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Directors' and Officers' Insurance and Shareholders' Protection

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Martin Boyer[*]

Résumé / *Abstract*

En tant que représentants de l'entreprise, les administrateurs sont responsables des actes de l'entreprise. Étrangement, les plaignants les plus fréquents dans les causes contre les administrateurs sont les actionnaires qui les ont nommés initialement. Par conséquent, les administrateurs demandent à être protégés de telle sorte que leur richesse personnelle ne soit pas expropriée en cas d'une erreur de bonne foi de leur part. Il existe trois manières pour un administrateur de protéger sa richesse personnelle: les plans d'indemnisation, la responsabilité limitée et l'assurance de la responsabilité civile des administrateurs et des dirigeants. De ces trois outils, le dernier est probablement le plus étrange, non pas parce que les actionnaires l'achètent pour protéger les administrateurs en cas de poursuite, mais bien par ce qu'il protège également les actionnaires. À partir d'une base de données unique, nous testons un ensemble d'hypothèses qui devraient influencer la demande d'assurance des administrateurs. Notre analyse suggère que la demande d'assurance s'explique mieux si on la considère comme faisant partie de la rémunération des administrateurs, comme un signal de la qualité des administrateurs et comme un outil de protection pour les actionnaires. Les notions d'aversion pour le risque et de coûts de détresse financière ne semblent pas jouer un rôle important par ailleurs. Nos résultats nous permettent de conclure que l'assurance de la responsabilité civile des administrateurs et des dirigeants n'est pas là pour protéger la richesse personnelle des administrateurs, mais bien pour protéger la richesse des actionnaires. Cet article offre ainsi une vision nouvelle d'une des questions fondamentales en finance: Quels sont les déterminants de la gestion des risques?

Mots clés : Assurance des administrateurs et des dirigeants, assurances et gestion des risques des entreprises, rémunération des administrateurs.

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Corporate directors are liable for the corporation's actions as well as their own. Strangely, and by far, the most likely plaintiffs in a lawsuit against corporate directors are the shareholders who appointed them in the first place. As a result, directors often require protection so that their own personal wealth is not expropriated in the event of a good faith error. There are three ways to protect a director's wealth: Corporate indemnification plans, Limited liability provisions and Directors' and Officers (D&O) insurance policies. Of the three types of protection, D&O insurance is arguably the strangest not because shareholders purchase it to protect directors in case of a lawsuit, but because it also protects shareholders. Using an original database, we test a set of hypotheses that should determine the demand for D&O insurance. Our analysis suggests that the D&O insurance demand is best explained as part of the directors' compensation package, managerial signalling and shareholders' wealth protection. D&O insurance also appears to be a substitute for financial institution monitoring. Surprisingly, managerial risk aversion and financial distress do not seem to play important roles. Our results lead us to conclude that D&O insurance is not designed to protect the directors' personal wealth as much as it is designed to protect the shareholders'. In that sense, our paper offers an original approach to one of the many fundamental questions in finance: What determines corporate risk management practices?

Keywords: *Directors' and Officers' Insurance, Corporate Insurance and Risk Management, Board Compensation.*

Codes JEL : G34, G22, J44, G32.

1 Introduction

1.1 Corporate director liability and protection

As its representatives, directors and officers are liable for actions committed by the corporation. More importantly, they are personally responsible for those actions. As a result their own personal assets are at risk in the event of a lawsuit against the corporation and its management. Following the recent loss of confidence in corporate governance initiated by the debacle of corporate giants like Enron, Worldcom, Adelphia and Anderson, company managers may be faced with more and more lawsuits by angry stakeholders who feel they are kept in the dark regarding the company's operations. According to a 2002 survey of Tillingast-Towers Perrin 19% of firms had at least one lawsuit brought upon their directors in the previous ten years. One way for a corporate director to protect his personal wealth is to have the corporation buy insurance on his behalf. This insurance is known as Directors' and Officers' (D&O) insurance.

Although D&O insurance offers protection to corporate managers, it does so for strange events. D&O insurance protects managers against liability lawsuits brought unto them as managers of the corporation. In this sense, this is not too different from other types of insurance. What is surprising, however, is that most lawsuits originate from the firm's stakeholders. According to a study of Tillinghast-Towers Perrin (1999), lawsuits usually originate from shareholders (44%), employees (29%) and clients (14%). More recently, Tillinghast-Towers Perrin (2002) reports that more than half the lawsuits against a firm's directors originate from the shareholders. In a sense, shareholders purchase insurance for managers to protect them against shareholder lawsuits.

According to a recent article in The Economist (June 14th, 2003, p. 14), D&O insurance provided by corporations goes against managerial accountability. Why, The Economist asks, do corporations purchase D&O insurance on behalf of their directors instead of letting directors purchase such liability insurance directly on the market place, just as medical malpractice insurance? We argue in this paper that D&O insurance is not designed to protect directors; rather D&O insurance is designed to **protect the shareholders' wealth**.

D&O insurance is only one of three ways that a corporation can protect a director's wealth while he sits on the corporate board. A corporation may also amend its charter so that the directors liability is limited. The limited liability provisions (LLP) all but eliminate the directors' personal financial responsibility toward the firm and its shareholders. LLPs became necessary after the 1984 landmark court decision known as *Smith Vs. Van Gorkom* (see Hartmann and Rogers, 1991, and Hanks, 1988, for more details about the case and its impact). Gutiérrez (2000) report that more than 70 % of American corporations have adopted limite liability provisions in an effort to attract

the best possible corporate directors. Brook and Rao (1994) show that firms in financial distress (i.e., the firms whose directors a more likely to be sued) gain from adopting LLPs. Presumably LLPs allow managers in financially distressed firms to adopt more frequently hero-or-zero strategies when they know they cannot be sued in case of a bankruptcy.

A second way that a corporation can protect its directors is through corporate indemnification plans (CIP). CIPs give directors a certain protection against a third-party lawsuit. CIPs are mandatory in the sense that corporations are legally responsible to indemnify directors for court costs that resulted from a third-party lawsuit if the director is found innocent of the allegations made against him. CIPs may also by available to the directors even if he is found guilty if, for example, the prejudice was caused in the best interest of the corporation. If that is the case, a director could be indemnified for court expenses and damages.

Given that LLPs are frequently part of the corporate charter and CIPs are mandatory, it is not clear why directors would need D&O insurance on top of it all. LLPs limit the amount a director may be responsible for, and CIPs pay for the damages. According to Gutiérrez (2000), D&O insurance is rarely used in continental Europe because it reduces director accountability. Furthermore, Ferrera (2000) reports that few directors in Europe considered D&O insurance coverage necessary in the early nineties.

In Japan, the usefulness of D&O insurance is limited because the concept of punitive damages is regarded as "incompatible with the public order". Moreover no shareholder can sue directors under Japanese law, unless it is on behalf of the corporation (derivative lawsuit). Even with a weak economy and general mismanagement of the financial system, the frequency of lawsuits has barely risen in Japan.[1] In Brazil, among the sixty-six (66) Brazilian companies that trade in American Depository Receipts, D&O insurance did not appear until 1995. In the Netherlands, derivative actions are not recognized. In France, the "action sociale" limits the scope of derivative lawsuits.

Why is D&O insurance so widely used to protect corporate directors in the United States, Canada, Australia and the United Kingdom? What makes the U.S., Canadian and British markets so different? If these common law countries are better at protecting shareholder rights as claimed by Shleifer and Vishny (1997) and LaPorta et al. (1998,2000), why is D&O insurance most likely found in common law countries given that it reduces director accountability? One explanation is that the entry barriers to the courts is too high in civil code countries. Another explanation is that D&O insurance policies limit coverage to losses the corporation is "required or permitted to

[1] This is not to say that Japanese directors are imune against legal action. Indeed, recently six former Nippon Credit Bank executives, including the former president, were imprisoned for having "embellished" the bank's accounts in 1997.

indemnify."[2] This policy language represents a wide spectrum of incidents in common law countries. In many civil law countries, however, this language offers little protection because indemnification of directors and officers is rare. As a result corporate directors in civil law countries have not found it essential to have D&O insurance; until recently that is. A third explanation, and the one we find the most interesting, is that D&O insurance protects shareholders more than managers.

According to Romano (1991a), the largest benefactors of D&O insurance are not the directors, but the shareholders. Directors are already protected under LLPs and CIPs. As a result, shareholders purchase D&O insurance on behalf of their directors in case shareholders, who feel they were wronged, decide to sue the directors for improper conduct as their representatives on the board. Similar to Romano (1991a), Gutiérrez (2003) also sees D&O insurance as an instrument that benefits shareholders instead of directors. Gutiérrez suggests that D&O insurance works as a commitment device for efficient shareholder litigation.

Other explanations exist as to why corporations purchase D&O insurance on behalf of its directors. Core (1997) offers two such explanations: Managerial risk aversion and Managerial compensation. O'Sullivan (1997), Holderness (1990) and Core (2000) suggest that D&O insurance works as a monitoring tool as insurers are asked to monitor the directors. Although risk aversion, compensation and monitoring may appear to be good reasons to purchase D&O insurance, corporations have access to better instruments to achieve those goals: Risk aversion is best dealt with by amending the corporate charter by including limited liability provisions, managerial compensation is better served with option, stock and cash distribution, and monitoring is better done by having large shareholders.

As an insurance tool used by shareholders to protect their wealth, D&O insurance enters the realm of one of the most intriguing facets of economics and finance: Why do risk neutral corporations manage their risk?

1.2 Economic importance of D&O insurance

The stated role of D&O insurance is to cover managers in case they are sued as representatives of the corporation or for breach of duty toward the firm's stakeholders. Managers are covered for their court expenses as well as for any settlement arising from the lawsuit, subject of course to a maximum amount (the policy limit).

The largest D&O lawsuit settlement[3] occurred in 1999 when Cendant Corp. was ordered to pay

[2] See Aon Risk Services, 1999.

[3] The case was finally settled only in 2001, however. The settlement amount is associated with two lawsuits that were logged at the same time but were settled at two different dates. The first lawsuit awarded 2.827 billion dollars to the plaintiffs and the second awarded 700 million dollars to the plaintiffs.

3.5 billion dollars to shareholders because of accounting fraud. Another notorious case not related to the Private Securities Litigation Reform Act of 1995 is that of Drexel Burnham Lambert Group Inc. where a 1.2 billion dollars settlement was paid. Table 1 presents the most important D&O settlements since the passage of the Private Securities Litigation Reform Act of 1995.

TABLE 1. Largest security litigation settlements post PSLRA 1995

Name of the Corporation	Year Filed	Year Settled	Settlement Millions of USD
Cendant	1998	1999	3,527
Lucent	2000	2001	563
Bank of America	1998	2002	490
Waste Management II	1999		457
Rite Aid	1999	2003	320
Oxford Health Plans	1997	2003	300
3-Com	1998	2000	259
Waste Management I	1997		220
Microstrategy	2000	2001	193
Dollar General Corp.	2001		162
Informix	1997	1999	142
Sunbeam	1998	2002	141
Mattel	1999		122
Conseco	2000	2002	120
Ikon	1998	1999	111
Prison Realty	1999	2001	105

The year settled is not available for some cases pending appeal.
In those cases the settlement value is that before the appeal.
Source: Stanford University Law School Securities Class Action Clearinghouse.

Many of these settlements occurred in the past few years as the result of a change in the securities law in the United States. In an effort to speed up the settlement process associated with security violation lawsuits, the Private Securities Litigation Reform Act of 1995 rests more power with the courts in determining which lawsuits are frivolous. Unfortunately, and contrary to the act's good intentions, the number of litigation cases has not decreased post 1996, even after one discards lawsuits associated with IPO laddering cases. Even more unfortunate for the sponsors to the Act, however, the amount asked by plaintiffs has increased dramatically.

Because security litigation settlements may be quite large and directors are personally responsible for these amounts, directors may seek protection to prevent the use of their personal assets to compensate plaintiffs in these lawsuits. D&O insurance supposedly provides such protection so

that individuals may require it before they agree to become a corporate director.

According to Tillinghast-Towers Perrin (1998, 1999, 2002) the proportion of U.S. firms that carried D&O insurance was 92% in 1998, 93% in 1999, and 97% in 2002, up from 81% in 1992. The market penetration of D&O insurance is smaller in Canada where 84% of surveyed corporation carried D&O insurance in 1998, 73% in 1999 and 90% in 2002. One possible reason why D&O insurance has become more and more popular is that lawsuits against management are becoming more frequent. Although carrying D&O insurance is the norm,[4] the sum of all D&O insurance premiums paid by U.S. corporations amounted to only three billion dollars in 2001 (up from two billion dollars in 1998). Obviously, D&O insurance represents only a small part of the 70 trillion dollars paid in corporate insurance each year by U.S. corporations.

1.3 Findings

Our findings are based on an original data set of poublicly traded Canadian corporations that filed their annual reports between 1 January 1993 and 31 December 1998. Canadian data is used because the Ontario Securiries Commission that oversees the Toronto Stock Exchange mandates that basic D&O insurance information (policy limit, deductible and premium) be made public in the corporations' management proxies and information circulars.

We test seven hypotheses related to the demand of corporate risk management in general and of D&O insurance in particular. A summary of our empirical results follows.

1. If D&O insurance acts as a deep pocket payor of last resort for shareholders, then D&O insurance should be associated with greater shareholders' wealth. The evidence strongly supports the *shareholders' protection* hypothesis.

2. If D&O insurance is part of the directors' compensation package, we should expect to see a negative relationship between the amount of D&O insurance provided to board members and other forms of compensation. Our evidence strongly supports the *compensation package* hypothesis.

3. If D&O insurance is used to attract more risk averse corporate outsiders unto the board, we should expect a positive relationship between the board members' risk aversion and the level of protection. We find no support for the *risk aversion* hypothesis.

4. If D&O insurance is used to reduce the cost of financial distress, then a positive relationship

[4] One notable exception, according to The Economist (op.cit.), is Berckshire-Hathaway that does not provide D&O insurance to its directors.

should exist between the level of D&O insurance coverage and the riskiness of the firm. We find weak evidence in favor of the *financial distress* hypothesis.

5. If D&O insurance is used as a monitoring, then we should observe a negative relationship between the amount of D&O insurance coverage and other forms of corporate monitoring. We find weak evidence in favor of the *monitoring* hypothesis.

6. If D&O insurance provides a signalling mechanism for managerial quality, firms where managerial signalling is more important should purchase less coverage. We find strong support of the *managerial signalling* hypothesis.

7. Finally, if D&O insurance is an entrenchment device for corporate boards who do not want to assume the impact of their decisions, D&O insurance coverage and managerial entrenchment should be positively linked. The evidence concerning the *entrenchment* hypothesis is mixed.

Before discussing the D&O insurance literature, we present the structure of the D&O insurance market. Section 3 presents the data and the testable hypotheses used to explain D&O insurance demand. In particular, we present the *shareholders' protection hypothesis*, which is the foremost contribution of this paper. Section 4 presents the results. We divided the result section into three parts. In the first part, we determine the likelihood that an agent will purchase D&O insurance. In the second part we find the determinants of the policy limit and deductible amount respectively. We conduct robustness checks in the last part of section 4. In section 5, we discuss our results and conclude.

2 Directors' and Officers' Liability Insurance

2.1 The D&O Insurance Market

Contrary to the late eighties, the directors' and officers' insurance market was very soft in the mid to late 1990s. The liability insurance crisis of the mid eighties (see Winter, 1991) had reduced the industry's capacity to provide insurance. This supply shock had a direct impact on premiums paid which increased ten-fold between 1984 and 1988 according to the standardized premium index for D&O insurance (see Larsen, 2000).

A D&O insurance policy comes to life when a manager is being sued as a representative of the corporation. The insurance company indemnifies the corporation and/or the manager only if the manager acted in good faith on behalf of the company; i.e., managers are not covered in case of gross negligence or criminal behavior. Depending on the type of D&O contract (there are more

than 40 *standard* D&O insurance contracts), sometimes the manager will be indemnified directly, other times the corporation will be indemnified for the expenses incurred in the manager's defense (for example when the corporation has its own in house legal team). As with traditional insurance contracts, D&O insurance contracts stipulate a premium to be paid, a policy limit as well as a deductible.

Most D&O insurance contracts are written on a "claims made and reported" basis (CMR). CMR contracts differ from regular occurrence based contracts in that they cover losses that are made and reported during the policy year even though such claims may have been incurred in previous years. Occurrence based contracts cover losses that are incurred during the policy year no matter when the claim is reported in the future.[5]

Past behavior therefore has a double importance in designing the current year's insurance contract. Firstly, if past behavior is any indication of current behavior, any information related to the risk of the insured gathered in the past by the insurance company will be used as a signal regarding the current risk of the insured. This is true both for occurrence based and CMR contracts. Secondly, not only is past behavior an indication of current risk, it is also an indication of current losses paid. Thus past behavior becomes doubly important when the insurance contract is written on a *claims made and reported* basis.

Insurance brokers who negotiate with insurance companies on behalf of the coporation are the main providers of directors' and officers' insurance policies. In the United States, the top three D&O insurers (AIG, Chubb and Lloyd's) collect about 65% of the premiums, while the top ten companies collect over 85%. In Canada, one company (Chubb) is reported to be the primary insurere in the majority of cases. A similar market concentration can be observed at the brokerage level; the top-4 brokers in the United States, and the top-2 in Canada, manage 66% of all D&O insurance accounts (see Goch, 2001, 2002, and Tillingast-Towers Perrin, 2002, for more details).

So-called sticky points also characterize the D&O insurance coverage market. Typically coverage limit is sold by layers of $1,000,000, although the most important steps appear to be $5,000,000. For our sample of companies, out of the 173 companies that purchased D&O insurance in 1998, two-thirds chose one of six policy limits: $5,000,000 (18 times), $10,000,000 (43 times), $15,000,000 (12 times), $20,000,000 (18 times), $25,000,000 (10 times) and $50,000,000 (13 times). Other years have similar sticky points.

[5] For example, suppose that an incident occurs in 1995 (say the accidental pollution of a river), but is not reported until 2000 when a claim is filed. Under a CMR contract, all the financial responsibility for the loss falls upon the 2000 insurer. Under an occurrence based insurance contract, it is the 1995 insurer who is responsible. See Doherty (1991) for more details regarding claims made and reported insurance contracts compared with occurrence based contracts.

2.2 Previous Literature on D&O Insurance

Because of the limited access to public information prior to 1990,[6] only a few studies have been conducted on the demand for D&O insurance. Public information became available following the Cadbury (1992) report in the United Kingdom and the Dey (1993) report in Canada. Both reports recommended to their respective securities commission to make available more information on the compensation of officers and directors. As a result, more information regarding managerial compensation is available in both countries, including the purchase of D&O insurance since it is viewed as part of the managers' compensation package. Recently the German commission on corporate governance recommended that the securities law be changed so that corporations become mandated to report premiums paid toward D&O insurance.

The first studies that used the newly available public data in Canada and the United Kingdom are Core (1997,2000) and O'Sullivan (1997). Using a sample of 222 firms whose fiscal year ended between 31 May 1994 and 31 December 1994, Core (1997) finds that the most important determinants of D&O insurance purchase are the risk of a lawsuit and the cost of financial distress. No evidence is shown that D&O insurance is in any way part of the mangers' compensation package. In a follow-up article, Core (2000) finds that the factors explaining premiums are about the same at the factors explaining the demand for D&O insurance. Core's results are supported by O'Sullivan (1997) who concludes that in the United Kingdom, D&O insurance coverage and managerial share ownership are corporate governance instrument substitutes. Moreover, Core (2000) and O'Sullivan (1997) suggest that D&O insurance acts as a monitoring device (see also Holderness, 1990).

If D&O insurance reduces the expected cost of bankruptcy and acts as a corporate governance instrument or monitoring device, one should expect that stock returns should be positively correlated with D&O insurance purchases. Surprisingly, however, D&O insurance does not seem to have any impact on stock returns (see Bhagat et al., 1987, and Janjigian and Bolster, 1990).

More recently, Chalmers et al. (2002) study the interaction between D&O insurance coverage and initial public offering (IPO) under-pricing using an original sample of firms going public with a specific investment bank. Their study, using 72 observation points, is based on earlier studies by Ibbotson (1975) and Tinic (1988) who argued that IPOs are initially under priced as a way to prevent shareholder lawsuits when the stock falls in the long run (see also Lowry and Shu, 2002). Chalmers et al. find that corporations with substantial D&O insurance coverage were, on average, more likely to be sued in the future for mispricing. More specifically, they find that the three-year performance is negatively related to the amount of D&O insurance purchased at the IPO inception.

[6] Prior to 1990, the only information related to D&O insurance was collected via surveys by Wyatt (now part of the Tillinghast-Towers Perrin).

Put another way, the greater the D&O insurance coverage, the less underpriced was the stock at the time of the initial public offering.

There are two caveats to the Chalmers et al. (2002) study. First, they did not consider in their analysis that D&O contracts are written on a claims made and reported (CMR) basis rather than occurrence. Under a CMR contract, it is not important what the D&O insurance coverage was at inception; what is important is the D&O insurance coverage when the claim is made. Given that the Chalmers et al. (2002) data set reflects only the information related to the D&O insurance contract at the IPO data, the database does not include the information regarding the D&O insurance when the claim was made.

The second caveat is that D&O insurance policies per se does not cover many of the persons involved in the IPO process (see Barker and Smick, 2000). According to Ferrera (2001), because private companies rely on non-director to advise them during the IPO process, these advisors insist that the company protects them from liability should anything happen during the securities offering. Moreover, other shareholders could also be liable if it is perceived that they had better information than the broad market.

> "Ordinary D&O policies will not provide coverage for these non-officers and directors, but special *IPO policies* will. These forms are usually based on the D&O model, and extend coverage to advisors, shareholders and others. While such policies can be relatively expensive, they can offer unitary protection for all concerned parties."[7]

As a result, the Chalmers et al. (2002) study, although yielding interesting results regarding the protection of managers involved in the IPO process, may not be generalized to the wider D&O insurance market. In particular, higher D&O insurance coverage in established corporations may or may not be associated with future poor performance or managerial opportunism.

Only one paper to our knowledge examines in details the modelling of Directors' and Officers' insurance. Gutiérrez (2003) presents a model where D&O insurance is used as a commitment device for stockholders to monitor the behavior of corporate directors. The paper follows in the steps of Sarath (1991), but innovates by having an uninformed principal purchase insurance on behalf of an informed agent because the insurer cannot observe ex post the true effort of the agent. As a result D&O insurance protects shareholders against the risk that corporate directors will not have enough wealth to pay for the damages they have caused. As a consequence, D&O insurance acts as a deep-pocket last-chance payor for shareholders who suffered a loss because of managerial incompetence.

[7] Ferrera, D. (2001). Beyond D&O, *www.coveragefirst.com/executivefirst/Lib.html*, page 3.

3 Hypotheses, Data collection and Data source

Although there are many hypotheses that one can test to find the determinants of the demand for D&O insurance, the main hypothesis we want to test in this paper is the one we refer to as the *shareholders' protection hypothesis*. We shall present the shareholders' protection hypothesis first, then the other hypotheses second. In our discussion, we refer to the protection or the coverage associated with a given D&O insurance policy. More protection (or more coverage) means that the policy limit is larger or that the deductible is smaller or both.

3.1 Main hypothesis: Shareholders' protection.

Since shareholders are those that have the most to lose because of managerial incompetence or error, the shareholders' protection hypothesis claims that it is them who should value D&O insurance protection the most. In other words, the more shareholders have to lose because of the managers' incompetence, the more protection they will purchase.

The market value of equity gives us the maximum possible loss that can befall on shareholders. As the size of the possible loss increases, more protection becomes needed. To see why, consider the case of a corporation where all the board members are homeless or "poor academics." If the board becomes liable because of an error on their part, shareholders may not be able to be compensated justly for their loss, as the directors have no personal wealth to be seized. D&O insurance then allows shareholders to claim back part of the wealth they lost. As a result, if the shareholders' protection hypothesis is correct, we should see a positive relationship between a corporation's market value of equity and the amount of D&O insurance protection. Because we are dealing with large dollar values, we shall use the log of the market value of equity in millions of Canadian dollars[8] ($LnMVE$) as our measure for the shareholders' wealth.

Another way to measure whether D&O insurance protects the firm's providers of capital rather than its directors would be to look at the use of debt in the corporation's financial structure. Indeed, the more debt there is, the more the creditors can receive back from the D&O insurance policy in the event of a lawsuit. We shall use the debt ratio as our measure of debtholder wealth in the corporation. The debt ratio is equal to the ratio of the book value of debt to the quasi-market value of assets calculated as the book value of debt plus the market value of equity. Thus,

$$DebtRatio = \frac{\text{Book Value of Debt}}{\text{Book Value of Debt+Market Value of Equity}}$$

[8] All monetary figures are denominated in Canadian dollars; any amount in U.S. dollar has been converted to Canadian dollars using the exchange rate at year-end.

If shareholders' protection hypothesis also applies to the creditors, we should see a positive relationship between D&O insurance coverage and the use of debt in the corporation.

3.2 Other hypotheses and determinants

3.2.1 Compensation package hypothesis.

Core (1997) has argued that D&O insurance is part of the director's compensation package so that directors who have better coverage should be willing to accept a smaller compensation. We therefore need to control for the directors compensation. To do so, we calculated the corporation board members' annual compensation using three measures: *Cash*, *Options* and *Stock*.

Our first measure is the average annual compensation received by each board member. The data we have gives us the total salary of board members in Canadian dollars. Dividing the total salary by the number of board members gives us our measure to *Cash* compensation. For ease of presentation in the tables, we divide the average cash compensation by one thousand. Put succinctly

$$Cash = \frac{\text{Total board compensation}}{\text{Number of board members}}/1000$$

A similar approach is used to measure the average option compensation of board members. The *Option* variable is equal to the total value of stock options given to directors divided by the number of board members. Stock option value (in thousands of dollars) is calculated as the number of options multiplied by the stock volatility and the stock price at the end of the year. Put differently,

$$Option = \frac{\text{Number of options given to the board } \times \text{ Price } \times \text{ Volatility}}{\text{Number of board members}}$$

The *Stock* variable gives us a measure of each board member's involvement in the corporation. Similarly to Tufano's (1996) CEO's wealth involvement in the corporation, we measure *Stock* the one-year variation in the average board member's wealth.

$$Stock = \frac{\text{Total Board Share Ownership } \times \text{ Price}}{\text{Number of board members}} - \text{Lag}\left(\frac{\text{Total Board Share Ownership } \times \text{ Price}}{\text{Number of board members}}\right)$$

According to the compensation package hypothesis, D&O insurance coverage and the different measures of director compensation (*Cash*, *Option* and *Stock*) should be negatively correlated.

3.2.2 Risk aversion hypothesis.

The literature on corporate boards divides the origin of board members in three categories depending on each board member's relationship to the managerial team. Directors that are also officers

are classified as having the least independence, whereas outside directors are classified as being most independent. It is the independent managers that need to be most convinced to sit on board of directors. Officers who sit on boards, also known as inside directors, receive other forms of compensation and benefits from the corporation and as such may not request D&O insurance as much. Independent directors on the other hand request better and more complete protection to sit on boards. As a result, if the director risk aversion hypothesis is correct, we expect the proportion of independent directors (*Independent*) on a corporate board to be positively associated with a higher level of protection. A director is defined as independent if he is not an officer of the corporation, related to an insider, nor a former employee.

Non-tradable human capital within a corporation is also a good intuitive reason to insure (see Froot et al., 1993, and Stulz, 1996). Given that managers may have the great majority of their human capital tied up in a corporation, managers may use their position to have the corporation manage the risk in their own interest instead of the stockholders'. Along that line of thought, Tufano (1996) conjectures that a corporation manages its risk for only two reasons, one being to protect risk averse managers. Tufano (1996) finds that value maximization does not seem to play an important role in determining risk management practices,[9] although the structure of the managers' compensation does. Indeed, corporations whose managers own more call options manage risk the least whereas corporations whose managers own more shares manage risk the most (see also Knopf et al., 2002). A result similar to Tufano (1996) was found by Schrand and Unal (1998) in the financial services sector, but no evidence was found by Haushalter (2000) in the oil and gas industry. If Tufano's non-tradable human capital / managerial risk aversion hypothesis is correct, we should expect a positive relationship between the size of the directors' stock holding in the corporation (*Stock*) and D&O insurance coverage and a negative relationship with the directors' option holdings (*Options*).

3.2.3 Financial distress / corporate insurance hypothesis.

If one considers insurance as part of a corporation's overall risk management portfolio, then the corporate insurance hypothesis is probably the one that has received the most attention in the finance literature. Although insurance is only one of the many hedging tools available to corporation, it is the oldest and it represents an important economic sector. In the United States, for example,[10] close to 20 trillion dollars are paid in premiums every year to cover commercial multiple peril risks. That is on top of the 30 trillion dollars paid by toward worker's compensation insurance and the 20

[9] See Dionne and Garand (2003) for the opposite result.

[10] See the National Association of Insurance Commissionners web site at www.naic.org.

trillion dollars paid for other types of liability coverage (including insurance for corporate directors and officers). These three insurance lines represent about 20 % of the 340 trillion dollars paid in property and casualty insurance premiums in the United States 2000. This is down from 27 % in 1994.

Size should be an important determinant of a corporation's need for corporate insurance as larger corporations are better able to self-insure so that they have less need for insurance (see Mayers and Smith, 1982, and Smith and Stulz, 1985). For example, large corporations may have an in house litigation department that handles lawsuits. To measure the impact of size, we shall use the previously defined variable $Ln\,(MVE)$.

The way in which a corporation is financed should affect the need for corporate insurance. For example, a corporation near bankruptcy will incur large financial distress costs. Moreover, since a bankrupt firm cannot honor its promise to financially support its managers' legal fees in the event of a lawsuit, the corporate indemnification plan becomes moot. As a result corporate managers will require better protection to sit on boards of corporations near bankruptcy. Thus, bankruptcy risk should increase the need for D&O insurance coverage. Our measure of *Bankruptcy* is calculated as

$$Bankruptcy = -\left(\frac{\text{Book Value of Assets}}{\text{Book Value of Debt}}\right)\left(\frac{1}{\text{Stock Volatility}}\right)$$

This variable measures the probability that a put option on the corporation's assets will be exercised at a strike price equal to the book value of debt. The stock's annual volatility is calculated as in Hull (2000). We used the standard deviation.

Financial distress also increases when the size of the corporate debt is relatively large. In other words, the corporation's financial structure should be important. Corporations that have a high debt ration (as defined earlier as our *DebtRatio* variable) are more at risk of being in financial distress. We may also see the inverse of this ratio as a measure of the corporation's creditworthiness; the smaller is *DebtRatio*, the more creditworthy is the firm.

Finally, a firm's past return may be a good indication of its financial health. As a consequence, the higher the return the more liquidity the corporation has to face small market downturn. The need for D&O insurance should therefore be smaller when past returns have been high. We shall use the firm's return on assets as our profitability measure. We calculate *ROA* as the ratio of net earnings the book value of assets.

3.2.4 Monitoring hypothesis.

Holderness (1990), O'Sullivan (1997) and COre (2000) hypothesize that D&O insurance is a substitute for board monitoring. D&O insurance monitoring is, by definition, done by an insurance

company. As such, it seems appropriate to suppose that if insurers already have an important presence in the corporation, say through an important block ownership, then D&O insurance monitoring should be less important. As a consequence, we expect a negative relationship between D&O insurance and insurer stock ownership of a corporation. Another impact of an insurer's participation in the profits is that it may be able to offer risk assessment and mitigation services to the corporation. So, similarly to the monitoring argument, we should see a negative relationship between the amount of D&O protection and insurer stock ownership.

As a proxy for the involvement of insurance companies in the ownership structure of Canadian corporations, we shall use the presence of large financial institution blockholders (*Blockholder*) in the ownership structure. *Blockholder* is calculated as the percentage of the shares held by financial institutions. Contrary to United States where the 5% rule applies, Canadian corporation only need to report their block holders if they hold more than 10% of the shares. As a result we may under estimate the involvement of financial institution investors in Canadian corporations if many hold nine percent of the shares. Nevertheless, given the wave of consolidation in the financial industry in the nineties in Canada, we feel that financial institution ownership is a good measure of insurer involvement and monitoring of a corporation. *Blockholder* is expected to have a negative impact on the need for D&O insurance if the monitoring hypothesis is correct.

If D&O insurance does indeed act as a substitute for other forms of corporate monitoring, then we should expect less monitoring by other types of stakeholders. For example, creditors may not need to monitor the health of the corporation as much if a D&O insurer is the corporation's deep pocket in case of managerial incompetence. As a consequence, we should expect a negative relationship between the presence of large debtholders and the size of D&O insurance coverage. According to the monitoring hypothesis then, the *DebtRatio* variable should have a negative sign.

3.2.5 Signalling hypothesis.

The signalling literature makes two conflicting predictions. First it predicts that good managers will signal their quality by having less insurance; and second that good managers will signal their quality by hedging idiosyncratic risk more.

The first case is the standard Rothschild and Stiglitz (1976) adverse selection argument. Suppose that managers can be of two types, good or bad, where the bad managers are more likely to be sued than the good managers. How can a good manager signal his type? According to Rothschild and Stiglitz (1976), in a one period model, the good manager accepts less than full insurance and the bad manager opts for full insurance. A similar story can be told using a managerial effort and moral hazard approach. Thus, we should expect managers to choose less insurance if they want to

signal their quality. This signalling is typically done through the use of higher deductibles rather than smaller policy limit.

In the second case, as hypothesized by Breedan and Viswanathan (1998), more hedging may be used by better managers to signal their quality if it is hard to assess it ex post due to idiosyncratic shocks to earnings. A good manager wants to reduce the volatility of earnings so that earnings may be completely attributed to managerial quality rather than the role of a die. The Breedan and Viswanathan (1998) argument does not apply to the demand for D&O insurance because it offers no earnings' protection and it does not reduce the volatility of the results ex post. Consequently, we believe that signalling is more likely to be due to adverse selection motivations in our context.

Signalling is most important when managerial quality is harder to assess. This would occur in corporations that have complex investment opportunities and/or large free cash flows. As a result, the type of firm (growth versus value) may be a determinant of D&O insurance purchase, because managers in growth corporations benefit more from signalling their quality than managers in value corporations. As a result, managers of growth corporations should opt for smaller D&O insurance coverage. We measure $Growth$ as the ratio of the market value of equity to its book value.

Another measure of complexity we may use is the corporation's stock volatility. Managers in corporation whose stock is very volatile are more likely to signal their quality through lower insurance coverage. As a result, we should expect lower coverage when the stock is volatile. To measure $Volatility$, we use the annual volatility of compounded daily returns of the stock (see Hull, 2000).

3.2.6 Entrenchment hypothesis.

According to the entrenchment hypothesis, D&O insurance should be used to protect entrenched managers against lawsuits from unhappy shareholders. The level of managerial entrenchment is often measured as the power that corporate insiders exert on the board of directors. As Core (1997) and Chalmers et al. (2002) suggest in their results, entrenched firm insiders may use their power on the board to purchase more D&O insurance to extract wealth from shareholders without too much fear of reprisal.

We use two main measures of entrenchment: The voting power of the CEO ($CEOPower$), and the wealth of insiders ($InWealth$) on the corporate board. In both cases, we expect a positive relationship between D&O insurance coverage entrenchment if the entrenchment hypothesis is correct.

Canadian security laws allow the existence of different classes of voting shares.[11] Contrary

[11] See Grossman and Hart (1979) for a critique of one-share-many-votes rules.

to the United States, the use of multiple-voting shares is very common in Canada. This confers extraordinary voting power in the hands of those who own the shares, since they have relatively more voting power than rights to the dividends. This power entrenchment should be more evident when it is in the hands of the CEO. As a result, we shall use the CEO's voting power as a proxy for managerial entrenchment. $CEOPower$ is measured as the proportion of the votes in the hands of the CEO divided by the total number of votes in the corporation.

$$CEOPower = \frac{\text{Number of CEO votes}}{\text{Total number of votes}}$$

Another measure of managerial entrenchment we shall use is the proportion of the corporation's total wealth in the hands of corporate insiders who sit on the board. The greater is their proportion of the corporation's wealth, the more entrenched are the insiders since other shareholders have relatively less to gain by supervising them. $InWealth$ is calculated as the total number of shares held by insiders who sit on the board divided by the total number of shares.

$$InWealth = \frac{\text{Number of shares of insider directors}}{\text{Total number of shares}}$$

We define a corporate insider as any corporate officer or employee who sits on the board in addition to the chairman of the board.

Another possible measure of corporate entrenchment is whether the corporate managers are receiving too much money for their work. In that sense, the entrenchment hypothesis would predict that the first measures of director compensation ($Cash$, $Stock$, $Option$) should be positively related to D&O insurance coverage.

3.2.7 Litigation risk and other control variables

One last important determinant of D&O insurance demand is the perceived litigation risk a corporation faces. Through strategic corporate choices, a firm may increase its risk of being sued even though corporate managers have done nothing wrong or out of the ordinary. Sometimes, the environment is simply more litigious. For example, a Canadian corporation that has important activities in the United States should be faced with more litigation than a coporation whose activities are in Canada only. As reported by Core (1997) and Clarkson and Simunic (1994), the Canadian legal system is less litigious than the American legal system. It follows that claims filed in the United States should be costlier than claims filed in Canada. Given that almost half of the D&O lawsuits originate from shareholders, we feel that the most important litigation risk that corporations face is whether they have violated some SEC rule, typically an accounting irregularity

(see Eitel, 2000).[12] It follows that corporations that are listed on a stock exchange in the United States ($USListed$) should have a greater policy limit and a larger deductible.

Another example, mentioned by Core (1997), is that corporations are the most likely to be sued if they engage in mergers, acquisitions and divestiture, independently of financial health, shareholder wealth and managerial entrenchment. This variation in litigation risk has to be taken into account. Increased litigation risk resulting from a merger or divestiture should be a function of large variations in the corporation's book value of assets. We let *Acquiror* equals the log of the book value of assets (in millions of dollars) if said book value has increased by more than 25 % over the previous year. *Divestor*, on the other hand, equals the previous year's log of the book value of assets (in millions of dollars) if the book value has decreased by more than 25 % in the current year. In both cases, the litigation risk should increase.

An increase in the litigation risk may increase the frequency or the severity of lawsuits. In the first case, this leads to an increase in the deductible because the number of lawsuits is more predictable, and thus better manageable. In the second case, an increase in the severity should increase the policy limit. Because variations in litigation risk have nothing to do with a corporation's fundamentals, we cannot consider them as a determinant of the demand for D&O insurance coverage. Instead, litigation risk may be due to the environment in which the firm operated, an environment over which the firm has no control.

The last variable we want to include in the analysis takes into account the length of the D&O insurance contract. It was common practice in the nineties for insurers to issue multi-year contracts with automatic reinstatement clauses.[13] To control for these multi-year insurance contracts, we count the number of years during which the parameters of the contract (deductible and policy limit) did not change. Because it appears that no contract is ever longer than three years, our $MultiYear$ variable takes only the values 1, 2 and 3.

The astute reader will note that there is no mention of the convexity of the tax schedule in the present analysis, even though progressive tax systems induce corporations to smooth earnings (see Smith and Stulz, 1985, and Graham and Smith, 1999). The reason is that D&O insurance offers little tax advantages. Consequently, we see no reason why the convexity of the tax structure should have any bearing on the demand for D&O insurance. Graham and Rogers (2002) find

[12] The laws governing corporations in the United States allow more lawsuits than the laws governing Canadian corporations. Moreover, the jurisprudence in the United States is such that lawsuits are very common; this is not the case in Canada where lawsuits are not considered a normal business expense for corporations. The probability of litigation is therefore higher for firms that are listed in both the United States and Canada as opposed to firms listed in Canada only. Although it is true that sexual harassment and/or employment discrimination suits against managers fall under the D&O coverage, most lawsuits are brought by stockholders under the different security laws.

[13] See http://www.gcr.com/.

that corporations do not seem to alter their hedging strategy as a function of the convexity of the schedule, which reduces the strength of the general tax argument for purchasing insurance.

3.3 Summary of hypotheses and predicted impact

Table 2 presents a summary of the predicted impact of each variable as a function of the hypothesis it claims to test. The + (−) sign means that the variable in the left column is expected to have a positive (negative) impact on the need to carry D&O insurance coverage. For example, for LnMVE, the financial distress hypothesis predicts that larger corporations need less insurance (thus the − sign) because they face smaller financial distress cost and they are better able to self insurer. On the other hand, the shareholder protection hypothesis predicts that larger corporations will choose more protection (thus the + sign) because shareholders have more to lose.

Table 2. Predicted Impact of Each Variable on the Demand for Directors' and Officers' Insurance Coverage as a Function of the Testable Hypothesis and Litigation Risk

Variable Name	Shareholders' protection	Package	Aversion	Distress	Monitor	signalling	Entrench	Litigation
Cash		−					+	
Option		−	−				+	
Stock		−	+				+	
Independent			+					
LnMVE	+			−				
Bankruptcy				+				
DebtRatio	+			+	−			
ROA				−				
Blockholder					−			
Growth						−		
Volatility						−		
CEOPower							+	
InWealth							+	
USListed								+/−
Acquiror								+/−
Divestor								+/−

The variable used to test our model are listed in the first column. The different testable hypotheses are found in the other column. The + (−) sign represents the predicted impact of the variable on the level of D&O insurance protection purchased by the corporation on behalf of its director. The term « more protection » refers to an insurance policy that has a higher policy limit and/or a lower deductible.

3.4 Dependent Variables

We use three different dependent variables. First, we have a dichotomous variable to see whether D&O insurance was purchased or not. Second, we have the policy limit that gives us the maximum possible indemnity paid by the D&O insurance policy for any single event, or for any single year. Although D&O insurance is usually sold in excess layers (see Chalmers et al., 2002), we do not have access to that information. Third, we have information regarding the contract's deductible. This deductible gives us the amount the corporation (or the managers) must pay out-of-pocket before the insurance coverage kicks in.

To reduce problems associated with the extreme measures of policy limit and deductible, we used the logarithm of the dollar figure in our analysis. In the case of deductibles, there are times where the insurance contract specifies an individual deductible, a corporate deductible, or both. For the purpose of this paper, we used the highest amount available, typically the corporate deductible.

Although there are no standard D&O insurance policy forms, they all include a policy limit and a premium paid. The non-standard aspects of D&O insurance policies relate to the exclusions and inclusions, the length of the policy and who is covered. Unfortunately, we do not have access to the specific insurance contract, but only to what is reported in the corporation's information circulars.

Our sample gives us 988 firm-years that report having D&O insurance. Of these, we have information about the policy limit for 985 firm years; the other three observations are for a company whose parent provided D&O coverage. Information about the deductible amount is revealed in only 861 cases, as some companies did not specify whether there was any deductible even though it had purchased D&O insurance. This causes an identification problem since we do not know whether the deductible was omitted by mistake of whether it was equal zero and not mentioned as such. Three possibilities are offered to us. We can set the deductible to zero, we can eliminate the hundred-odd observations for which no deductible is mentioned or we can set the deductible to the lowest amount in our data set (10,000 dollars). We opted for the last option, although the results are sensibly the same whichever approach we use (see section 4.3.3).

3.5 Data Source

Financial data was obtained from three different sources: Compustat, Stock Guide and CanCorp Financial. The use of three different sources allows us to increase the size of the data set compared to Compustat alone. Unfortunately information is not always the same for corporations whose financial information appears in more than one source. If that occurred, we used a lexicographic approach to the problem, trusting the Compustat entry over the other two, and the Stock Guide entry over CanCorp's. Stock prices and total returns are drawn from the TSE-Western tapes.

Information concerning managerial compensation and board composition was coded directly from each corporation's information circular and management proxy. Table 3 summarizes the source and the construction of each of the variables used.

Table 3. Source and Construction of the Variables Used in the Study

Variable Name	Construction	Source
D&O Insurance Limit	ln(policy limit)	MP
D&O Insurance Deductible	ln(deductible)	MP
Cash	$\frac{\text{Average cash compensation}}{1000}$	MP
Option	Average number of options $\times$ Price $\times$ Volatility	MP/TSE
Stock	Variation in average board member's wealth in stock	MP
Independent	$\frac{\text{Number of Independent board members}}{\text{Total number of board members}}$	MP
LnMVE	$\text{Ln}(\frac{\text{Market value of equity}}{1{,}000{,}000})$	AS
Bankruptcy	$-\frac{\text{Book value of assets}}{\text{Book value of debt}} \times \frac{1}{\text{Stock volatility}}$	AS/TSE
DebtRatio	$\frac{\text{Book value of debt}}{\text{Book value of debt + Market value of equity}}$	AS
ROA	$\frac{\text{Net Earnings}}{\text{Book Value of Equity}}$	AS
Blockholder	Percentage of stock owned by financial institution	MP
Growth	$\frac{\text{Market value of equity}}{\text{Book value of equity}}$	AS
Volatility	See Hull (2000)	TSE
CEOPower	$\frac{\text{Number of CEO votes}}{\text{Total number of votes}}$	MP
InWealth	$\frac{\text{Number of shares of insider directors}}{\text{Total number of shares}}$	MP
USListed	1 if company listed on U.S. stock market; 0 otherwise	AS
Acquiror	$\ln(\frac{\text{assets}}{1{,}000{,}000})$ if assets increased by more than 25%; 0 otherwise	AS
Divestor	$\text{lag}[\ln(\frac{\text{assets}}{1{,}000{,}000})]$ if assets decreased by more than 25%; 0 otherwise	AS

AS refers to the annual statement. AS data comes from Compustat, Stock Guide or CanCorp Financials. MP refers to the management proxy. MP data was collected from the management proxies and information circular available on SEDAR or ordered from Micromedia or the company itself. TSE refers to the TSE-Western data tapes.

Since 1996 all management proxies and information circular are available on the internet site of SEDAR (http://www.sedar.com/). Prior to this date the information must be collected from the companies directly, or purchased from Micromedia.

Information regarding D&O insurance purchases and executive compensation of publicly traded Canadian companies listed on the Toronto Stock Exchange were collected from the annual management proxies and information circulars. Management proxies also give us the information related

to the firm's blockholders, board member compensation and ownership, as well as the type and number of stock held by each officer (regular or multi-voting). By law (see the statutes of the Ontario Securities Commission), basic information regarding D&O coverage must be reported. This basic information states whether the corporation had D&O insurance, and if so what was the D&O insurance policy limit and occasionally the deductible and the premium paid.

3.6 D&O Insurance Data Information

The original sample included 354 Canadian corporations drawn from 7 economic sectors: biopharmaceutical, forest and paper, industrial products, technological, consumer products, merchandising, and communication and media. These sectors were chosen based on the Toronto Stock Exchange (TSE) sector list drawn from the TSE FactBook. Two important sectors of the Canadian economy (financial institutions, and mining and natural resources) were deliberately omitted to keep our sample more homogenous. The fiscal years used are from 1993 to 1998.

Table 4A. Distribution of firms by economic sector and fiscal year.

Fiscal Year	1992	1993	1994	1995	1996	1997	1998
Sector							
Bio-phamaceutical	4	8	12	13	20	20	18
Forest and Paper	1	29	31	32	28	27	23
Industrial Products		56	78	77	76	74	64
Technological	1	10	20	25	33	34	34
Consumer Products		40	49	54	58	51	39
Merchandising		25	30	33	36	31	22
Media		13	18	18	15	14	13
Total	6	181	238	252	266	251	213

Number of companies in each sector for each year in the final sample of 1407 firms

For each economic sector, all corporations listed in the TSE publication and traded on the exchange were included in the data set for each year of our sample. Our exercise yielded a total of 1519 observations. Because of incongruities in the financial and management proxies (for example board or CEO ownership of more than 100% of the company's stock and no trading in the stock during the year), we had to remove 112 observations from the original data set. Our final data set includes 1407 observations for 318 firms. Table 4A presents the number of firms per year and per economic sector included in our final sample.

This data set presents no apparent survivor bias because each year we added firms to the data based on the TSE FactBook. Also, companies disappeared during the period under study, either

because of a merger or a bankruptcy. Because of this incomplete rolling panel we have an average of 4.4 observation per firm. Of the 318 firms used in our final sample, close to 60% have information for five or six years and 17% no longer existed at the start of 2000.

Insurance penetration is calculated as the proportion of corporations that purchased D&O insurance. On average, 70% of the firms purchased D&O insurance, although penetration seems to increase over the years (67 % in 1993, 73 % in 1998). Table 4B presents D&O insurance penetration for each sector and each year.

Table 4B. D&O insurance penetration by economic sector and fiscal year.

Fiscal Year	1992	1993	1994	1995	1996	1997	1998
Sector							
Bio-phamaceutical	75%	88%	92%	92%	90%	90%	89%
Forest and Paper		59%	58%	63%	64%	67%	70%
Industrial Products		68%	69%	71%	76%	74%	64%
Technological	100%	90%	90%	84%	70%	68%	74%
Consumer Products		68%	65%	70%	67%	63%	67%
Merchandising		52%	57%	58%	56%	55%	55%
Media		77%	78%	78%	73%	79%	85%
Weighted Average	83%	67%	69%	71%	70%	71%	73%

Percentage of corporations by economic sector and by year that carry D&O insurance.

D&O insurance penetration in our data set is slightly below that reported by Tillinghast-Towers Perrin (1999), for the year 1998, but higher than Core (1997) for the years 1993-94. In the case of Tillinghast-Towers Perrin, 84% of Canadian corporations were reported to purchase D&O insurance in 1998.[14] That is a full ten percentage points higher than our figure. Four important factors explain this difference. First, Tillinghast-Towers Perrin relied on a corporation survey that biases their results because of the type of respondent. Second, the number of corporations polled is smaller than the entire sample of possible companies. Third, the same companies are not polled every year, so that it is difficult to keep a tab on the actual trend in the industry. Finally, our data set does not include financial firms, mining firms, public utilities and not-for-profit firms.

In the case of Core (1997), 63% of corporations whose fiscal year ended between 1 June 1993 and 31 May 1994 are reported to have D&O insurance. Although Core relied on the same public information source as us, his sample of companies is different because he included public utility, financial and mining corporations. This explains why Core's sample consists of 222 companies, compared to our 181 for 1993 and 238 for 1994.

[14] For comparison, D&O insurance penetration in the United States was 84% in 1993 and 92% in 1998.

4 Results

4.1 D&O purchase: Comparing means and likelihood

4.1.1 Descriptive statistics

Table 5 presents the basic descriptive statistics[15] of our data set before using lagged variable in the analysis. Table 6 does the same exercise after removing the observations for which the lagged value of assets is not available. This reduces the number of observations from 1407 to 1074 observations.

In each table, the mean of every variable is calculated for corporations that carried D&O insurance (first set of numbers) and for corporations that did not carry D&O insurance (second set of numbers). We see in the tables that only a few variables have means that are statistically different from each other. In particular, it appears that corporations that purchase D&O insurance are larger ($lnMVE$), are more likely to be listed in the United States ($USListed$) and are more likely to have engaged in a round of mergers and acquisition in the past year ($Acquiror$[16]). Firms that carry D&O insurance are also more likely to compensate their directors through the use of stock options, but only weakly so since the difference between the means is significant at the 10% level only. The reason may be that very few corporations distribute options to their directors as part of their compensation package: Only 14% of corporations purchasing and 11% of corporations not purchasing D&O insurance give options to their directors.

Corporations that carry D&O insurance also appear to be more growth oriented. The difference between the means is statistically significant at the 5% level in Table 5, but only at the 10% level in Table 6. In both cases, corporations that carry D&O insurance have, on average, a larger market-to-book ratio, suggesting that firms that carry D&O insurance are deemed to have more growth options. Finally, according to Table 6, corporations that carry D&O insurance have a smaller debt ratio than other companies. This difference is not statistically significant in Table 5, however.

The difference between the results presented in Table 5 and Table 6 in terms of statistical significance raises the possibility that the sample is not the same when the number of observation drops from 1407 in Table 5 to 1074 in Table 6. To see if that is the case, we tested whether the distribution of firms is different between the 1074 observations of Table 6 and the 333 firms that were dropped.

For corporations that carry D&O insurance, we find that director cash ($Cash^{*}$) and option ($Option^{\#}$) compensation is smaller[17] for the dropped observations (the table is not shown). Also,

[15] All remaining tables are in the appendix.

[16] The means for *Acquiror* and *Divestor* cannot be compute in Table 5 because they are calculated using the lagged book value of assets.

[17] The * ($^{\#}$) refers to the differences significant at the 5% level (10 % level).

dropped observations are smaller with respect to their market value of equity*, have smaller D&O insurance policy limits* and deductibles#. Moreover, dropped observations are less likely to be crosslisted on an U.S. stock market ($USListed^*$). Finally, CEOs of dropped firms seems to hold more power ($CEOPower^*$) in the firm. All these differences were to be expected since firms, on average, grow with time. Moreover, as the companies need more money to grow, they will tend to issue more equity and move where the capital is easier to raise. As a result, the proportion of votes in the hands of the CEO should diminish at the same time as corporations gain access to the U.S. stock market.

For corporations that do no carry D&O insurance, the differences in the samples are observed only with respect to the debt ratio* (dropped observations have a lower debt ratio), the proportion of listed corporations in the United States# (dropped observations are less likely to be crosslisted) and the presence of financial institution blockholders# (blockholders are more common in the dropped observations).

Whether the samples are the same is a matter of debate. The differences appear to have logical explanations based on the growth of the stock market in the mid-to-late nineties and on the convergence of the Canadian and the American financial markets.

4.1.2 Likelihood of carrying D&O insurance

Before exploring what explains D&O insurance policy limits and deductibles, it would be interesting to find the determinant of the purchase or not of the policy. Once we have determined what type of corporation purchases D&O insurance, we will then be able to study what determines the policy limit and the deductible given that the corporation has purchased the insurance policy.

Looking back at Table 6, one could expect that size, financial structure, growth opportunities and listing on an American stock exchange could be important determinants of D&O insurance purchases. Running a probit regression,[18] using all the independent variables without any firm of time fixed effects, only four variables appear to have any significance: *Bankruptcy*, *DebtRatio*, *USListed* and *Acquiror*. Except for the debt ratio variable that reduces the likelihood of carrying D&O insurance, the other three variables appear to increase its likelihood. The result related to the debt ratio lends power to the monitoring hypothesis to the detriment of the financial distress hypothesis. However, the positive impact of the bankruptcy risk on the likelihood of purchasing D&O insurance supports the financial distress hypothesis. The other two variables suggest that corporations who have more litigation risk because their stock is listed in the United States or because they have just increased significantly the book value of their assets are more likely to

[18] Table not shown.

purchase D&O insurance. No other hypothesis seems to be supported by the data.

This analysis does not take into account firm effects or period effects. Because our panel data has many observations for the same corporation, the draws are not independent from year to year. Moreover, there may be important year effects that may not be picked up by our variables. Starting first by including time fixed effects, our results do not change much. The same four variables are significant, although less so, and no other is. When we include firm fixed effects, our results change dramatically. It appears that corporations in our dataset either purchased D&O insurance all the time or never purchased D&O insurance. In other words, no company decided, in the middle of the time window covered in our study, to pick up D&O insurance when it did not carry any in the previous period, or drop D&O insurance altogether.

The probit analysis has interesting implications with regard to the reasons why some corporations manage risk and others don't. Indeed our different hypotheses with regards to D&O insurance do not seem to be supported since variations in any of them does not seem to induce corporations to purchase D&O insurance for the first time; or decide to drop it altogether. Boyer (2003) suggests that this may be due to the managers' unwillingness to change their approach to risk management from which they do not want to deviate by fear of appearing weak. As a result, a manager may not want to admit to have made a mistake by changing horses in mid run, as shown in Prendergast and Stole (1996) (see also Dewatripont and Tirole, 1996, and Boyer and Moreaux, 1997). As a result, the reasons why corporations either hedge always or never hedge has nothing to do with efficient risk management strategies and positioning; instead, it has to do with the managers' faith in the usefulness of hedging idiosyncratic risk altogether.

The debate in the gold mining industry between hedgers and non-hedgers of the gold price offers testimony to the chasm in the managers' faith in hedging instruments. The language in the industry press is self-explanatory:

> "Executives at Newmont Mining Corp., Barrick Gold Corp. and Placer Dome Inc. used the opportunity of results week to *pontificate* on the pro's and cons of committing for sale still unmined ounces."[19]
>
> "Newmont Mining Corp. blamed hedgers for *crucifying* the spot gold price."[20]

On the one hand there is Barrick Gold, the world's number 3 gold producer who hedges more than 20 % of its production, and on the other there is Newmont Mining, the world's number one gold producer, that does not want to use any instrument to hedge the gold price. The industry press

[19] *Gold producers cut hedges, disagree on philosophy*, Reuters, August 1 2003. My emphasis.
[20] *Barrick Hedging Delivers Growth*, MineWeb, August 5 2002; http://www.mips1.net/. My emphasis.

seems to attribute the decision to hedge to the faith of the each corporation's CEO in the process than any fundamental aspect of the corporation. As a result, both Randal Oliphant, Barrick's former CEO, and Pierre Lassonde, Newmont's current CEO, have been termed gold market gurus or sage. The reason why Newmont does not hedge has nothing to do with the firm being too small or not understanding the market, as in Chacko et al. (2001). Rather it is the CEO's beliefs that are antitheses to the use of risk management devices.

Risk management therefore appears to be closely associated with the personal beliefs of the CEO. This faith translates into some corporations purchasing D&O insurance for its directors, while others follow the Berckshire-Hathaway example in never providing any because, perhaps, the CEO does not believe in protecting directors against shareholder lawsuits.

The fact that D&O insurance demand appears to be a matter of belief is consistent with the industry view that denied D&O insurance coverage is almost unheard of.[21] Moreover, the structure of the D&O insurance contract as a *claims made and reported* policy may explain why corporations that purchase D&O insurance do so for a long time. It is nevertheless still problematic to explain why directors in corporations that do not purchase D&O insurance do not care about it.

4.2 Policy limit and deductible

The probit analysis suggests that a corporation's financial health and structure, and its board's compensation and composition have no impact on its decision to purchase directors' and officers' insurance or not. Nothing is said in those results about the D&O insurance coverage in firms that have decided to purchase some. Firm specific conditions may have an impact on the chosen policy limit or deductible. This section of the paper deals with the demand for D&O insurance given that it was purchased.

In studies on insurance demand and hedging, it is normally important to control for the fact that the dependent variable is truncated at zero because we do not know the policy limit choice of corporations that did not purchase any insurance. As a result standard econometric methodology (see Green, 1997) asks us to use a tobit regression approach and the Mills' ratio to control for those unobservable. This is the approach taken by Core (1997) in his study.

A tobit regression is not warranted in our case, however, because the decision to purchase D&O insurance or not has nothing to do with any financial, corporate governance or litigation risk measure. A corporation's decision to purchase D&O insurance appears to be purely based on whether the corporation purchased D&O insurance the previous year, or on some invariable particularity of the corporation. Thus, not only can we discard completely from the analysis all

[21] See Chalmers et al. (2002), page 615.

firms that never purchased D&O insurance, but also we need not control for them.

The main results of the paper are found in Table 7. In this table, we run an ordinary least square regression using time and firm fixed effects where we assume that the deductible and the policy limit are chosen independently of each other. This may not be the case, however. A policyholder usually chooses the policy limit before he negotiates the deductible. It may then be important to control for the timing in the choice variables, which we shall in the next section of the paper. Table 7 presents two OLS repressions using the same independent variables. The first regression explains the policy limit choice and the second the deductible choice.

4.2.1 Policy limit

In the policy limit regression, only director cash compensation, market value of equity, debt ratio and the presence of large financial institution blockholders appear to have a significant impact on the policy limit. The negative sign on $Cash$ supports the efficient compensation package hypothesis, even though the two other variables used to measure this hypothesis ($Option$ and $Stock$)

With respect to the shareholders' protection hypothesis, strong support is shown through the combination of the positive sign on both the $DebtRatio$ variable and, more importantly, on the $LnMVE$ variable. The two variables used to measure the shareholders' protection hypothesis are significant at the 1% level in explaining the D&O insurance policy limit. As a result, we can say with confidence that when shareholders have more wealth to lose and/or when creditors are relatively more involved, then corporations purchase more coverage against managerial incompetence. Because this insurance coverage benefits disproportionately the shareholders, we feel confident that our shareholders' protection hypothesis is validated in our empirical analysis.

It is true that the positive sign on $DebtRatio$ lends support to both the shareholders' protection and to the financial distress hypothesis. The support for the latter is, however, weaker than for the former for two reasons. First and foremost, the positive sign on $LnMVE$ contradicts the financial distress hypothesis, although it confirms the shareholders' protection hypothesis. Second, no other variable used to measure the cost of financial distress ($Bankruptcy$ and ROA) is significant. As a result, we say that the support for the financial distress hypothesis is weak because: 1- only the measure of leverage supports it; and 2- another measure used to test it has the wrong sign (and significantly so), namely $LnMVE$.

The other hypothesis for which we find some support is the monitoring hypothesis. The monitoring hypothesis stated that D&O insurance coverage was a substitute for other forms of managerial control such as the presence of creditors and of large blockholders. We therefore expected a negative relationship between coverage and the $DebtRatio$ and $Blockholder$ variables. With respect to

Blockholder, our hypothesis finds support, but the impact of *DebtRatio* on coverage is opposite to what we expected. As a result, and similarly to the financial distress hypothesis, we say that support for the monitoring hypothesis is weak because: 1- only the *Blockholder* variable supports it; and 2- another measure used to test it has the wrong sign (and significantly so), namely *DebtRatio*.

With respect to the risk aversion, managerial quality signalling and managerial entrenchment hypotheses, we find no significant impact on the policy limit choice. Even the variables used to control for higher litigation risk, including whether the corporation is listed in the United States, do not seem to have an impact on the D&O insurance policy limit. Maybe the story will not be the same when we look at the deductible regression.

4.2.2 Deductible

In the deductible regression, it is interesting to see that none of the variables that had any explanation power in determining the limit have any power in determining the deductible. Rather, the only four variables that have any explanatory power are the measure of growth opportunity, stock volatility, corporate insider wealth and whether the corporation is listed in the United States. The first three variables suggest that the managerial signalling and the managerial entrenchment hypotheses are both supported by the data.

The signalling hypothesis predicted that when it is harder to assess the quality of a manager, then good managers will want to signal their quality by choosing an insurance contract that protects them less. In other words, they will choose an insurance contract with a higher deductible. In our analysis, we used the presence of growth opportunities and of market return volatility as instances when good managers are more likely to want to signal their quality. In our regression, both the *Growth* and the *Volatility* variables are positively correlated with the deductible, just as the managerial signalling hypothesis predicted. This result is in accordance with standard adverse selection in insurance results where agents prefer to signal their quality through a higher deductible rather than a lower limit. We can therefore conclude that the case for the managerial signalling hypothesis is strong in the determination of the deductible, as it was for the shareholders' protection hypothesis in the determination of the policy limit.

With respect to the managerial entrenchment hypothesis, it appears that the more wealth insiders have in the corporation, the more protection the corporation purchases in their behalf through a lower deductible. The case for this hypothesis would be strong were it not for the wrong impact of the *Cash* variable on the limit. The entrenchment hypothesis states that managers will use D&O insurance coverage to protect the extraordinary perks they are receiving from being corporate directors. These perks may be through an extraordinary amount of compensation, such

are cash, options or through the consumption of in kind benefits to which they have access because of the amount of power they hold in the corporation. As a result, we expected measures of wealth and of power to be positively correlated with D&O insurance coverage. This is not found to be entirely true. On the one hand, insider power on the board does increase coverage through a lower deductible, but cash compensation reduces coverage through a lower limit. There is a contradiction. Since the contradiction is, however, on two different dependent variable, we shall say that the evidence in favor of the managerial entrenchment hypothesis is mixed.

Contrary to the case of the policy limit, we find no evidence in favor of the shareholders' protection, the institutional monitoring or the financial distress hypotheses. Similar to the case of the policy limit, however, we find no evidence that managerial risk aversion plays any role in the determination of the deductible.

4.2.3 Discussion

It is interesting to see that no hypothesis is supported by the two regressions simultaneously. This raises the interesting question that it is possible that we are over-fitting the model by putting too many controls in the regressions. Another question that the results presented in Table 7 raises is that the motivation behind the determinants of the policy limit and of the deductible are not the same. For example, and based on the results of Table 7, it is perhaps the case that the efficient compensation, shareholders' protection, institutional monitoring and financial distress hypotheses determine the policy limit only, whereas the managerial signalling and entrenchment hypotheses determine the deductible only. We test to see if that is the case in a restricted OLS with time and firm fixed effects model. The results of these regressions are displayed in Tables 8A and 8B.

The regressions we run for Tables 8A and 8B only use the variables that had predictive power on each dependent variables in Table 7. The testable restricted models are then

$$Limit_{i,t} = Cash_{i,t} + LnMVE_{i,t} + DebtRatio_{i,t} + Blockholder_{i,t} + Longterm_{i,t} + d_t + d_i + \eta_{i,t}$$

and

$$Deductible_{i,t} = Growth_{i,t} + Volatility_{i,t} + InWealth_{i,t} + UsListed_{i,t} + d_t + d_i + \xi_{i,t}$$

The results from the OLS regression using this restricted model are presented in Table 8A. Put succinctly, all the variables used in the restricted model have an impact on the corresponding dependent variables that is the same as in Table 7. Thus, there does not appear to be any over-fitting problem associated with our main results.

Table 8B is similar in its methodology are Table 8A with the difference that more observation are used to derive the Table 8B's results than Table 8A's. Why is that? Note that in the restricted

model no variable is constructed using a lagged observation. As a result, we are able to add back to the regression observations that were deleted to run the regression that yielded the results presented in Table 7.[22] The regression results are sensibly the same, with the difference that the *Volatility* variable no longer has any significant impact on the deductible in Table 8B. The reduction in significance is not very large, however, since *Volatility* was significant at the 10% level only in Table 7.

Overall, the results we present in Tables 7, 8A and 8B are quite striking in that many of the theories put forth in the finance and economic literature about the corporate demand for insurance appear to apply to the demand of directors' and officers' insurance. The theories that find the most support are the shareholders' protection, the efficient compensation, and the managerial signalling hypotheses. The only theory for which we find no support whatsoever in our analysis is the one that relates to managerial risk aversion.

Although these OLS results are interesting, they do not consider the fact that, usually, policyholders choose the policy limit before the deductible. As a result, when it comes time to choose the deductible amount, the policy limit is known. As a consequence the OLS results for the deductible may be biased. Another question is that the deductible and the policy limit are chosen simultaneously. These two problems and others are answered in the next section of the paper were we verify the robustness of our results.

4.3 Robustness

We want to test the robustness of our results in three ways. First, we control for possible endogeneity issues that may arise from the choice of the policy limit and the deductible. Second, as mentioned in Section 2.1 of the paper, D&O insurance limits is characterized with sticky points. As a result the dependent variable is not completely continuous so that an ordered probit approach may be more appropriate. Finally, we use other measures of the deductible to see if our results are driven by the $10,000 mark used so far.

4.3.1 Endogeneity

Endogeneity may take on many forms. We test for two, which are presented in Tables 9A through 9C. First, we see whether the sequence of choice in the insurance contract has any impact on the dependent variables. Second, we test for simultaneity in the choice of each dependent variable to see whether the independent assumption are not driving the results.

[22] For example, the lagged book value of assets was needed to calculate the *Acquiror* and *Divestor* variables.

The first robustness check we conduct is to test whether the deductible is chosen after the limit during the negotiations between the corporation and the insurance broker. Because it is through a higher deductible that a policyholder can most reduce the insurance premium paid and because the policy limit is the most important part of the insurance contract, it makes intuitive sense to negotiate the policy limit first, then to negotiate the deductible. It therefore makes theoretical sense to have the policy limit chosen irrespective of the deductible; and then to have the deductible chosen as a function of the policy limit. These regressions are presented in Table 9A. It appears that by adding the policy limit as a determinant of the deductible does not change the results greatly compared to those presented in Table 7.[23]

A second endogeneity check is that we may want to account for the possibility that the policy limit and the deductible are chosen simultaneously rather than one after the other, or independently of one another. One way to check for such endogeneity is to use a set of variables as instruments in a two-stage regression. The following regressions are then tested

$$Limit_{i,t} = Cash_{i,t} + LnMVE_{i,t} + DebtRatio_{i,t} + Blockholder_{i,t} + Longterm_{i,t} + \widehat{Deductible}_{i,t} + d_t + d_i + \eta_{i,t}$$

and

$$Deductible_{i,t} = Growth_{i,t} + Volatility_{i,t} + InWealth_{i,t} + UsListed_{i,t} + \widehat{Limit}_{i,t} + d_t + d_i + \xi_{i,t}$$

where $\widehat{Limit}_{i,t}$ and $\widehat{Deductible}_{i,t}$ represent the predicted value of each variable obtained from the reduced form regressions. The reduced form regressions are

$$Limit_{i,t} = \left(X_{i,t}^{Limit} \cup X_{i,t}^{Deduct}\right) + d_t + d_i + \varepsilon_{i,t}^{Limit}$$

and

$$Deductible_{i,t} = \left(X_{i,t}^{Limit} \cup X_{i,t}^{Deduct}\right) + d_t + d_i + \varepsilon_{i,t}^{Deduct}$$

from which we keep the predicted limit and deductible values designated as $\widehat{Limit}_{i,t}$ and $\widehat{Deductible}_{i,t}$. For notation, we use X^k as the matrix of independent variables that explains each dependent variable, d_t is the dummy variable for the years (the year fixed effect) and d_i is the dummy variable for the corporations (the firm fixed effect). $\left(X_{i,t}^{Limit} \cup X_{i,t}^{Deduct}\right)$ is the the union of the independent variables.

The results from the structural form regressions (the results from the reduced form regressions are not shown) are presented in Table 9B. As we see, all variables remain significant and of the anticipated sign, including the predicted dependent variables. The results are sensibly the same as

[23] Of course, by construction, the regression for the policy limit is the same.

those obtained in Table 8A when we ran a the restricted OLS regression using firm and time fixed effects.

As for Tables 8A and 8B, no variable used in the regression relies on the use of a lagged observation. The IV regression results from the restricted model using all available observations are presented in Tables 9C. Overall, the regression results are basically the same as those presented in Table 8B, but with some variables having more power and others having less power.

We can therefore be reasonably certain, given he results presented in Table 8A, 8B and 8C that the endogeneity problem is not severe, if it exists at all. Even after controlling for endogeneity, we find strong support for the shareholders' protection, efficient compensation and managerial signalling hypotheses, and weak or mixed support for the monitoring, financial distress and managerial entrenchment hypotheses.

4.3.2 Probit

As mentioned earlier, the D&O insurance market is characterized by sticky points. As a result, the policy limit choice does not seem to follow a continuous distribution. In fact, six policy limit levels account for two-thirds of all D&O insurance policy sold in 1998: $5,000,000, $10,000,000, $15,000,000, $20,000,000, $25,000,000 and $50,000,000. Other years have similar sticky points. It may then be appropriate to use another regression analysis to take into account these jumps in the dependent variable. For example, an ordered probit may be more appropriate. The results from the ordered probit are presented in Table 10. The results are sensibly the same as those presented in the main body of the paper.

The most important differences appear not in the determinants of the policy limit, but in the determinants of the deductible. In this probit analysis, the risk of bankruptcy appears to reduce the size of the deductible in accordance with the financial distress hypothesis. At the same time, however, the debt ratio increases the deductible, thus invalidating the financial distress hypothesis. It is therefore not clear what conclusion to draw from this result. Similarly, the managerial entrenchment hypothesis is validated by the negative sign on the impact of insider wealth, but invalidated by the positive sign of the CEO voting power.

4.3.3 Other deductible measures

As mentioned in the data section of the paper, some corporations did not mention if their insurance policy had a deductible and if so its amount. For those missing observation, we assumed that the deductible was the lowest amount we had in the rest of the database (that is $10,000). We ran our regressions using two other possible specifications for the deductible. In one case, we assumed there

was no deductible[24], and in the other case we removed the observation entirely from the analysis. For these two cases, we ran a fixed effect OLS regression for the deductible and the policy limit similar to the results presented in Table 7. These results are displayed in Table 11.

In Model 11.1, the deductible is set to \$1 rather than \$10,000 when the information is missing. In Model 11.2, the observation is deleted from the analysis if the information is missing. This occurred for 87 observations. Whatever specification is used does not alter the results much compared to Table 7's. The evidence favoring the efficient compensation hypothesis is weaker in model 11.2, but the evidence in favor of the signalling hypothesis is stronger. Overall, the results are relatively robust to the way the deductible variable is specified. Interestingly, in both Table 11 models, the shareholders' protection hypothesis is validated as in all other tables; both the $LnMVE$ and the *DebtRatio* variables have positive and significant impact on the policy limit.

5 Discussion and Conclusion

The goal of this paper was to further our understanding of the corporate demand for insurance by focusing on one particular aspect: The demand for directors' and officers' liability insurance. Corporations purchase this insurance on behalf of their directors and officers to protect them in case a lawsuit is brought onto them as representatives of the corporation. Our paper tests many measures hypothesized to have an impact on the corporate demand for insurance. More specifically, we find the determinants for the size of the policy limit and of the deductible.

The study of D&O insurance is important for three reasons. First, it remains an unexplored territory as few papers have been devoted to this aspect of corporate governance. Is D&O insurance part of the compensation package? Is it a tool to align the manager's incentives with those of the shareholders? Is it truly designed to protect corporate directors or other stakeholders like the shareholders and the debtholders? Second, it gives us a further insight into the general corporate demand for insurance. Why do firms hedge their risk given that it is more costly to them than to shareholders?

The result we find the most interesting is the one related to the fact that directors' and officers' insurance offers protection not as much to directors and officers or the corporation, but rather to its shareholders and other providers of capital. In fact, the *shareholders' protection hypothesis* finds consistent support in all model specifications. Because shareholders wealth and the reliance on debt as a source of capital appear to be positively linked to the demand for D&O insurance, we conclude that the evidence strongly supports the view that D&O insurance is used by shareholders to protect

[24] Or rather the deductible was set to equal one dollar so as to make the natural log of the deductible equal to zero. According to Chalmers et al. (2002), a personnal deductible equal to zero is often seen.

their own wealth in case of managerial incompetence. Whereas the traditional literature on risk management predicts that larger corporations should purchase relatively less insurance because they face lower bankruptcy costs and are better able to spread risk over its different operations, we find that the richer the shareholders and the larger the use of debt in the financial structure, the larger is the insurance protection. This result relates to the theoretical model of Guttiérez (2003).

All the results are presented concisely in Table 12.

Table 12. Summary of Results: The Demand for Directors' and Officers' Insurance as a Function of the Testable Hypothesis

Tested hypothesis	Support	Comment
Shareholder protection	**Strong** for policy limit	In all specifications, shareholders' wealth and debtholders' wealth (debt ratio) have positive impact on limit
Compensation package	**Strong** for policy limit	In all specifications, director cash compensation has negative impact on limit
Managerial risk aversion	**None**	No measure used in any specification has any significant impact
Financial distress cost	**Weak** for policy limit	In all specifications only the debt ratio supports this hypothesis, but debt ratio also supports another hypothesis; other measure for distress has the wrong sign.
Institutional monitoring	**Weak** for policy limit	Only one variable (Blockholder) appears to support this hypothesis; other measure for monitoring has the wrong impact.
Managerial signalling	**Strong** for deductible	In all specifications, stock return volatility or growth opportunities or both have positive impact on deductible.
Managerial entrenchment	**Mixed** for deductible	In all specifications, corporate insider wealth has negative impact on deductible, but one measure on limit has wrong sign

Summary of our results and comments related to the significant of the model specifications presented in the different tables in the paper. In the support column, « None » refers to the case where no independent variable used to measure that hypothesis had any significant impact on either measure for the demand for D&O insurance coverage; « Weak » refers to the case where at least one variable explained either measure for D&O insurance demand, but another variable has the wrong sign for the same measure; « Mixed » refers to the case where the variables used explain well one measure of D&O insurance demand but the impact on the other measure has the wrong sign; model specification; « Strong » refers to the case where an independent variable was significant in explaining D&O insurance demand and was of the expected sign.

Because director cash compensation and D&O insurance coverage appear to be substitutes, we interpret this as an indication that D&O insurance coverage may allow shareholders to save money by offering directors liability insurance coverage rather than cash. If the insurance premium is smaller than the saving made on cash compensation, then corporations create wealth by purchasing D&O insurance on behalf of their directors. This hypothesis was also formulated by Core (1997), but he found not evident of it. Our greater sample size and reliance on panel data methodology may explain the difference in the results. Other measures of compensation, such as restricted stocks and options grants, do not seem to be affected by the purchase of D&O insurance. A possible reason is that very few corporations compensate their directors through the distribution of call options and restricted stocks. For example, only 13% of the corporations in our sample use call options as a form of director compensation.

The managerial entrenchment hypothesis stipulates that entrenched managers are better able to secure higher compensation and protect themselves from litigation through greater insurance coverage. Contrary to Core (1997) and Chalmers et al. (2002) who conclude that D&O insurance is used to protect entrenched managers, our case for the managerial entrenchment hypothesis is mixed. On the one hand, we show that D&O insurance and cash compensation are substitutes. On the other hand, corporations in which corporate insiders on the board (i.e., corporate officers who are also board members) have more wealth invested in the corporation choose much lower deductibles - in line with the managerial entrenchment hypothesis. Although there is no impact on the policy limit, it appears that boards on which powerful insiders sit have broader coverage than boards where insiders have little power.

The negative impact of director cash compensation we find on D&O insurance coverage is contrary to Core (1997) who finds a positive relationship between director *excess* cash compensation and D&O insurance coverage. One possible reason may come from the way the cash compensation variable is constructed in each study. Whereas we use cash compensation directly in the regression, Core first regresses cash compensation on some explanatory variables, and then uses the residual as the "unexplained" portion of the director's cash compensation. Using the same methodology as Core does not alter our results significantly,[25] however, so that the difference must lie elsewhere. Another possible reason for the difference may come from the fact that he uses the total board compensation whereas we use the average *per member* compensation. Again, using Core approach in our study does not alter the results significantly.[26] One last possibility is that our data set allows us to use panel data estimation techniques, which may pick up some time and firm fixed effects

[25] Result not shown.
[26] Result not shown.

that generated artificial noise in Core (1997).

Given that D&O insurance is generally said to attract better risk averse directors unto the corporation's board, we were surprised to find no support for the risk aversion hypothesis. We see two possible reasons for this result. First, it is possible that the variables we use are not good proxies for managerial risk aversion. A second reason is that D&O insurance is not used to reduce the risk averse directors' risk exposure since better mechanisms are available to reduce it. One such mechanism is the use of limited liability plans for corporate boards. By adopting an LLP, a corporation tells potential directors that their personal wealth is not too much at risk in the event of a lawsuit brought unto them as representatives of the corporation. The LLPs typically state that outside directors cannot lose more than some relatively small amount in the event of a lawsuit. As a result, LLPs are better designed to alleviate outside director fears than D&O insurance.

Being in financial distress does not appear to be an important determinant of the demand for D&O insurance. Of all the measures we use, only the debt ratio had an impact that supported the hypothesis. Unfortunately, one other measure commonly used to proxy for the cost of financial distress, the size of the corporation, had the opposite impact. Moreover, the positive impact of the debt ratio on the demand for insurance also supports the shareholders' wealth hypothesis, which may drive the impact of the debt ratio. As a result, we find only weak support for the financial distress hypothesis.

Finally, it appears that directors signal their quality by accepting larger deductibles, just as the adverse selection literature predicts. The need to signal is proportional to the difficulty in assessing the agent's type. We measure this difficulty through a corporation's growth opportunities and the volatility of its stock return. We find that corporations with more growth opportunities and/or more volatile stock returns choose larger deductibles.

Of all the theories that underly the benefits to corporate risk management, an important one we did not control for is the convexity of the tax schedule. Graham and Smith (1999) and Graham and Rogers (2002) show that the tax incentive to hedge is important and may create value for the shareholders by reducing fluctuations in taxable earnings. Because D&O insurance has no impact on earnings, there is no intuitive or theoretical reason why the convexity of the tax schedule should have any impact on the demand for D&O insurance. As a consequence we did not include this variable in our analysis.

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7 Appendix: Tables

Table 5. Descriptive statistics for the initial 1407 observations.
Test of means between firms that purchased D&O insurance or not

	Insured			Uninsured		
Variable	Obs.	Mean	St.Dev.	Obs.	Mean	St.Dev.
Ln(Limit)	992	16.52	(1.01)	n/a		
Ln(Deductible)	992	11.16	(1.43)	n/a		
Longterm	992	1.67	(0.812)	n/a		
Cash	992	5.03	(9.74)	415	5.39	(15.59)
Option	966	0.051$^{\#}$	(0.810)	400	0.003	(0.016)
Stock	n/a					
Independent	992	5.47	(2.35)	415	5.31	(2.79)
LnMVE	980	5.07*	(1.85)	406	4.77	(1.91)
Bankruptcy	928	-6.76	(6.82)	393	-7.20	(10.18)
DebtRatio	980	0.400	(0.237)	406	0.417	(0.219)
ROA	992	0.013	(0.146)	415	0.023	(0.170)
Blockholder	987	5.65	(13.34)	414	6.58	(14.97)
Growth	980	12.33*	(148.2)	406	2.67	(8.56)
Volatility	935	0.512	(0.306)	394	0.531	(0.367)
CEOPower	992	0.130	(0.211)	415	0.140	(0.231)
InWealth	980	150	(1168)	406	177	(1215)
USListed	992	0.128*	(0.334)	415	0.082	(0.275)
Acquiror	n/a					
Divestor	n/a					

The variables *Acquiror*, *Divestor* and *Stock* are not calculated because they rely on lagged values. By definition the limit and the deductible are not listed for corporations that did not report to have D&O insurance. The * ($^{\#}$) represents variables whose mean is statistically different at the 5% (10%) level between firms that purchased D&O insurance and firms that did not. Obs. is the number of observations, and St.Dev. is the standard deviation.

Table 6.

Descriptive statistics for the 1074 usable observations by insurance purchasing or not.

	Insured			Uninsured		
Variable	Obs.	Mean	St.Dev.	Obs.	Mean	St.Dev.
Ln(Limit)	770	16.61	(1.00)	n/a		
Ln(Deductible)	770	11.20	(1.45)	n/a		
Longterm	770	1.86	(0.83)	n/a		
Cash	770	5.57	(10.24)	304	5.79	(14.91)
Option	756	0.064#	(0.915)	301	0.004	(0.018)
Stock	764	4.29	(51.98)	304	3.19	(25.32)
Independent	770	5.50	(2.38)	304	5.37	(2.81)
LnMVE	764	5.16*	(1.87)	304	4.82	(1.94)
Bankruptcy	730	-6.60	(6.57)	301	-6.63	(6.38)
DebtRatio	764	0.402*	(0.237)	304	0.438	(0.217)
ROA	770	0.013	(0.145)	304	0.021	(0.183)
Blockholder	766	5.50	(13.10)	303	5.70	(13.43)
Growth	764	13.16#	(158)	304	2.12	(4.09)
Volatility	735	0.506	(0.285)	301	0.530	(0.348)
CEOPower	770	0.122	(0.206)	304	0.137	(0.233)
InWealth	764	169	(1301)	304	161	(1156)
USListed	770	0.151*	(0.358)	304	0.095	(0.294)
Acquiror	770	1.58*	(2.59)	304	1.14	(2.27)
Divestor	770	0.189	(0.908)	304	0.153	(0.867)

Because of the lagged variable used in the analysis, the number of observations has decreased from 1407 to 1074. By definition the limit and the deductible are not listed for corporations that did not report to have D&O insurance. The * (#) represents variables whose mean is statistically different at the 5% (10%) level between firms that purchased D&O insurance and firms that did not. Obs. is the number of observations, and St.Dev. is the standard deviation.

Table 7. The Determinants of Policy Limit and Deductible Amounts
Ordinary Least Square Regressions with Firm and Year Fixed Effects

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev.
Cash (1000)	Package	-	+	-8.403**	(2.660)	-1.358	(5.113)
	Entrenchment	+	-				
Option	Package	-	+	-0.017	(0.013)	-0.030	(0.025)
	Aversion	-	+				
	Entrenchment	+	-				
Stock (1000)	Package	-	+	0.190	(0.603)	0.064	(1.159)
	Aversion	+	-				
	Entrenchment	+	-				
Independent (%)	Aversion	+	-	0.633	(1.210)	1.292	(2.327)
lnMVE	Distress	-	+	0.108**	(0.033)	0.024	(0.063)
	Shareholder	+	-				
Bankruptcy (%)	Distress	+	-	-0.003	(0.243)	-0.728	(0.467)
DebtRatio	Distress	+	-	0.386**	(0.149)	0.388	(0.287)
	Monitor	-	+				
	Shareholder	+	-				
ROA	Distress	-	+	-0.144	(0.131)	-0.068	(0.252)
Blockholder (%)	Monitor	-	+	-0.523**	(0.187)	-0.251	(0.360)
Growth (%)	Signalling	-	+	0.022	(0.072)	0.399**	(0.139)
Volatility	Signalling	-	+	0.045	(0.065)	0.240#	(0.125)
CEOPower	Entrenchment	+	-	0.046	(0.180)	0.350	(0.347)
InWealth (1000)	Entrenchment	+	-	-0.057	(0.084)	-0.464**	(0.161)
USListed	Litigation	+	+	0.081	(0.058)	0.225**	(0.109)
Acquiror (%)	Litigation	+	+	-0.807	(0.515)	0.312	(0.990)
Divestor (%)	Litigation	+	+	1.428	(1.271)	0.054	(2.444)
LongTerm		-	-	-0.177**	(0.017)	-0.048	(0.033)
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2			0.959		0.928	

The dependent variables are the log of the policy limit and the log of the deductible respectively. Ordinary least square regression using time and firm fixed effects. The hypothesis or hypotheses that each independent variable wants to test is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is the predicted impact on the deductible. The ** represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses. N=696.

Table 8A. The Determinants of Policy Limit and Deductible Amounts
Restricted Model OLS Regression with Firm and Year Fixed Effects

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev
Cash (1000)	Package Entrenchment	- +	+ -	-7.252**	(2.545)		
lnMVE	Distress Shareholder	- +	+ -	0.077**	(0.030)		
DebtRatio	Distress Monitor Shareholder	+ - +	- + -	0.377**	(0.147)		
Blockholder (%)	Monitor	-	+	-0.671**	(0.185)		
Growth (%)	Signalling	-	+			0.314**	(0.115)
Volatility	Signalling	-	+			0.181#	(0.105)
InWealth (1000)	Entrenchment	+	-			-0.375**	(0.129)
USListed	Litigation	+	+			0.231*	(0.104)
LongTerm		-	-	-0.186**	(0.017)		
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2 Obs.			0.954 733		0.925 704	

The dependent variables are the log of the policy limit and the log of the deductible respectively. OLS regression for limit and deductible using time and firm fixed effects. Number of determinants restricted. The hypothesis or the hypotheses that each independent variable tests is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is on the deductible. The **represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses.

Table 8B. The Determinants of Policy Limit and Deductible Amounts
Restricted Model OLS Regression with Firm and Year Fixed Effects

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev
Cash (1000)	Package	-	+	-5.661**	(2.237)		
	Entrenchment	+	-				
lnMVE	Distress	-	+	0.075**	(0.028)		
	Shareholder	+	-				
DebtRatio	Distress	+	-	0.439**	(0.141)		
	Monitor	-	+				
	Shareholder	+	-				
Blockholder (%)	Monitor	-	+	-0.562**	(0.167)		
Growth (%)	Signalling	-	+			0.296**	(0.105)
Volatility	Signalling	-	+			0.146	(0.093)
InWealth (1000)	Entrenchment	+	-			-0.333**	(0.109)
USListed	Litigation	+	+			0.356**	(0.100)
LongTerm		-	-	-0.170**	(0.018)		
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2			0.936		0.911	
	Obs.			884		843	

The dependent variables are the log of the policy limit and the log of the deductible respectively. OLS regression for limit and deductible using time and firm fixed effects. Number of determinants restricted. The hypothesis or the hypotheses that each independent variable tests is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is on the deductible. The **represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses.

Table 9A. The Determinants of Policy Limit and Deductible Amounts
OLS Regressions using Firm and Year Fixed Effects. Policy Limit is Chosen First, then Deductible.

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev.
Cash (1000)	Package	-	+	-8.403**	(2.660)	-0.154	(1.158)
	Entrenchment	+	-				
Option	Package	-	+	-0.017	(0.013)	-0.028	(0.025)
	Aversion	-	+				
	Entrenchment	+	-				
Stock (1000)	Package	-	+	0.190	(0.603)	0.037	(1.158)
	Aversion	+	-				
	Entrenchment	+	-				
Independent (%)	Aversion	+	-	0.633	(1.210)	1.204	(2.324)
lnMVE	Distress	-	+	0.108**	(0.033)	0.008	(0.063)
	Shareholder	+	-				
Bankruptcy (%)	Distress	+	-	-0.003	(0.243)	-0.728	(0.467)
DebtRatio	Distress	+	-	0.386**	(0.149)	0.333	(0.288)
	Monitor	-	+				
	Shareholder	+	-				
ROA	Distress	-	+	-0.144	(0.131)	-0.047	(0.252)
Blockholder (%)	Monitor	-	+	-0.523**	(0.187)	-0.176	(0.362)
Growth (%)	Signalling	-	+	0.022	(0.072)	0.396**	(0.138)
Volatility	Signalling	-	+	0.045	(0.065)	0.234#	(0.125)
CEOPower	Entrenchment	+	-	0.046	(0.180)	0.344	(0.346)
InWealth (1000)	Entrenchment	+	-	-0.057	(0.084)	-0.456**	(0.161)
USListed	Litigation	+	+	0.081	(0.058)	0.214#	(0.109)
Acquiror (%)	Litigation	+	+	-0.807	(0.515)	0.428	(0.991)
Divestor (%)	Litigation	+	+	1.428	(1.271)	-0.335	(2.443)
LongTerm		-	-	-0.177**	(0.017)	-0.022	(0.036)
Limit						0.143	(0.089)
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2			0.959		0.928	

The dependent variables are the log of the policy limit and the log of the deductible respectively. Two-stage regression using instrumental variables for limit and deductible, and time and firm fixed effects. The instrument for limit (deductible) is the previous period's limit (deductible). The correlation matrix between these four variables is found in section 4.2.2. The hypothesis or the hypotheses that each independent variable tests is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is on the deductible. The ** represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses. N=696.

Table 9B. The Determinants of Policy Limit and Deductible Amounts
Restricted Model: Instrumental Variables, Two-Stage Regression with Firm and Year Fixed Effects

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev
Cash (1000)	Package Entrenchment	- +	+ -	-8.130**	(2.446)		
lnMVE	Distress Shareholder	- +	+ -	0.081**	(0.028)		
DebtRatio	Distress Monitor Shareholder	+ - +	- + -	0.286*	(0.151)		
Blockholder (%)	Monitor	-	+	-0.454*	(0.192)		
Growth (%)	Signalling	-	+			0.325**	(0.115)
Volatility	Signalling	-	+			0.176#	(0.105)
InWealth (1000)	Entrenchment	+	-			-0.380**	(0.129)
USListed	Litigation	+	+			0.196#	(0.105)
LongTerm		-	-	-0.169**	(0.018)		
Predicted (Limit)						0.318*	(0.155)
Predicted (Deduct)				0.221#	(0.131)		
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2			0.957		0.926	

The dependent variables are the log of the policy limit and the log of the deductible respectively. Two-stage regression using instrumental variables for limit and deductible, and time and firm fixed effects. Number of determinants restricted. The hypothesis or the hypotheses that each independent variable tests is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is on the deductible. The ** represents a coefficient that is significant at the 1% level * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses. N=700.

Table 9C. The Determinants of Policy Limit and Deductible Amounts
Instrumental Variable, Two-Stage Regression with Firm and Year Fixed Effects; No Lagged Variable

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev
Cash (1000)	Package Entrenchment	- +	+ -	-5.808**	(2.211)		
lnMVE	Distress Shareholder	- +	+ -	0.077**	(0.028)		
DebtRatio	Distress Monitor Shareholder	+ - +	- + -	0.474**	(0.147)		
Blockholder (%)	Monitor	-	+	-0.415*	(0.169)		
Growth (%)	Signalling	-	+			0.317**	(0.106)
Volatility	Signalling	-	+			0.150	(0.093)
InWealth (1000)	Entrenchment	+	-			-0.350**	(0.109)
USListed	Litigation	+	+			0.323**	(0.101)
LongTerm		-	-	-0.161**	(0.018)		
Predicted (Limit)						0.324*	(0.158)
Predicted (Deduct)				0.043	(0.118)		
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	R^2			0.943		0.912	

The dependent variables are the log of the policy limit and the log of the deductible respectively. Two-stage regression using instrumental variables for limit and deductible, and time and firm fixed effects. The hypothesis or the hypotheses that each independent variable tests is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is on the deductible. The ** represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses. The number of observations is larger because lagged observations are no longer deleted. N=839.

Table 10. The Determinants of Policy Limit and Deductible Amounts
Ordered Probit Analysis with Firm and Year Fixed Effects

		Pred. sign		Policy Limit		Deductible	
Variable	Hypothesis	Lim.	Ded.	Coeff.	St.Dev.	Coeff.	St.Dev.
Cash	Package	-	+	-0.046**	(0.012)	-0.000	(0.013)
	Entrenchment	+	-				
Option	Package	-	+	-0.086	(0.081)	-0.085	(0.061)
	Aversion	-	+				
	Entrenchment	+	-				
Stock	Package	-	+	0.000	(0.003)	-0.000	(0.003)
	Aversion	+	-				
	Entrenchment	+	-				
Independent	Aversion	+	-	0.025	(0.057)	0.047	(0.056)
lnMVE	Distress	-	+	0.618**	(0.149)	0.151	(0.153)
	Shareholder	+	-				
Bankruptcy (%)	Distress	+	-	0.002	(0.011)	-0.019#	(0.012)
DebtRatio	Distress	+	-	2.041**	(0.698)	1.266#	(0.702)
	Monitor	-	+				
	Shareholder	+	-				
ROA	Distress	-	+	-0.948	(0.662)	0.060	(0.614)
Blockholder	Monitor	-	+	-0.028**	(0.009)	-0.008	(0.009)
Growth	Signalling	-	+	0.001	(0.003)	0.011**	(0.003)
Volatility	Signalling	-	+	0.437	(0.313)	0.445**	(0.300)
CEOPower	Entrenchment	+	-	0.179	(0.875)	1.416#	(0.811)
InWealth (1000)	Entrenchment	+	-	0.002	(0.004)	-0.013**	(0.004)
USListed	Litigation	+	+	0.291	(0.264)	0.679**	(0.263)
Acquiror (%)	Litigation	+	+	-0.048*	(0.019)	0.004	(0.024)
Divestor (%)	Litigation	+	+	0.071	(0.058)	0.004	(0.058)
LongTerm		-	-	-0.890**	(0.083)	-0.130	(0.082)
FIRM Fixed Effect				Included		Included	
TIME Fixed Effect				Included		Included	
	LL			-1100		-1054	

The dependent variables are the log of the policy limit and the log of the deductible respectively. Ordered Probit regression using time and firm fixed effects. The hypothesis or hypotheses that each independent variable wants to test is presented in the second column. Also, the second column gives the predicted sign of each coefficient on the dependent variable; the first sign is the predicted impact on the policy limit and the second sign is the predicted impact on the deductible. The ** represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses. N=696.

Table 11.
The Determinants of the Policy Limit and the Deductible Amounts
OLS Regression with Firm and Year Fixed Effects (see Table 7).
In Model 11.1, the deductible is set to 1 $ when the deductible is missing;
In Model 11.2, the observation is deleted when the deductible is missing.

	Model 11.1				Model 11.2			
	Limit		Deductible		Limit		Deductible	
Variable	Coeff.	St.Dev.	Coeff.	St.Dev.	Coeff.	St.Dev.	Coeff.	St.Dev.
Cash (000)	-8.404**	(2.660)	-6.452	(13.06)	-4.856#	(2.866)	-1.180	(4.583)
Option	-0.017	(0.013)	-0.022	(0.064)	-0.016	(0.013)	-0.031	(0.021)
Stock (000)	0.192	(0.602)	-0.338	(2.962)	-0.101	(0.611)	0.435	(0.977)
Independent (%)	0.618	(1.210)	7.941	(5.946)	-0.235	(1.253)	-1.332	(2.004)
LnMVE	0.108**	(0.033)	-0.012	(0.160)	0.117**	(0.035)	-0.067	(0.055)
Bankruptcy (%)	-0.003	(0.243)	-1.344	(1.194)	0.005	(0.244)	-0.491	(0.390)
DebtRatio	0.386**	(0.149)	1.488	(0.731)	0.324*	(0.161)	-0.214	(0.257)
ROA	-0.144	(0.131)	0.312	(0.643)	-0.176	(0.137)	-0.223	(0.220)
Blockholder (%)	-0.523*	(0.187)	0.234	(0.919)	-0.591**	(0.190)	0.482	(0.303)
Growth (%)	0.022	(0.072)	1.058**	(0.350)	0.029	(0.080)	0.002	(0.128)
Volatility	0.042	(0.065)	0.004	(0.320)	0.029	(0.067)	0.300**	(0.107)
CEOPower	0.046	(0.180)	1.031	(0.886)	0.061	(0.196)	-0.121	(0.313)
InWealth (1000)	-0.057	(0.085)	-1.220**	(0.412)	-0.044	(0.093)	0.020	(0.149)
USListed	0.081	(0.057)	-0.016	(0.279)	0.084	(0.059)	0.277**	(0.095)
Acquiror	-0.008	(0.005)	-0.004	(0.025)	-0.007	(0.005)	0.001	(0.009)
Divestor	0.014	(0.013)	-0.020	(0.062)	0.018	(0.013)	0.005	(0.021)
Longterm	-0.177**	(0.017)	0.052	(0.084)	-0.171**	(0.018)	-0.093**	(0.029)
FIRM F.E.	Included		Included		Included		Included	
TIME F.E.	Included		Included		Included		Included	
R^2	0.959		0.940		0.961		0.942	
n	696				602			

The dependent variables are the log of the policy limit and the log of the deductible respectively. OLS regressions using time and firm fixed effects. The ** represents a coefficient that is significant at the 1% level, * significant at the 5% level and # at the 10% level. Some coefficients have been scaled for presentation purposes. Standard errors are in parentheses.