	0.009	0.022
		(1.18)	(0.44)	(1.24)
SIZE	+	0.021*	0.023**	-0.002
		(1.74)	(2.51)	(-0.23)
LDMKV	−	-0.103**	-0.111***	0.005
		(-2.34)	(-3.08)	(0.16)
CR	+	-0.003	0.003	0.006**
		(-0.72)	(0.85)	(2.45)
ROA	−	0.034	0.095	-0.048
		(0.32)	(1.16)	(-0.65)
RDEXP	−	0.068	0.401	-0.319
		(0.20)	(1.46)	(-1.43)
CAPEXP	−	-0.416**	-0.017	-0.418***
		(-2.30)	(-0.12)	(-3.22)
AGE	+	0.005***	0.002**	0.003***
		(3.78)	(2.13)	(3.15)
Industry dummies		Include	Include	Include
Year dummies		Include	Include	Include
Adjusted-R^2		0.114	0.119	0.052
N		8,020	8,020	8,020

Notes: This table reports the regression results of corporate diversification on excess D&O insurance coverage and control variables. Variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

4.4 Results of TESTING HYPOTHESIS 2

Table 6 reports regression results for equation (3). We find that the coefficients of *EXDOCOV* in columns (1) and (2) are negative and significant at the 5% level, suggesting that firms with excess D&O coverage experience higher agency costs that destroy firm value. In addition, the coefficients on the interaction term *DIV×EXDOCOV* and *DU×EXDOCOV* are negative and significant at the 5% and 1% levels, respectively. This supports our prediction that firms with excess D&O coverage experience value-reducing diversification, especially unrelated diversification.

Turning to our control variables, we find that equity compensation (*ECOMP*), board independence (*OURDIR*), and growth opportunities (*SG*) are positively associated with firm value. In addition, large firms (*SIZE*), low-leverage firms (*LEV*), and low-risk profile firms (*RISK*) tend to experience higher firm value.

TABLE 6 Excessive D&O Insurance Coverage, Diversification And Firm Value

		RET	
		(1)	(2)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		1.155***	1.170***
		(19.14)	(19.37)
DIV	+/−	-0.003	
		(-0.44)	
DR	+/−		0.002
			(0.25)
DU	+/−		-0.013
			(-1.18)
EXDOCOV	−	-0.205**	-0.196**
		(-2.14)	(-2.09)
DIV×EXDOCOV	−	-0.476**	
		(-2.27)	
DR×EXDOCOV	−		0.201
			(0.89)
DU×EXDOCOV	−		-0.829***
			(-2.60)
ECOMP	+	0.065***	0.062***
		(3.25)	(3.13)
CEOOWN	+	0.714	0.729
		(1.53)	(1.54)
$CEOOWN^2$	−	-3.148	-3.308
		(-0.59)	(-0.62)
OUTOWN	+	0.107	0.111
		(1.18)	(1.22)
OUTDIR	+	0.051*	0.050
		(1.68)	(1.63)
FAM	+	-0.011	-0.010
		(-1.35)	(-1.28)
SIZE	+	0.024***	0.025***
		(7.32)	(7.63)
LEV	−	-0.146***	-0.149***
		(-5.55)	(-5.65)
SG	+	0.051***	0.051***
		(4.23)	(4.25)
RISK	−	-0.354***	-0.358***
		(-4.52)	(-4.53)
Industry dummies		Include	Include
Year dummies		Include	Include
Adjusted-R^2		0.491	0.491
N		8,020	8,020

Notes: This table reports the regression results of firm value on diversification, excessive D&O insurance coverage, and control variables. Variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%,and 1% levels, respectively (two-tailed).

4.5 Moderating Role of Corporate Governance Effectiveness

As demonstrated above, over-insured managers are inclined to entrench themselves via diversification, which destroys shareholder value. We further investigate whether the effectiveness of corporate governance can mitigate the agency problems stemming from excess D&O insurance coverage. To measure governance effectiveness, we follow Chen, Lu, and Sougiannis (2012) and consider four governance variables: (1) Board size (*BOARD*); (2) Percentage of outside directors on the board (*OUTDIR*); (3) CEO/Chair separation (*CEOSEP*: coded one if the CEO and the chair of the board are not the same person, zero otherwise); and (4) institutional ownership (*INST*). We adopt principle component factor analysis to reduce the dimensionality of these variables. This analysis produces two factors which have given values greater than one and account for more than half of the sample variance. The variables that load on the first factor include *BOARD*, *CEOSEP,* and *INST*, and we label the first factor *Factor*1. *OUTDIR* loads on the second factor, and we label the second factor *Factor*2. A higher score on the *Factor1* or *Factor2* factors represents strong corporate governance, because a larger board size, a larger percentage of institutional shareholders and independent directors, and separating the role of CEO and chair can strengthen the monitoring of managers' behavior. We then create a dummy variable, *STCG1* (*STCG2*), which equals one if *Factor1* (*Factor2*) is greater than or equal to the median value of *Factor1* (*Factor2*), and zero otherwise.

Table 7 presents the test results. As shown in Panel A of Table 7, the coefficients on the interaction term *EXDOCOV*×*STCG*2 are negative and significant at the 10% and 5% levels in columns (2) and (6), respectively. In Panel B of Table 7, the coefficients on *EXDOCOV*×*STCG*1 and *EXDOCOV*×*STCG*2 are positive and significant at the 10% and 5% levels, respectively. These results indicate that firms with strong corporate governance can constrain the behavior of over-insured managers and reduce the level of unrelated diversification, and, in turn, promote firm value. In sum, effective corporate governance is able to alleviate the agency problem that results from excess D&O insurance coverage.

TABLE 7 Corporate Governance, Diversification and Firm Value

Panel A: Diversification analysis

		DIV		*DR*		*DU*	
		(1)	(2)	(3)	(4)	(5)	(6)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		0.383	0.186	0.030	-0.161	0.372*	0.334**
		(1.22)	(0.75)	(0.12)	(-0.85)	(1.96)	(2.08)
EXDOCOV	+	0.689***	0.748***	0.364*	0.357*	0.344**	0.402**
		(2.79)	(2.92)	(1.40)	(1.81)	(2.05)	(2.31)
*STCG*1	+/−	-0.194***		-0.125**		-0.082*	
		(-2.75)		(-2.17)		(-1.95)	
*STCG*2	+/−		-0.260***		-0.132*		-0.135**
			(-3.03)		(-1.91)		(-2.46)
EXDOCOV×*STCG*1	+/−	0.224		0.171		0.088	
		(0.93)		(0.98)		(0.55)	
EXDOCOV×*STCG*2	+/−		-0.413*		-0.066		-0.331**
			(-1.78)		(-0.35)		(-2.04)
ECOMP	−	-0.070	-0.074	-0.069*	-0.071*	-0.004	-0.006
		(-1.38)	(-1.46)	(-1.87)	(-1.91)	(-0.10)	(-0.17)
CEOOWN	−	0.796	0.722	0.463	0.408	0.313	0.287
		(1.37)	(1.24)	(1.02)	(0.90)	(0.79)	(0.73)
OUTOWN	−	0.134	0.166	-0.026	-0.018	0.159	0.181
		(0.49)	(0.61)	(-0.13)	(-0.08)	(0.94)	(1.05)
OUTDIR	−	0.034	-1.782***	0.008	-0.916*	0.038	-0.909**
		(0.36)	(-3.09)	(0.11)	(-1.96)	(0.58)	(-2.50)
BOARD	+	-0.031*	0.002	-0.017	0.006	-0.016	-0.003
		(-1.73)	(0.28)	(-1.18)	(0.95)	(-1.57)	(-0.63)
DUAL	+	0.227***	-0.040	0.140**	-0.022	0.101**	-0.019
		(3.03)	(-1.26)	(2.29)	(-0.88)	(2.24)	(-0.90)
INST	−	-0.591***	-0.201***	-0.323**	-0.068	-0.296***	-0.133***
		(-3.72)	(-3.31)	(-2.50)	(-1.42)	(-3.17)	(-3.05)
FAM	−	0.032	0.032	0.010	0.008	0.023	0.023
		(1.23)	(1.22)	(0.47)	(0.42)	(1.26)	(1.30)
SIZE	+	0.018	0.022*	0.021**	0.024**	-0.003	-0.002
		(1.44)	(1.77)	(2.26)	(2.58)	(-0.45)	(-0.26)
LDMKV	−	-0.111**	-0.100**	-0.116***	-0.110***	-0.008	-0.003
		(-2.53)	(-2.26)	(-3.24)	(-3.05)	(-0.26)	(-0.09)
CR	+	-0.003	-0.002	0.003	0.003	0.006**	0.005**
		(-0.81)	(-0.55)	(0.77)	(0.95)	(2.51)	(2.29)
ROA	−	0.025	0.024	0.088	0.092	-0.051	-0.055
		(0.23)	(0.22)	(1.07)	(1.12)	(-0.71)	(-0.76)
RDEXP	−	0.080	0.096	0.411	0.409	-0.314	-0.300
		(0.24)	(0.28)	(1.49)	(1.49)	(-1.41)	(-1.34)
CAPEXP	−	-0.417**	-0.415**	-0.017	-0.015	-0.419***	-0.419***
		(-2.30)	(-2.31)	(-0.12)	(-0.10)	(-3.21)	(-3.23)
AGE	+	0.005***	0.005***	0.002**	0.003**	0.003***	0.003***
		(3.75)	(3.88)	(2.09)	(2.17)	(3.11)	(3.22)
Industry dummies		Include	Include	Include	Include	Include	Include
Year dummies		Include	Include	Include	Include	Include	Include
Adjusted-R^2		0.117	0.117	0.121	0.120	0.053	0.055
N		8,020	8,020	8,020	8,020	8,020	8,020

TABLE 7 Corporate Governance, Diversification and Firm Value (Continued)

Panel B: Firm value analysis

		RET			
		(1)	(2)	(3)	(4)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		1.177***	1.179***	1.174***	1.176***
		(17.82)	(17.87)	(17.69)	(17.72)
DIV	−	-0.004		-0.005	
		(-0.60)		(-0.60)	
DR	−		0.002		0.003
			(0.25)		(0.29)
DU	−		-0.013		-0.013
			(-1.20)		(-1.24)
EXDOCOV	−	-0.181*	-0.181*	-0.234**	-0.234**
		(-1.91)	(-1.91)	(-2.45)	(-2.45)
*STCG*1	+	0.003	0.003		
		(0.75)	(0.70)		
*STCG*2	+			0.023	0.022
				(0.85)	(0.84)
EXDOCOV×*STCG*1	+	0.282*	0.280*		
		(1.71)	(1.70)		
EXDOCOV×*STCG*2	+			0.220**	0.221**
				(2.19)	(2.20)
ECOMP	+	0.064***	0.064***	0.064***	0.063***
		(3.20)	(3.20)	(3.21)	(3.20)
CEOOWN	+	0.716	0.724	0.686	0.695
		(1.52)	(1.53)	(1.46)	(1.47)
$CEOOWN^2$	−	-3.108	-3.218	-2.993	-3.103
		(-0.58)	(-0.60)	(-0.56)	(-0.58)
OUTOWN	+	0.125	0.126	0.106	0.107
		(1.33)	(1.34)	(1.16)	(1.16)
OUTDIR	+	0.052*	0.052*	0.213	0.212
		(1.71)	(1.72)	(1.09)	(1.08)
FAM	+	-0.011	-0.010	-0.012	-0.011
		(-1.32)	(-1.29)	(-1.44)	(-1.40)
SIZE	+	0.026***	0.026***	0.024***	0.024***
		(6.84)	(6.88)	(7.32)	(7.38)
LEV	−	-0.153***	-0.153***	-0.150***	-0.150***
		(-5.73)	(-5.73)	(-5.72)	(-5.72)
SG	+	0.052***	0.052***	0.051***	0.051***
		(4.27)	(4.28)	(4.23)	(4.23)
RISK	−	-0.353***	-0.352***	-0.357***	-0.356***
		(-4.51)	(-4.50)	(-4.56)	(-4.54)
Industry dummies		Include	Include	Include	Include
Year dummies		Include	Include	Include	Include
Adjusted-R^2		0.491	0.491	0.491	0.491
N		8,020	8,020	8,020	8,020

Notes: This table reports the analyses of the strength of corporate governance. *STCG*1 (*STCG*2) is a dummy variable that equals one if *Factor*1 (*Factor*2) is greater than or equal to the median value of *Factor*1 (*Factor*2), and zero otherwise. *Factor*1 (*Factor*2) is the factor score value from a factor analysis of four governance variables as in Chen et al. (2012). Other variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

4.6 Sensitivity Analyses

4.6.1 Self-selection bias of D&O insurance

Since firms which purchase D&O insurance may reflect certain unique characteristics, our sample may have self-selection bias. We thus run two-stage Heckman regressions to control for possible self-selection bias (Heckman 1979). In the first regression, the dependent variable, *PURCHASE*, is a dummy variable equal to one if the firm purchases D&O insurance, and zero otherwise. Following previous research (Core 1997; O'Sullivan 2002; Chung and Wynn 2008), explanatory variables include firm size (*SIZE*), market to book ratio (*MB*), debt ratio (*LEV*), CEO ownership (*CEOOWN*), outside blockholders' ownership (*OUTOWN*), excessive cash holding (*EXCASH*),[15] high-tech industry (*HITECH*), cross-listing status (*CROSS*), increase in the book value of total assets (*ACQUIRER*), and decrease in the book value of total assets (*DIVESTOR*).[16] The first stage of the probit model is specified as follows:

$$\begin{aligned} PURCHASE_{i,t} = {} & \theta_0 + \theta_1 SIZE_{i,t} + \theta_2 MB_{i,t} + \theta_3 LEV_{i,t} + \theta_4 CEOOWN_{i,t} \\ & + \theta_5 OUTOWN_{i,t} + \theta_6 EXCASH_{i,t} + \theta_7 HITECH_{i,t} + \theta_8 CROSS_{i,t} \\ & + \theta_9 ACQUIRER_{i,t} + \theta_{10} DIVESTOR_{i,t} \\ & + Industry\ and\ Year\ dummies + \varepsilon_{i,t}. \end{aligned} \quad (4)$$

We estimate the Inverse Mills ratio (*Lambda*) from equation (4)[17] and then include *Lambda* in equations (2) and (3) as an additional control variable. Panel A of Table 8 reports the probit analysis of equation (4). The probit analysis shows that firm size (*SIZE*), market-to-book ratio (*MB*), shares owned by CEO and outside blockholders (*CEOOWN* and *OUTOWN*), excess amount of cash a firm holds (*EXCASH*), membership in high-tech industry (*HITECH*), and divestor (*DIVESTOR*) are essential determinants of purchase decisions for our sample firms. Panel B of Table 8 shows that the coefficients on *Lambda* are not significant in all cases, suggesting selection bias may not be a significant issue. In addition, the results indicate that the coefficients on *EXDOCOV* remain significant with the expected positive sign in columns (1) and (3). The coefficients on *DIV*×*EXDOCOV* and *DU*×*EXDOCOV* are still negative and significant in columns (4) and (5), respectively. Overall, the results in Table 8 are qualitatively similar to those reported above.

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[15] Following Wynn (2008), the excessive cash, *EXCASH*, is the residual derived from the regression of cash on determinants of cash holding which includes firm size, growth opportunities, cash flows, financial distress, net working capital, governance quality, cross-listing status, volatility of stock returns, and membership in a high-tech industry.

[16] *ACQUIRER* (*DIVESTOR*) takes the value of one if the book value of total assets at the fiscal year-end increases (decreases) by more than 25% from the beginning of the fiscal year, and zero otherwise.

[17] The inverse Mills ratio, calculated from the probit model, equals the probability density function divided by the cumulative density function.

TABLE 8 Selection Bias of D&O Insurance Coverage

Panel A: First stage

Variables	Predicted sign	*PURCHASE* Coefficient (*t*-statistic)
Constant		-3.981*** (-5.72)
SIZE	+	0.189*** (5.98)
MB	−	0.059** (2.16)
LEV	+	-0.069 (-0.34)
CEOOWN	−	3.811** (2.20)
OUTOWN	+	3.050*** (3.95)
EXCASH	+	0.630*** (2.71)
HITECH	+	1.231** (2.56)
CROSS	+	0.165 (0.75)
ACQUIRER	−	0.089 (1.36)
DIVESTOR	+	0.411*** (3.79)
Industry dummies		Included
Year dummies		Included
Pseudo-R^2		0.141
N		7,901

Panel B: Second stage

		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.688* (-1.68)	-0.847*** (-2.82)	0.179 (0.70)	0.967*** (4.91)	0.947*** (4.80)
DIV	+/−				-0.007 (-0.89)	
DR	+/−					0.001 (0.15)
DU	+/−					-0.017 (-1.59)
EXDOCOV	+/−	0.696*** (2.81)	0.360 (1.41)	0.349** (2.08)	-0.172* (-1.80)	-0.163* (-1.74)
DIV×EXDOCOV	−				-0.411** (-1.96)	
DR×EXDOCOV	−					0.247 (1.09)
DU×EXDOCOV	−					-0.829*** (-2.62)
ECOMP	+/−	-0.065 (-1.28)	-0.064* (-1.71)	-0.005 (-0.14)	0.066*** (3.28)	0.063*** (3.15)
CEOOWN	+/−	1.073 (1.62)	0.756 (1.49)	0.260 (0.60)	0.785 (1.62)	0.838* (1.71)
CEOOWN^2	−				-1.929 (-0.36)	-2.171 (-0.41)
OUTOWN	+/−	0.421 (1.19)	0.273 (1.02)	0.123 (0.58)	0.233* (1.66)	0.255* (1.82)
OUTDIR	+/−	0.016 (0.17)	0.001 (0.01)	0.027 (0.41)	0.046 (1.52)	0.044 (1.46)

TABLE 8 Selection Bias of D&O Insurance Coverage (Continued)

		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
BOARD	+	0.015**	0.013***	0.003		
		(2.40)	(2.62)	(0.70)		
DUAL	−	0.026	0.010	0.0172		
		(1.12)	(0.53)	(1.06)		
INST	−	-0.164***	-0.043	-0.120***		
		(-2.66)	(-0.89)	(-2.71)		
FAM	+/−	0.031	0.009	0.023	-0.009	-0.009
		(1.19)	(0.43)	(1.25)	(-1.18)	(-1.11)
SIZE	+	0.036**	0.038***	-0.003	0.017**	0.017**
		(2.13)	(3.12)	(-0.34)	(2.33)	(2.31)
LEV	−				-0.147***	-0.149***
					(-5.50)	(-5.57)
SG	+				0.052***	0.052***
					(4.27)	(4.30)
RISK	−				-0.391***	-0.392***
					(-5.00)	(-4.96)
LDMKV	−	-0.108**	-0.113***	0.008		
		(-2.42)	(-3.08)	(0.25)		
CR	+	-0.001	0.004	0.006**		
		(-0.37)	(1.21)	(2.38)		
ROA	−	0.042	0.107	-0.052		
		(0.39)	(1.29)	(-0.70)		
RDEXP	−	0.148	0.451	-0.294		
		(0.43)	(1.63)	(-1.28)		
CAPEXP	−	-0.388**	0.005	-0.413***		
		(-2.12)	(0.03)	(-3.15)		
AGE	+	0.005***	0.002**	0.003***		
		(3.73)	(2.11)	(3.10)		
Lambda	+/−	0.165	0.142	-0.021	0.064	0.076
		(1.39)	(1.43)	(-0.28)	(1.10)	(1.29)
Industry dummies		Include	Include	Include	Include	Include
Year dummies		Include	Include	Include	Include	Include
Adjusted-R^2		0.114	0.119	0.052	0.495	0.496
N		7,901	7,901	7,901	7,901	7,901

Notes: This table reports the analyses of Heckman self-selection estimation. *MB* is market to book ratio. *EXCASH* is the residual derived from the regression of cash on determinants of cash holding. *HITECH* is a dummy variable that equals one if the firm is in a high-technology industry, and zero otherwise. *CROSS* is a dummy variable that equals one if the firm is cross-listed in exchanges outside of Taiwan, and zero otherwise. *ACQUIRER* is a dummy variable that equals one if the book value of total assets at the fiscal year-end increase by more than 25% from the beginning of the fiscal year, and zero otherwise. *DIVESTOR* is a dummy variable that equals one if the book value of total assets at the fiscal year-end decreases by more than 25% from the beginning of the fiscal year, and zero otherwise. *Lambda* is the inverse Mills ratio. Other variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

4.6.2 Endogeneity of diversification

It is possible that firms with higher market valuation are more likely to diversify. We thus take into account the potential reverse causality problem on the association between corporate diversification and firm valuation. We use a two-stage model to correct the potential endogeneity problem. We perform by first regressing the diversification variable on all exogenous variables (instruments) in equations (2) and (3). In the second stage, we replace the diversification variable in equation (3) by its fitted value (*PVDIV*, *PVDR*, and *PVDU*) from the first stage regression. The results are presented in Table 9. Panel A shows

the results for the first-stage regression and we find that firms are more likely to engage in diversification when they are larger (*SIZE*) and older (*AGE*), have larger board size (*BOARD*) and higher leverage (*LEV*). In addition, firms are less involved in diversification activities when they have lower institutional holdings (*INST*) and lower capital expenditures (*CAPEXP*). Panel B of Table 9 reports the results for the second-stage regression and we find significantly negative coefficients on *PVDIV×EXDOCOV* and *PVDR×EXDOCOV*, suggesting our main results are not vulnerable to the potential endogeneity issue.

TABLE 9 Endogeneity of Diversification

Panel A: First stage				
		DIV	*DR*	*DU*
		(1)	(2)	(3)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.209	-0.320*	0.093
		(-0.87)	(-1.76)	(0.63)
ECOMP	−	-0.060	-0.059	-0.004
		(-1.19)	(-1.60)	(-0.10)
CEOOWN	−	-0.354	-1.028	0.599
		(-0.26)	(-0.95)	(0.62)
$CEOOWN^2$	+/−	12.357	16.428	-3.437
		(0.83)	(1.35)	(-0.33)
OUTOWN	−	0.074	-0.056	0.129
		(0.27)	(-0.27)	(0.75)
OUTDIR	−	0.027	0.004	0.033
		(0.27)	(0.05)	(0.51)
BOARD	+	0.016**	0.013***	0.004
		(2.52)	(2.63)	(0.91)
DUAL	+	0.028	0.011	0.018
		(1.21)	(0.59)	(1.11)
INST	−	-0.169***	-0.055	-0.113**
		(-2.80)	(-1.16)	(-2.58)
FAM	−	0.025	0.005	0.019
		(0.95)	(0.27)	(1.07)
SIZE	+	0.020	0.022**	-0.001
		(1.61)	(2.22)	(-0.13)
LEV	+/−	0.173*	0.109	0.049
		(1.89)	(1.55)	(0.78)
SG	+/−	0.001	-0.007	0.009
		(0.08)	(-0.63)	(0.89)
RISK	+/−	0.257	0.223*	0.033
		(1.54)	(1.69)	(0.28)
LDMKV	−	-0.065	-0.088**	-0.006
		(-1.33)	(-2.22)	(-0.17)
CR	+	0.001	0.005	0.005*
		(0.27)	(1.40)	(1.72)
ROA	−	0.023	0.103	-0.071
		(0.20)	(1.20)	(-0.95)
RDEXP	−	0.235	-0.519*	-0.268
		(0.70)	(-1.93)	(-1.18)
CAPEXP	−	-0.406**	-0.006	-0.421***
		(-2.25)	(-0.03)	(-3.27)
AGE	+	0.005***	0.002*	0.003***
		(3.56)	(1.91)	(3.06)
Industry dummies		Include	Include	Include
Year dummies		Include	Include	Include
Adjusted-R^2		0.112	0.120	0.051
N		8,020	8,020	8,020

TABLE 9 Endogeneity of Diversification (Continued)

Panel B: Second stage

		RET	
		(1)	(2)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		1.202***	1.152***
		(18.44)	(16.81)
PVDIV	+/−	0.064	
		(1.31)	
PVDR	+/−		0.075
			(0.81)
PVDU	+/−		0.079
			(0.93)
EXDOCOV	−	-0.964***	-0.191**
		(-4.20)	(-1.97)
PVDIV×EXDOCOV	−	-2.666***	
		(-4.04)	
PVDR×EXDOCOV	−		0.765
			(1.11)
PVDU×EXDOCOV	−		-2.242*
			(-1.94)
ECOMP	+	0.056***	0.056***
		(2.76)	(2.74)
CEOOWN	+	0.625	0.756
		(1.32)	(1.56)
$CEOOWN^2$	−	-3.423	-4.353
		(-0.64)	(-0.78)
OUTOWN	+	0.142	0.124
		(1.56)	(1.36)
OUTDIR	+	0.040	0.041
		(1.31)	(1.35)
FAM	+	-0.012	-0.013
		(-1.44)	(-1.59)
SIZE	+	0.029***	0.026***
		(8.12)	(6.24)
LEV	−	-0.143***	-0.133***
		(-5.08)	(-4.72)
SG	+	0.050***	0.050***
		(4.14)	(4.13)
RISK	−	-0.329***	-0.326***
		(-4.14)	(-4.04)
Industry dummies		Include	Include
Year dummies		Include	Include
Adjusted-R^2		0.492	0.491
N		8,020	8,020

Notes: This table reports the analyses of instrumental variable estimation. *PVDIV* (*PVDR*, *PVDU*) is the predicted value of a regressing total diversification (related diversification, unrelated diversification) on all exogenous variables in equations (2) and (3). Other variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

4.6.3 Alternative Measure of firm value

To check the robustness of the results, we use the next year's excess value (*EXV*) as an alternative measure of firm value. *EXV* is the next year's natural logarithm of the ratio of a firm's total capital to input value (Berger and Ofek 1995).[18] A positive firm value

[18] Total capital is measured as the sum of market value of common equity and book value of debt in the next year, and the input value is derived as the sum of the product of segment sales and the sales multiplier in the next year. The multiplier is measured as the median ratio of total capital to sales for the single-segment firms in the same industry for the same year.

indicates that the firm trades at a premium compared to single-industry firms. Conversely, a negative firm value indicates a diversification discount. The results of this analysis are reported in Table 10. The coefficients on *DIV*×*EXDOCOV* and *DR*×*EXDOCOV* remain qualitatively similar to those reported in Table 6. That is, our statistical inferences are robust to alternative measures of firm value.

TABLE 10 Alternative Measure of Firm Value

		EXV	
		(1)	(2)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.004	0.001
		(-0.07)	(0.01)
DIV	+/−	-0.009*	
		(-1.94)	
DR	+/−		-0.009
			(-1.55)
DU	+/−		-0.010
			(-1.64)
EXDOCOV	−	-0.085*	-0.091**
		(-1.82)	(-1.97)
DIV×*EXDOCOV*	−	-0.163**	
		(-2.02)	
DR×*EXDOCOV*	−		0.117
			(1.28)
DU×*EXDOCOV*	−		-0.228**
			(-2.18)
ECOMP	+	0.002	0.002
		(0.16)	(0.22)
CEOOWN	+	0.582**	0.574**
		(2.15)	(2.11)
$CEOOWN^2$	−	3.269	3.170
		(1.22)	(1.17)
OUTOWN	+	0.027	0.031
		(0.53)	(0.60)
OUTDIR	+	0.012	0.013
		(0.65)	(0.70)
FAM	+	0.0124***	0.0127***
		(2.59)	(2.65)
SIZE	+	0.006***	0.006***
		(3.03)	(2.96)
LEV	−	-0.270***	-0.269***
		(-16.54)	(-16.53)
SG	+	0.022***	0.022***
		(4.61)	(4.58)
RISK	−	-0.296***	-0.298***
		(-7.30)	(-7.33)
Industry dummies		Include	Include
Year dummies		Include	Include
Adjusted-R^2		0.515	0.516
N		6,133	6,133

Notes: This table reports the analyses of alternative measure of firm value. *EXV* is the next year's natural log of the ratio of a firm's total market value to its imputed value using Berger and Ofek (1995) method. Other variables are defined in Table 2. *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

4.6.4 Alternative measure of D&O insurance coverage

Our main results are obtained from regressions using the excess D&O coverage as the independent variable of interest. Following prior research (e.g., Lin et al. 2013), we use

four alternative D&O insurance coverage measures: raw coverage ratio (*DOCOV*), high and low coverage indicators (*HIDOCOV* and *LODOCOV*), change in coverage ratio (Δ*DOCOV*), and personal coverage ratio (*PERDOCOV*). *HIDOCOV* (*LODOCOV*) is a dummy variable that equals one if the firm has D&O insurance and the insurance coverage ratio is greater than or equal to (less than) the median of coverage ratio for the sample of firms with insurance, and zero otherwise. *PERDOCOV* is *DOCOV* divided by the number of directors and supervisors. The regression results, using these alternative measures, reported in Panels A, B, C, and D of Table 11, are similar to the previous results.

TABLE 11 Alternative Measure of D&O Insurance Coverage

Panel A: D&O insurance coverage ratio

		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.367	-0.436**	0.044**	1.213***	1.217***
		(-1.57)	(-2.46)	(0.30)	(19.03)	(19.01)
DIV	+/−				-0.06	
					(-0.78)	
DR	+/−					0.002
						(0.18)
DU	+/−					-0.015
						(-1.42)
DOCOV	+/−	0.409***	0.218	0.196**	-0.129*	-0.131**
		(2.75)	(1.49)	(2.02)	(-1.94)	(-2.02)
DIV×*DOCOV*	−				-0.397***	
					(-2.84)	
DR×*DOCOV*	−					-0.020
						(-0.14)
DU×*DOCOV*	−					-0.585**
						(-2.41)
Controls		Include	Include	Include	Include	Include
Adjusted-R^2		0.113	0.119	0.052	0.491	0.491
N		8,020	8,020	8,020	8,020	8,020

Panel B: High and Low D&O insurance coverage ratio

		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.382	-0.440**	0.037	1.208***	1.207***
		(-1.63)	(-2.49)	(0.25)	(18.85)	(18.76)
DIV	+/−				0.011	
					(0.98)	
DR	+/−					-0.005
						(-0.34)
DU	+/−					0.006
						(0.31)
HIDOCOV	+/−	0.086***	0.038	0.049**	-0.023**	-0.022**
		(2.94)	(1.64)	(2.38)	(-2.18)	(-2.07)
LODOCOV	+/−	0.006	-0.001	0.008	-0.002	-0.003
		(0.21)	(-0.05)	(0.40)	(-0.19)	(-0.27)
DIV×*HIDOCOV*	−				-0.044**	
					(-2.25)	
DIV×*LODOCOV*	−				-0.013	
					(-0.75)	
DR×*HIDOCOV*	−					0.022
						(0.95)
DR×*LODOCOV*	−					0.003
						(0.14)

TABLE 11 Alternative Measure of D&O Insurance Coverage (Continued)

		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
DU×*HIDOCOV*	−					-0.056** (-2.03)
DU×*LODOCOV*	−					-0.006 (-0.24)
Controls		Include	Include	Include	Include	Include
Adjusted-R^2		0.115	0.119	0.053	0.491	0.491
N		8,020	8,020	8,020	8,020	8,020
Panel C: Change in D&O insurance coverage ratio						
		Δ*DIV*	Δ*DR*	Δ*DU*	Δ*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.001 (-0.05)	-0.007 (-0.36)	0.007 (0.37)	-0.153*** (-20.50)	-0.152*** (-20.37)
Δ*DIV*	+/−				-0.069* (-1.88)	
Δ*DR*	+/−					-0.055 (-1.38)
Δ*DU*	+/−					-0.094** (-2.21)
Δ*DOCOV*	+/−	0.173** (2.41)	0.077 (1.34)	0.103* (1.94)	-0.856*** (-2.89)	-0.818*** (-2.79)
Δ*DIV*×Δ*DOCOV*	−				-1.103*** (-2.90)	
Δ*DR*×Δ*DOCOV*	−					0.194 (0.50)
Δ*DU*×Δ*DOCOV*						-1.113** (-2.24)
Δ*Controls*		Include	Include	Include	Include	Include
Adjusted-R^2		0.034	0.031	0.018	0.149	0.149
N		6,561	6,561	6,561	6,561	6,561
Panel D: Personal D&O insurance coverage ratio						
		DIV	*DR*	*DU*	*RET*	
		(1)	(2)	(3)	(4)	(5)
Variables	Predicted sign	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)	Coefficient (*t*-statistic)
Constant		-0.362 (-1.54)	-0.431** (-2.42)	0.0432 (0.29)	1.221*** (19.04)	1.222*** (18.96)
DIV	+/−				-0.006 (-0.77)	
DR	+/−					0.002 (0.20)
DU						-0.015 (-1.38)
PERDOCOV	+/−	3.183*** (2.59)	1.631 (1.38)	1.616** (2.03)	-1.326** (-2.15)	-1.281** (-2.08)
DIV×*PERDOCOV*	−				-2.169* (-1.76)	
DR×*PERDOCOV*	−					0.301 (0.21)
DU×*PERDOCOV*						-3.794* (-1.78)
Controls		Include	Include	Include	Include	Include
Adjusted-R^2		0.113	0.118	0.052	0.491	0.491
N		8,020	8,020	8,020	8,020	8,020

Notes: This table reports the analyses of alternative measure of D&O insurance coverage. *HIDOCOV* (*LODOCOV*) is a dummy variable that equals one if the firm has D&O insurance and the insurance coverage ratio is greater than or equal to (less than) the median of coverage ratio for the sample of firms with insurance, and zero otherwise. *PERDOCOV* is *DOCOV* divided by number of directors and supervisors. *Controls* is a vector of control variables. Other variables are defined in Table 2. The symbol Δ represents the change in the variable between year *t* (*t*+1) and year *t*-1 (*t*). *t*-statistics based on robust standard errors with firm-level clustering are given in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

5. Conclusion

D&O insurance is one way that firms encourage managers to pursue risky investment strategies because it shields managers from shareholder litigation. However, a high level of D&O coverage could be an agency problem, which motivates managers to pursue opportunistic behavior. Research suggests that entrenched managers prefer to operate large and diversified firms because they can enjoy the effects of increased prestige and compensation. In this study, we test whether managers with abnormally high D&O insurance coverage tend to pursue a high level of diversification. We also examine whether abnormally high D&O coverage will affect the relation between diversification and firm performance.

Using a sample of Taiwanese listed firms during the period from 2008 to 2014, we find evidence that firms with excess D&O insurance coverage are associated with higher levels of diversification, particularly unrelated diversification. The results also show that firms with excess D&O coverage are associated with value-destroying (unrelated) diversification. These results suggest that excess D&O coverage create an agency problem, which in turn destroys shareholder value.

Our results have implications for regulators, such as the Financial Supervisory Commission, R.O.C. (Taiwan) and stock exchanges, as they attempt to formulate corporate governance policy. Our results suggest that high D&O insurance coverage contains additional information related to managers' behavior actions. Such information should be subject to mandatory disclosure, and is beneficial to investors when making a decision regarding stock investment and portfolio management. Firms may also design compensation contracts that induce over-insured managers to operate in the shareholders' interest.

A potential limitation of this study lies in the measure of D&O insurance. While we focus on coverage limits, the most important feature of D&O insurance, we lack information on other parameters of D&O insurance, such as premiums and deductibles. Future research may include all parameters of D&O insurance contracts.

Appendix

We utilize the total domestic and foreign sales of Far Eastern Textile Ltd. (FETL) (Stock id: 1402) in 2014 to illustrate the calculation of diversification index. We use the middle classification code and small classification code that derived from Taiwan Industry Economic Services (TIE 2009 edition) to identity the industry group and industry segment, respectively. Panel A, Appendix 1 shows that FETL is spread across six industry groups (middle code) and eight industry segments (small code). Panel B, Appendix 1 reports the calculation process of diversification index.

APPENDIX Diversification Index Of Far Eastern Textile Ltd. (FETL) in 2004

Panel A: Industry classification

		Industry classification code in the Taiwan Industry Economics Services			
Product name	Total domestic and foreign sales (in $ thousands)	Middle classification code (Industry group)		Small classification code (Industry segment)	
Industrial yarn	4,306,839	1311	Man-made Fibers Manufacturing	C1850	Man-made Fibers Manufacturing
Portial oriented yarn	3,506,439	1311		C1850	
Polyester staple fiber	17,115,460	1311		C1850	
Drawn textured yarn	2,658,425	1312	Yarn Spinning Mills	C1114	Synthetic Textured Yarn Mills
Industrial fabric	2,658,251	1313	Fabric Mills	C1123	Woven Fabric Mills, Man-made Fibers
Cotton yarn (Greige yarn)	8,507,693	1313		C1123	
Knitting fabrics	5,556,072	1313		C1125	Knit Fabric Mills
Apparel	9,584,740	1314	Wearing Apparel and Clothing Accessories Manufacturing	C1221	Knitted Outerwear Manufacturing
Polyester Film	460,261	1512	Chemical Material Manufacturing	C1820	Petrochemicals Manufacturing
Polyethylene terephthalate	4,810,921	1512		C1820	
Solid state polymer	37,689,472	1512		C1820	
Purified terephthalic acid	37,349,528	1512		C1820	
Apet	4,912,013	1515	Plastic Products Manufacturing	C2201	Plastic Sheets, Pipes and Tubes Manufacturing
Perform	2,525,218	1515		C2203	Plastic Made Grocery Manufacturing

APPENDIX Diversification Index Of Far Eastern Textile Ltd. (FETL) in 2004 (Continued)

Panel B: Calculation of diversification index

Middle code (Industry group)	Small code (Industry segment)	Total domestic and foreign sales (in $ thousands)	P_i	P_{ji}	P_j	$\ln(1/P_i)$	$P_i \times \ln(1/P_i)$	$\ln(1/P_{ji})$	$P_{ji} \times \mathrm{n}(1/P_{ji})$	$DR_j \times P_j$	$\ln(1/P_j)$	$P_j \times \ln(1/P_j)$
1311	C1850	24,928,738	0.176	1.000		1.737	0.306	0.000	0.000			
	Subtotal	24,928,738			0.176				0.000	0.000	1.737	0.306
1312	C1114	2,658,425	0.019	1.000		3.976	0.075	0.000	0.000			
	Subtotal	2,658,425			0.019				0.000	0.000	3.976	0.075
1313	C1123	11,165,944	0.079	0.668		2.540	0.200	0.404	0.270			
	C1125	5,556,072	0.039	0.332		3.238	0.127	1.102	0.366			
	Subtotal	16,722,016			0.118				0.636	0.075	2.137	0.252
1314	C1221	9,584,740	0.068	1.000		2.693	0.182	0.000	0.000			
	Subtotal	9,584,740			0.068				0.000	0.000	2.693	0.182
1512	C1820	80,310,182	0.567	1.000		0.567	0.322	0.000	0.000			
	Subtotal	80,310,182			0.567				0.000	0.000	0.567	0.322
1515	C2201	4,912,013	0.035	0.660		3.362	0.117	0.415	0.274			
	C2203	2,525,218	0.018	0.340		4.027	0.072	1.080	0.367			
	Subtotal	7,437,231			0.053				0.641	0.034	2.947	0.155
	Total	141,641,332	1.000				1.400 (*DIV*)			0.109 (*DR*)		1.291 (*DU*)

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