Directors' and Officers' Liability Insurance and the Cost of Equity[☆]

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ABSTRACT

We examine whether directors' and officers' (D&O) liability insurance affects a firm's cost of equity. We find a positive association between D&O insurance and the cost of equity. Information quality and risk-taking appear to be two underlying channels through which D&O insurance affects the cost of equity. Further tests suggest that this positive association is not due to optimal risk-taking, as evidenced by a negative market reaction to an increase in D&O insurance coverage, a lack of improvement in firms' cash flow and a low valuation associated with D&O insurance. Overall, our evidence is consistent with the notion that D&O insurance weakens the disciplining effect of shareholder litigation, leading to an increase in the cost of equity.

Keywords: *legal liabilities, directors' and officers' (D&O) insurance; cost of equity; investor protection*

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1. Introduction

Private enforcement via shareholder litigation is important to investor protection and stock market development (La Porta et al., 2006). Prior literature suggests that cross-country variation in shareholder litigation threat affects the cost of equity (Hail and Leuz, 2009; Khurana and Raman, 2004). However, there is relatively scant evidence on how firm-level mechanisms affect the disciplining role of shareholder litigation and therefore the cost of equity. This research question is important as the cost of equity is a summary measure of how investors perceive the risk and return tradeoff of investing in a firm (Francis et al., 2004). In addition, the cost of equity plays a key role in corporate financing and capital budgeting decisions. In this study, we examine how directors' and officers' liability insurance (D&O insurance) affects a firm's cost of equity.

D&O insurance is a policy purchased by a firm to cover defense cost and potential damage award when its directors and officers (D&Os) are sued. By effectively shielding D&Os from bearing personal financial liabilities, D&O insurance reduces the disciplining effect of shareholder litigation (Baker and Griffith, 2010). We hypothesize that D&O insurance increases a firm's cost of equity via two important channels. First, as shareholder litigation encourages managers to increase transparency (Ball, 2001), D&O insurance can result in poor financial reporting and disclosure quality, leading to a higher cost of equity (Leuz and Wysocki, 2008). Second, as D&O insurance limits the expected legal liabilities associated with bad outcomes of D&O decisions, it encourages risk-taking (Baker and Griffith, 2010; Core, 1997). To the extent that risk-taking results in a higher exposure to market risks, the cost of equity is higher.

Using a large manually collected dataset on D&O insurance from Canada, we find that D&O insurance coverage is positively associated with the ex ante cost of equity implied in stock prices and analyst forecasts. This association is robust to firm fixed effects regression and alternative cost of equity measures. It is also economically significant. Based on our

baseline model, an increase in D&O insurance coverage by one standard deviation is associated with an increase in the cost of equity of about 7% of the sample mean.

The positive association between D&O insurance and the cost of equity can be driven by endogeneity as D&O insurance purchase is a firm's choice. It can be the case that high risks lead to both high D&O insurance coverage and a high cost of equity. We conduct extensive tests to mitigate this concern. First, we control for economic determinants of liability coverage and corporate governance quality (Chen et al., 2011; Core 1997, 2000). We continue to find a positive association between D&O insurance and the cost of equity. Second, we conduct a lead-lag change analysis. If it is risk, which is already known by investors and manifested in the cost of equity, determines a firm's decision to purchase D&O insurance, then a change in the cost of equity should precede a change in D&O insurance. In contrast, our hypothesis predicts that a change in the cost of equity follows a change in D&O insurance coverage. We find that a change in the cost of equity follows, but not precedes, a change in D&O insurance coverage.

Next, we examine the market reaction to the release of proxy circulars that contain D&O insurance information. A short-term market event study is less likely to suffer from the omitted correlated variable bias. If investors charge a high cost of equity for firms with a high level of D&O insurance coverage, then they would react negatively to the disclosure of an increase in D&O insurance. Our finding is consistent with this prediction.

It is also possible that the D&O insurance purchase decision is based on D&Os' private information that is learnt by investors subsequently (the risk anticipation argument).[1] If this is the case, we can still observe that a change in the cost of equity follows, but not precedes, a change in D&O insurance coverage. In addition, the disclosure of an increase in D&O insurance can reveal D&O's private information on an increase in risk and therefore lead to a negative market reaction. While the risk anticipation argument and our hypothesis

[1] We thank an anonymous reviewer for suggesting this possibility.

are not mutually exclusive as a change in D&O insurance can reveal both D&Os' private information and an expected change in D&Os' behavior, empirically distinguishing them is difficult as D&Os' private information is not directly observable. Nevertheless, we conduct several tests to address this concern. First, we control for an ex ante measure of litigation risk developed by Kim and Skinner (2012) and continue to find a positive association between D&O insurance and the cost of equity. Second, we test a cross-sectional prediction of the risk anticipation argument. If the association between D&O insurance and the cost of equity is driven by D&Os' private information, then it should be more pronounced when D&Os have more private information. Following Chen et al. (2007), we develop proxies for D&Os' private information based on earnings surprises and CEOs' insider trading activities. We do not find a more pronounced association between D&O insurance and the cost of equity for firms with D&Os having more private information.

Ideally, to clearly distinguish the risk anticipation argument from our hypothesis, one needs to identify a change in D&O insurance not driven by D&Os' private information. However, we are not aware of decent instrumental variables that are capable of providing such identification. As an alternative, we conduct a test of the effect of an exogenous reduction in D&Os' personal legal liabilities on the cost of equity. Nevada swiftly changed its corporate law in 2001 in order to attract more firm incorporations. Before the change, Nevada's corporate law imposed similar fiduciary duties on D&Os as those under the Delaware corporate law. After the law change, D&Os are only liable if their behaviors involve both a breach of the duty of loyalty and an intentional fraud (or a knowing violation of the law). This implies that D&Os are no longer liable for a breach of the duty of care (Barzuza, 2012). We argue that this law change has a similar effect on reducing D&Os' personal legal liabilities as an increase in D&O insurance coverage. As the legislation process was very short, it is unlikely that firms could anticipate the law change and quickly reincorporate into Nevada. Thus, this change in D&Os' legal liabilities is exogenous.

Using a difference-in-differences analysis, we find that the change in the cost of equity after this law change is significantly higher for Nevada-incorporated firms than that for a sample of non-Nevada-incorporated firms matched on industry, firm size, and the average cost of equity before the law change. We observe a similar result when focusing on Nevada-incorporated firms that mainly operate outside Nevada. Thus, this result cannot be attributed to changes in macroeconomic conditions in Nevada that coincided with the law change. Taken together, although it is difficult to completely rule out the risk anticipation argument, the positive association between D&O insurance and the cost of equity does not appear to be entirely driven by D&Os' private information.

Finally, we conduct several tests to better understand the channels through which D&O insurance increases the cost of equity. We find that D&O insurance is positively associated with the absolute value of performance-adjusted discretionary accruals (Kothari et al., 2005), bid-ask spread, Amihud's (2002) illiquidity measure, analysts' earnings forecast error, and the dispersion of analysts' earnings forecasts. This result is consistent with D&O insurance reducing financial reporting and disclosure quality, increasing stock illiquidity and investors' estimation risk. We also find that D&O insurance is positively associated with the exposure to market risk, consistent with D&O insurance leading to more risk-taking.

It is possible that firms purchase D&O insurance to optimally motivate D&Os to take more risks that benefit shareholders. If this is the case, D&O insurance can be positively associated with the cost of equity while at the same time be positively associated with future operating performance. We do not find a significantly positive association between D&O insurance and future operating performance measured by industry-adjusted return on assets. The association, if any, is negative. These results, combined with a negative market reaction to the announcement of an increase in D&O insurance, suggest that a high risk

associated with high D&O insurance coverage is more likely due to D&Os' reduced vigilance or diligence than due to their optimal risk-taking activities which benefit shareholders.[2]

We make two important contributions to the literature. First, prior studies show that country-level variation in private enforcement via shareholder litigation plays a pivotal role in determining a firm's cost of equity (Hail and Leuz, 2009; Khurana and Raman, 2004). We show that even in common-law countries with stronger legal protection of investors, D&O insurance, a firm-level mechanism that reduces the deterrence effect of private litigation, increases the cost of equity. This evidence suggests that investors factor D&O insurance information in their investment decisions. Since D&O insurance is widespread in North America and many other countries, our results have an important policy implication that supports mandating the disclosure of D&O insurance (Baker and Griffith, 2010). In addition, as D&O insurance weakens the disciplining role of shareholder litigation, we add to the research linking corporate governance with a firm's cost of equity (Ashbaugh-Skaife et al., 2005; Chen et al., 2011).

Second, we contribute to the research on the consequences of D&O insurance. While prior studies have examined the economic determinants of D&O insurance purchases (Boyer, 2005; Chalmers et al., 2002; Core, 1997; O'Sullivan, 1997; Zou et al., 2008) and the effect of D&O insurance on accounting restatements (Kim, 2006), reporting conservatism (Chung and Wynn, 2008), management forecasts (Wynn, 2008), investment decisions (Lin et al., 2011) and loan financing (Lin et al., 2013), we document how D&O insurance affects the cost

[2] This point is echoed by Warren Buffet, Chairman of Berkshire Hathaway. For example, in a shareholder meeting in 2003, he said: "People would behave a lot better if D&O insurance were scrapped altogether." ("Costs of covering the board are at a premium", by Andrew Hill, Financial Times, May 6, 2003). This was not the only time he criticized D&O insurance. In his annual letter to shareholders in 2010, he emphasized the importance of director behaviors as a key factor behind a firm's long-term stellar performance: "We do not provide them directors and officers liability insurance, a given at almost every other large public company. If they mess up with your money, they will lose their money as well." Interestingly, Berkshire Hathaway is one of the most important players in the insurance market writing substantial D&O insurance through its insurance subsidiaries like General Reinsurance (Gen Re).

of equity. Our evidence, together with these prior studies and anecdotal criticisms (e.g., of Warren Buffett), point to a cost of D&O insurance.

The rest of the paper proceeds as follows. Section 2 discusses background of D&O insurance and develops our hypothesis. Section 3 describes data and research design. Section 4 presents main empirical results. Section 5 conducts robustness tests dealing with the potential endogeneity of D&O insurance. Section 6 provides evidence on channels through which D&O insurance affects the cost of equity. Section 7 concludes.

2. Institutional background and hypothesis development

2.1. Institutional background

Shareholders in Canada can sue firms and their D&Os for misrepresentations in securities issuance (primary market liability suits) and in continuous disclosures that do not involve securities issuance (secondary market liability suits). In addition, shareholders can sue D&Os for a breach of fiduciary duties (derivative suits as the potential recovery goes to the firm rather than to the plaintiff). An important way to protect D&Os from bearing personal financial liabilities is to purchase D&O insurance.

D&O insurance is a policy protecting D&Os collectively against allegations of "wrongdoings", including a breach of fiduciary duties and violation of the securities law. The policy is primarily intended to protect D&Os, but at the firm's cost. It contains personal coverage (Category A coverage) and corporate indemnity coverage (Category B coverage) (Baker and Griffith, 2010). Category A coverage provides direct payment to D&Os when a firm is unable to indemnify them due to legal reasons (in a shareholder derivative suit), financial distress, or when a firm chooses not to indemnify them. Category B coverage enables a firm to recoup the cost it incurs in indemnifying D&Os. Neither Category A nor Category B coverage protects a firm from legal liabilities when it is sued. However, a firm can add entity coverage (Category C coverage) to cover its own legal cost.

We argue that D&O insurance influences D&Os' behaviors even though the federal Canada Business Corporation Act (CBCA) allows a firm to indemnify D&Os' legal cost via its bylaws or charters. First, D&Os believe that D&O insurance is indispensable. A survey carried out in 2007 finds that 87% of the 356 directors surveyed rank the availability of comprehensive D&O insurance coverage as an important condition before agreeing to join a board despite the law's permission of corporate indemnification.[3]

Second, the award of corporate indemnification has three restrictions: (1) D&Os acting in good faith, (2) firms remaining solvent, and (3) covering only defense cost subject to court approval, but not settlement or damage award in derivative suits.[4] While a firm seldom refuses to indemnify its D&Os and corporate defaults are rare, these restrictions nevertheless create uncertainties to risk-averse D&Os. In contrast, D&O insurance is less restrictive and has considerably narrower exclusions that are typically deliberate frauds or illegal profits. Moreover, the narrow exclusions of D&O insurance are rarely applied. The prevalent practice is that as long as defending D&Os do not confess dishonesty, D&O insurers pay the claim (Baker and Griffith, 2010). Therefore, compared with corporate indemnification, D&O insurance represents less restrictive and more certain coverage. This is why the possibility of corporate indemnification via by-laws does not reduce the demand for D&O insurance.

Our check of a random sample of corporate filings indicates that firms invariably allow corporate indemnification of D&Os. However, we find no quantitative disclosure on the extent of such indemnification. Therefore, controlling for a binary proxy for corporate indemnification in our analysis is not meaningful while controlling for a continuous proxy for indemnification is not practical. However, the presence of corporate indemnification is

[3] "The Directors & Boards Survey: D&O Insurance" in *Boardroom Briefing*, Volume 4, No. 1.

[4] The business judgment rule sets a higher hurdle for shareholders to win a derivative suit alleging D&Os' violation of the duty of care than a securities lawsuit. Nevertheless, derivative suits (particularly those that allege the violation of the duty of loyalty) do constitute a source of liability.

unlikely to materially alter our inference on the effect of D&O insurance due to two reasons: 1) our result regarding the association between D&O insurance and the cost of equity is robust to firm fixed effects estimation and a change regression model. To the extent that firms' indemnification policy is stable, the effect of the time-invariant element of corporate indemnification should be captured by firm fixed effects. 2) The time-variant element of corporate indemnification can be picked up by proxies for firms' financial conditions such as size, leverage, credit rating and cash holdings (Chung and Wynn, 2008).

2.2. Hypothesis development

We argue that there are at least two channels through which D&O insurance increases the cost of equity. First, D&O insurance weakens the disciplining effect of shareholder litigation by decreasing D&Os' personal legal liabilities. A reduction in legal liabilities can lower the quality of financial reporting and disclosure, resulting in a poorer information environment. Second, a reduction in legal liabilities can lead to more risk-taking by D&Os.

2.2.1. D&O insurance, reporting/disclosure quality and the cost of equity

Litigation against D&Os for inadequate and untimely disclosures can encourage D&Os to improve transparency to reduce potential legal liabilities (Ball, 2001; Healy and Palepu, 2001). Timely and accurate disclosures reduce legal liabilities by mitigating plaintiffs' allegation that D&Os hide the truth, thereby reducing the amount of damage award (Skinner, 1994, 1997). Consistent with this notion, Khurana et al. (2006) show that private litigation threat is positively associated with earnings quality as measured by the predictability of earnings for future operating cash flows. By reducing the expected financial liabilities in a lawsuit, D&O insurance can lower D&Os' care and vigilance in financial reporting and disclosure, resulting in errors, omissions, or even frauds (Baker and Griffith, 2010). Prior studies find that firms with high D&O insurance coverage report less

conservative earnings (Chung and Wynn, 2008), provide fewer bad news management forecasts (Wynn, 2008), and are more likely to have accounting restatements (Kim, 2006). Thus, a high level of D&O insurance coverage may result in deterioration in financial reporting and disclosure quality.

Financial reporting and disclosure can affect the cost of equity through affecting stock liquidity and estimation risk (Leuz and Wysocki, 2008). Diamond and Verrecchia (1991) suggest that poor disclosure increases the cost of capital by exacerbating information asymmetry among investors. A stock becomes illiquid because uninformed investors (market makers) reduce their trading volume and increase bid-ask spread in order to limit potential losses from trading with informed investors. Such illiquidity increases investors' trading cost. In equilibrium, investors require compensation for expected trading cost by increasing the required return. Low quality disclosure thus leads to a high cost of capital.

Lambert et al. (2007) extend the literature on estimation risk (e.g., Coles et al., 1995) and directly examine the effect of accounting information on the cost of capital within a CAPM framework. They show that the cost of equity increases with the estimated covariance between its cash flow and the cash flow of all other firms in the market, and that this effect cannot be diversified. The estimated covariance of cash flows between two firms decreases with the precision of information about any of the two firms' cash flows as information about one firm's cash flow implicitly provides information about the other firm's cash flow. This information removes a source of common variation between the two firms' cash flows and hence reduces the estimated covariance of the cash flows. Low quality disclosure increases the estimated covariance of cash flows and consequently inflates the cost of equity.

Consistent with these theories, Welker (1995) finds a negative association between a firm's voluntary disclosure quality and the bid-ask spread of its stock. Lang and Lundholm (1996) show that better disclosure is associated with higher accuracy and lower dispersion of

analysts' earnings forecasts. Others find that a lower cost of equity is associated with more disclosures (Botosan, 1997) and higher quality financial reporting (Francis et al., 2004).

Existing evidence also shows that a stronger shareholder litigation environment is associated with a lower cost of equity. Hail and Leuz (2009) report that listing in a US exchange reduces the cost of equity as cross-listing exposes foreign firms to stronger shareholder litigation discipline. Khurana and Raman (2004) document that Big-4 auditors help lower the cost of equity in the US but not in Australia, Canada, and the UK, which have a similar economic structure but a less litigious environment.

In sum, D&O insurance coverage may lead to deterioration in financial reporting and disclosure quality that increases information asymmetry and non-diversifiable estimation risk, leading to a higher cost of equity.

2.2.2. D&O insurance, risk-taking and the cost of equity

D&Os are risk-averse because they cannot fully diversify risks specific to their claims in a firm (Smith and Stulz, 1985) and risks associated with their human capital (Amihud and Lev, 1981). The possibility of bearing legal liabilities in shareholder litigations against bad outcomes of their decisions can make D&Os even more risk-averse (Core, 1997). Consistent with this view, there is evidence that the Sarbanes-Oxley Act reduces corporate risk-taking as it increases legal liabilities of D&Os (Bargeron et al., 2010). D&O insurance effectively limits D&Os' legal liabilities in lawsuits against bad outcomes of their business decisions. Thus, with the protection offered by D&O insurance, D&Os are encouraged to invest in risky projects otherwise passed up (Core, 1997; Baker and Griffith, 2010).

Risk-taking induced by D&O insurance may or may not benefit shareholders. On the one hand, D&O insurance can encourage risk-taking activities based on prudent and informed decisions that are beneficial to shareholders (which we examine later in the paper). On the other hand, D&O insurance can provide D&Os incentives to breach the duty of care,

resulting in reduced vigilance, more recklessness or negligence in decision-making (Baker and Griffith, 2010). According to Eisenberg (1990), the duty of care requires D&Os to reasonably monitor the conduct of business, follow up on information that should raise concerns, adopt a reasonable decision-making process and make informed decisions. Breach of the duty of care can result in a failure in identifying, gathering information on, and assessing risks in business decisions that expose firms to risks harmful to shareholders (Bainbridge, 2009). Consistent with this notion, Bradley and Schipnai (1989) find a negative market reaction to the enactment of a Delaware legislation that permits firms to include in their articles of incorporation a provision that eliminates or limits directors' personal liabilities for a breach of the duty of care. They also find a negative market reaction when Delaware firms announce to adopt the provision limiting directors' legal liabilities.

Regardless of the nature of risk-taking, a likely outcome of D&O insurance is that it encourages D&Os to take risks. Acharya and Bisin (2009) argue that D&Os prefer increasing firms' exposure to the market risk than to the idiosyncratic risk as they can hedge the former by trading in financial markets on the market portfolio but cannot effectively hedge the latter. Thus, granting more risk-taking incentives (e.g., D&O insurance) to D&Os can encourage them to increase a firm's exposure to the market risk, resulting in a higher cost of equity. The above discussions lead to the following hypothesis:

Hypothesis: *The cost of equity increases in D&O insurance.*

We also note the possibility that the presence of D&O insurance can actually lower a firm's cost of equity via reducing its risk of financial distress.[5] Transferring liability risks to insurers who have a comparative advantage in managing liability risks can be an efficient risk management strategy (Mayers and Smith, 1982). Without D&O insurance coverage, a firm may have to resort to corporate resources to indemnify its D&Os for defense cost,

[5] In addition, if the presence of D&O insurance leads D&Os to make predictably bad decisions, a firm's risk and cost of equity can be lower. We thank an anonymous reviewer for suggesting this possibility.

settlement or damage award when they are sued. In addition, in many shareholder suits, firms are also named as a defendant together with D&Os. The absence of D&O insurance (Category C) exposes a firm to a significant financial risk. Therefore, D&O insurance can constitute an integral part of a firm's overall risk management strategy and help lower its default risk and thereby the cost of equity (Core, 1997; Hoyt and Khang, 2000; Zou and Adams, 2008). This possibility adds tension to our prediction and, if valid, makes it more difficult for us to find a positive association between D&O insurance and the cost of equity.

3. Research design

3.1. Data and sample selection

We use a sample of Canadian firms listed on the Toronto Stock Exchange (TSE) as Canada requires the disclosure of D&O insurance purchases. We manually collect D&O insurance information from annual proxy circular filings in the System for Electronic Document Analysis and Retrieval (SEDAR) database for TSE 300 firms for a 13-year period starting from 1996.[6] Available information about D&O insurance includes whether a firm has D&O insurance in a year and the associated personal and corporate coverage limits. Personal coverage and corporate indemnity coverage are typically equal. If the proxy circular for a firm-year is unavailable, we code the D&O insurance variable as missing.

We match our D&O insurance data with COMPUSTAT North America. We exclude financial institutions (SIC 6000-6999). We then merge the data with the I/B/E/S database to obtain analysts' earnings forecasts. This sample selection procedure results in about 2,000 firm-year observations used in our baseline regression. Samples used in other analyses are the intersections of the D&O insurance sample and other required variables.

3.2. Cost of equity estimates

[6] 1996 was the first year Canada required electronic filings of corporate disclosures.

We estimate the ex ante cost of equity implied in stock prices and analysts' earnings forecasts. Following Hail and Leuz (2009), we use the average (R_{AVG}) of the four cost of equity estimates by Claus and Thomas (2001) (R_{CT}), Gebhardt et al. (2001) (R_{GLS}), Ohlson and Juettner-Nauroth (2005) as implemented by Gode and Mohanram (2003) (R_{OJ}), and the modified PEG model by Easton (2004) (R_{MPEG}) as the main proxy. We also employ alternative estimates and results are robust.

3.3. Model specification

We estimate the following regression to investigate the association between D&O insurance and the cost of equity:

$$\begin{aligned} R_{AVG\,i,t+1} - R_{F,t+1} = \; & \delta_0 + \delta_1 DOICOV_{i,t} + \delta_2 UBETA_{i,t+1} + \delta_3 STD\_RESRET_{i,t+1} + \delta_4 \mathrm{Ln}MV_{i,t} \\ & + \delta_5 \mathrm{Ln}BM_{i,t} + \delta_6 LEV_{i,t} + \delta_7 \mathrm{Ln}RET12_{i,t+1} + \delta_8 FBIAS_{i,t+1} + \delta_9 FLTG_{i,t+1} \\ & + \delta_{10} XLIST_{i,t} + \delta_{11} CASH_{i,t} + \delta_{12} RATING_{i,t} + \delta_{13} MISS\_RATING_{i,t} \\ & + Industry\ and\ Year\ Indicators + \varepsilon_{i,t+1}, \end{aligned} \quad (1)$$

where R_{AVG} is the average of R_{GLS}, R_{CT}, R_{OJ} and R_{MPEG}. *DOICOV* is the D&O insurance coverage ratio. Following Chalmers et al. (2002) and Lin et al. (2011), we define *DOICOV* as the amount of personal coverage scaled by the average market value of equity of the year. If a firm does not purchase D&O insurance, *DOICOV* is zero.

We control for unlevered beta (*UBETA*), firm size (Ln*MV*), the book-to-market ratio (Ln*BM*), leverage (*LEV*), and the forecast of long-term earnings growth (*FLTG*) as these variables are correlated with the cost of equity (Botosan et al., 2011). We also control for idiosyncratic risk (*STD_RESRET*) as idiosyncratic volatility should matter under incomplete information (Merton, 1987). We include Ln*RET*12, the price run-up over a twelve-month period to control for analysts' sluggishness in processing information (Nekrasov and Ogneva, 2011) and *FBIAS*, the forecast bias of forthcoming annual earnings, to control for the effect of forecast optimism (Easton and Sommers, 2007). We expect negative coefficients on Ln*RET*12 and *FBIAS*. An indicator for cross-listing in the US (*XLIST*) is included to control for the potential effect of differences in legal protection and

disclosure commitment between Canada and the US on the cost of equity. Following Chung and Wynn (2008), we include a firm's cash holdings (*CASH*) to control for the capacity of corporate indemnification of D&Os' liabilities, though it is a crude measure (Wynn, 2008).

Firms with a high level of insolvency risk can have a high cost of equity and a high demand for D&O insurance. The effect of the insolvency risk is likely partially captured by leverage, prior stock return, cash, beta, and idiosyncratic risk. To further capture default risk, we control for a firm's credit rating (*RATING*). We convert letter S&P credit ratings into 22-point numeric ratings with a larger number representing a higher credit rating. *MISS_RATING* equals one if *RATING* is missing and zero otherwise. *RATING* is then set to zero if missing. Finally, we control for year and Fama and French 30 industry fixed effects. Detailed variable definitions are provided in the notes to Table 2.

4. Empirical results

4.1. Summary statistics

Panel A, Table 1 presents summary statistics for key variables. 70.9% of firm-year observations carry D&O insurance. The mean insurance coverage is 44.748 million Canadian dollars. The mean insurance coverage ratio (*DOICOV*) is 4.5% and its standard deviation is 7.6%, suggesting significant variation in the coverage ratio across firms. The mean of ($R_{AVG} - R_F$) is 7.392% and its standard deviation is 5.356%. Panel B compares summary statistics of ($R_{AVG} - R_F$) for low and high *DOICOV* groups classified by the sample median of *DOICOV*. The mean ($R_{AVG} - R_F$) for low coverage firms is 6.854% and it is 7.889% for high coverage firms. The difference is significant based on either a t-test (t = -4.473) or a Wilcoxon rank-sum test (z = -4.930), lending preliminary support for our hypothesis.[7]

[7] We also partition sample firms with D&O insurance into two groups based on the median *DOICOV* of these firms. Untabulated results show that firms in the high D&O insurance group have a significantly higher cost of equity than firms in the low D&O insurance group (t = -5.845; Wilcoxon rank sum z = -5.531).

4.2. Regression analysis

Table 2 reports regression results. Column (1) is based on an OLS regression, which serves as our baseline. Standard errors are adjusted for clustering at the firm level. We find that D&O insurance is significantly positively associated with the cost of equity (6.931, t = 3.755), supporting our hypothesis.[8] This effect is economically significant. A one-standard-deviation increase in *DOICOV* (0.076) is associated with a 53-basis-point increase (6.931×0.076) in the cost of equity, about 7% of the sample mean (7.392%).

Signs of control variables are consistent with theories and prior empirical findings. The cost of equity is positively associated with unlevered beta, idiosyncratic return volatility, book-to-market ratio, leverage and long-term growth rate, and is negatively associated with firm size, price run-ups and analysts' forecast bias. The cross-listing indicator, cash holdings, and credit rating have insignificant coefficients. To determine whether insolvency risk can spuriously cause the positive association between D&O insurance and the cost of equity, we drop firm-years with a leverage ratio over the 90th percentile of its distribution and continue to find a significantly positive coefficient on D&O insurance. Further, when we drop leverage from the model, *RATING* becomes negatively significant.

We also examine whether the positive association between D&O insurance and the cost of equity is sensitive to model specifications. The Fama-MacBeth (1973) regression (Column (2)) and the firm fixed effects regression (Column (3)) show that the association is not sensitive to model specifications. Overall, we find a statistically and economically significant positive association between D&O insurance and the cost of equity.

Finally, we check whether our baseline results are robust to alternative measures of the cost of equity. First, we use the four individual cost of equity estimates (R_{GLS}, R_{CT}, R_{OJ}, and R_{MPEG}) that are used in constructing R_{AVG}. Second, we follow Mohanram and Gode (2011) and estimate the cost of equity using analyst forecasts after removing predictable forecast

[8] Inference is the same if the standard errors are adjusted for clustering at both firm and year levels (t = 4.407).

errors. Finally, we follow Nekrasov and Ogneva (2011) and construct a measure of cost of equity estimated simultaneously with the perpetual growth rate. Results on *DOICOV* (untabulated) are qualitatively the same.

5. Endogeneity of D&O insurance coverage

As D&O insurance is a firm choice, findings in Table 2 can be driven by an endogeneity bias. Specifically, it is possible that some omitted correlated variables lead to both a high level of D&O insurance and a high cost of equity. This concern is partially addressed by the firm fixed effects regression to the extent that omitted variables are constant over time. In this section, we conduct additional analyses to mitigate this concern.

5.1. Controlling for determinants of liability coverage and corporate governance quality

Prior studies (e.g., Core, 1997, 2000; O'Sullivan, 1997) suggest that firms purchase D&O insurance at the request of outside directors in the hiring process, as an integral component of a risk management strategy to deal with litigation risk, or due to poor corporate governance. These determinants of D&O insurance are potentially correlated with the cost of equity (e.g., Ashbaugh-Skaife et al., 2005; Chen et al., 2011). Thus, we examine whether our baseline results are robust to further controlling for these determinants that are omitted from our baseline models.

More specifically, we add the following control variables to Equation (1): the proportion of outside directors, research and development scaled by sales, return on assets, an indicator for having M&As or divestitures in the previous year, an indicator for reporting the existence of lawsuits in the previous year, board size, CEO-chairman duality, and equity ownership of D&Os. We also include operating cash flow scaled by assets, volatility of operating cash flow, and capital expenditure scaled by assets as additional determinants of

cash holdings. Results are reported in Column (4) of Table 2. While sample size is reduced by about 25%, the coefficient on *DOICOV* is still positive and significant (t = 3.053).

5.2. Lead-lag change analysis

It is possible that riskier firms are more likely to have future lawsuits (Kim and Skinner, 2012) and thus are more likely to purchase D&O insurance in the current period. If the risk is known to investors, these firms should also have a higher cost of equity in the current period. When the cost of equity continues to be high in the next period, current D&O insurance can be positively associated with the cost of equity in the next period. If this is the case, then a change in the cost of equity should precede a change in D&O insurance. However, our hypothesis predicts that a change in the cost of equity follows a change in D&O insurance. We therefore investigate the association between a change in D&O insurance and a change in the lead or lagged measures of the cost of equity.

The change in D&O insurance in year t, $\Delta DOICOV_{i,t}$, is defined as the change in the amount of D&O insurance from year t-1 to year t scaled by the average market value of equity of year t. The change in the *lead* cost of equity, $\Delta(R_{AVG} - R_F)_{i,t+1}$, is the change in the cost of equity in year t+1. The change in the *lagged* cost of equity, $\Delta(R_{AVG} - R_F)_{i,t-1}$, is the change in the cost of equity in year t-1. If a change in the cost of equity *follows* a change in D&O insurance, then the association between $\Delta DOICOV_{i,t}$ and $\Delta(R_{AVG} - R_F)_{i,t+1}$ should be positive. If a change in the cost of equity *precedes* a change in D&O insurance, then the association between $\Delta DOICOV_{i,t}$ and $\Delta(R_{AVG} - R_F)_{i,t-1}$ should be positive.

Table 3 reports results. We find a significantly positive association between $\Delta DOICOV_{i,t}$ and $\Delta(R_{AVG} - R_F)_{i,t+1}$ (Column (1)), but the association between $\Delta DOICOV_{i,t}$ and $\Delta(R_{AVG} - R_F)_{i,t-1}$ is insignificant (Column (2)). In Column (3), we lag the change in the cost of equity by

two years and the association remains insignificant. These results suggest that a change in the cost of equity follows a change in D&O insurance, rather than the other way around.

5.3. Market reaction to disclosures of D&O insurance information

Next, we examine the market reaction to disclosures of D&O insurance information. If investors charge a high cost of equity for firms with high D&O insurance coverage, stock prices should react negatively when investors learn that firms have increased their D&O insurance coverage. A short-window event study is less likely to suffer from the omitted correlated variable problem and thus can be used to corroborate our baseline findings.

While the disclosure of D&O insurance information is compulsory in Canada, there is no regulation requiring firms to make announcements upon their purchases of D&O insurance. As a result, it is difficult to identify the exact date on which D&O insurance information is revealed to the market. Firms typically release D&O insurance information in proxy circulars which disclose the arrangement of annual general meetings of shareholders after the end of fiscal years. A random search suggests that a proxy circular is the predominant public source from which investors learn about a firm's D&O insurance.

In most cases a proxy circular is mailed to shareholders on or right after the proxy circular date (hereafter referred to as the proxy date, T_P). In very few cases the proxy circular is mailed within one week after the proxy date. The proxy circular is also filed with SEDAR, and the filing date is shown in SEDAR (hereafter referred to as the filing date, T_F). Our data show that the median (mean) number of trading days between the proxy date and the filing date is 8 (9.5). While we are certain that the D&O insurance information reaches the market by the filing date, we are less certain as to the exact date on which shareholders receive the mailed proxy circular (before the filing date). Following Brickley et al. (1985), we

use the period [T_P-2, T_F+2] as our event window.[9] We estimate the following regression to determine the market reaction to a change in D&O insurance coverage:

$$CAR_{i,t} = \delta_0 + \delta_1 \Delta DOICOV_{i,t} + \delta_2 \text{Ln}MV_{i,t} + \delta_3 \text{Ln}BM_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where $CAR_{i,t}$ is the cumulative abnormal return over the window [T_P-2, T_F+2] for fiscal year t. Abnormal return is defined as the prediction error of the market model estimated using daily stock returns over a one-year period ending 31 days before the proxy date. Other variables are as defined earlier.

We manually collect proxy circular filing dates from the SEDAR system and obtain a sample of 4,309 firm-year observations with non-missing filing dates. We then download proxy circulars and identify proxy dates in proxy circular letters to shareholders. We lose 792 observations missing information on the change in D&O insurance coverage and drop 63 observations missing proxy dates and 22 observations for which filing dates in SEDAR are later than annual general meeting dates. Finally, we delete 308 observations missing variables used in the model. This procedure results in a sample of 3,124 observations.

It is important to note a limitation for the event study. D&O insurance is often disclosed together with other items in a proxy circular. Typical examples include information on the election of directors, appointment of auditors, executive compensation, etc. These factors make it difficult to observe a clean market reaction around proxy circular releases. Results are reported in Table 4. In Column (1), the coefficient on $\Delta DOICOV$ is significantly negative (t = -2.113), suggesting that the market reacts negatively to an increase in D&O insurance. This evidence is consistent with our hypothesis. While it is impossible to control for all confounding news, we make an explicit attempt to check whether results are robust to removing confounding earnings announcements. We remove 684 observations with missing earnings announcement dates or those with earnings announcement dates falling during the

[9] As investors can receive mails of the proxy statements before the filing dates, as a robustness test, we also measure the market reaction over the window [T_P-2, T_P+5]. Results (untabulated) are qualitatively similar.

period three trading days before the proxy date and three trading days after the filing date (i.e., [T_P-3, T_F+3]). Results in Column (2) are qualitatively similar.[10]

5.4. Controlling for D&Os' anticipation of litigation risk

The results of the lead-lag analysis minimize the chance of public information on risk as an explanation of the positive association between D&O insurance and the cost of equity. However, another possibility is that D&Os can purchase insurance based on their private information about future adverse changes in a firm's risk that can lead to a higher litigation risk. When the market subsequently learns about D&Os' private information, the future cost of equity is higher. If this is the case, we can still observe that a change in the cost of equity follows, but not precedes, a change in D&O insurance. In addition, the market can react negatively to a disclosure of an increase in D&O insurance simply because the disclosure reveals D&Os' private information about future litigation. We refer to this as the risk anticipation argument. This argument and our hypothesis are not mutually exclusive as a change in D&O insurance can reveal D&Os' private information as well as an expected change in D&Os' behavior. We examine to what extent the risk anticipation argument can explain the positive association between D&O insurance and the cost of equity.

5.4.1. Controlling for the expected litigation risk

First, we determine whether our results survive after controlling for a measure of expected litigation risk (*LITRISK*) developed in Kim and Skinner (2012).[11] Results are reported in Panel A of Table 5. The coefficient on *LITRISK* is positive and significant (1.557, t = 2.464). However, both the magnitude (6.748) and the significance level (t = 3.654) of the

[10] We also find a negative announcement effect of D&O insurance initiations (54 observations after excluding observations with confounding earnings news).

[11] Specifically, *LITRISK* is constructed using regression coefficients of variables in Model 3 of Table 7 in Kim and Skinner (2012). They show that this measure is superior to a simple indicator variable based on industry membership that is commonly used in many accounting studies.

coefficient on *DOICOV* are similar to those reported in our baseline regression (Column (1) of Table 2), suggesting that our results cannot be completely driven by the expected litigation risk. In Panel B, we estimate a change model further controlling for the change in litigation risk. The inference on Δ*DOICOV* is qualitatively the same.

5.4.2. D&Os' private information and the association between D&O insurance and the cost of equity

Second, we test a cross-sectional prediction of the risk anticipation argument. According to this argument, the association between D&O insurance and the cost of equity should be more pronounced when D&Os have more private information. However, testing this prediction is difficult as D&Os' private information is not directly observable. Therefore, we follow Chen et al. (2007) and examine whether the association between D&O insurance and the cost of equity varies with proxies for D&Os' private information.

Our first set of proxies is based on earnings surprises, which can be justified for two reasons. First, D&Os have access to internal accounting records and know about earnings before it is publicly released to investors. Second, securities class action suits often result from bad outcomes (Kim and Skinner, 2012) and a large price drop driven by negative earnings news is a common trigger for shareholder litigations (Skinner, 1994). Field et al. (2005) also argue that the risk of litigation is heightened when a firm's earnings are substantially lower than investors' expectation. Gande and Lewis (2009) find that US firms with negative earnings surprises are more likely to be sued in class action suits.

Specifically, for each quarterly earnings announcement made in the year during which the cost of equity is estimated, we compute abnormal return over the five trading days [-2, +2] centered on the announcement date. We measure earnings surprise (*SURPRISE*) as the median of the absolute values of announcement period abnormal returns. As a large negative earnings surprise has a greater impact on litigation than a large positive earnings

surprise, we also construct a proxy (*NEG_SURPRISE*) that only considers negative earnings surprises. Specifically, we set positive announcement period abnormal returns to zero and define *NEG_SURPRISE* as the median of the revised absolute values of abnormal returns.

Our second set of proxies for D&Os' private information is based on insiders' trading activities. Prior studies (Seyhun, 1992) show that insider trading contains private information. Although insiders with private information do not necessarily trade, our premise is that on average, insiders with more private information trade more (Chen et al., 2007). We define *CEO_TRADE* as an indicator variable that equals one if a CEO conducts any open market purchase or sell during the fiscal year, and zero otherwise. We manually collect open market transactions for CEOs in our sample from the website of the System of Electronic Disclosure by Insiders (SEDI). As negative private information has a greater impact on litigation cost, we construct another proxy (*CEO_SELL*) that incorporates the direction of insiders' trades. *CEO_SELL* equals one if a CEO has a net sell during a fiscal year (i.e., total sell greater than total purchase) and zero otherwise.

One disadvantage of relying on insider trading data from SEDI is that SEDI only provides information on insider trades conducted after 2002. Therefore, our tests are based on a much smaller sample. To mitigate this problem, we also measure net selling activities of CEOs by the decrease in their stock ownership using an indicator variable *CEO_SELL2* that equals one if a CEO's stock ownership in the firm decreases during the fiscal year, and zero otherwise. CEO ownership data is manually collected from proxy circular filings. A disadvantage of this proxy, however, is that it can contain larger measurement errors as a change in ownership is affected by other factors such as restricted stock grants.

We then define an indicator variable (*HIGH*) denoting firms with more D&O private information. For *SURPRISE* (*NEG_SURPRISE*), *HIGH* equals one if *SURPRISE* (*NEG_SURPRISE*) is above the sample median, and zero otherwise. For *CEO_TRADE*, *CEO_SELL* and *CEO_SELL2*, we set *HIGH* equal to the proxy. We then augment the

baseline model with an interaction term between *HIGH* and *DOICOV*. The risk anticipation argument predicts a positive coefficient on the interaction term.

Panel A of Table 6 shows level regression results. Columns (1) to (5) use D&Os' private information measured by *SURPRISE*, *NEG_SURPRISE*, *CEO_TRADE*, *CEO_SELL*, and *CEO_SELL2*, respectively. In all regressions, we find a positive and significant coefficient on *DOICOV*, suggesting that a positive association between D&O insurance and the cost of equity exists in firms with a low level of D&Os' private information. The coefficients on *DOICOV*×*HIGH* are statistically insignificant in all regression.[12] Panel B of Table 6 reports change regression results. Inference is qualitatively the same. Specifically, coefficients on *ΔDOICOV* are significantly positive except in Column (4). Coefficients on *ΔDOICOV*×*HIGH* are insignificant in all regressions.

To summarize, our evidence suggests that the association between D&O insurance and the cost of equity does not vary with proxies for private information. Nevertheless, interpretation of the evidence hinges on the ability of these proxies to capture D&Os' private information that affects D&O insurance purchases and the future cost of equity. We acknowledge that we cannot completely rule out the risk anticipation argument.

5.5. Evidence from an exogenous law change lowering D&Os' legal liabilities

To further substantiate our hypothesis, we exploit an exogenous change in Nevada's Corporate Law in 2001 that reduced D&Os' personal legal liabilities. Nevada swiftly changed its corporate law in 2001 to attract more firm incorporations. Before the law change, Nevada's corporate law imposed similar default fiduciary duties on D&Os as those under the Delaware corporate law. After the law change, D&Os are only liable if their behaviors

[12] To avoid a large price drop on earnings announcement dates, firms may voluntarily disclose bad earnings news earlier (Skinner, 1994). Therefore, the market reaction over a short window ([-2, +2]) around the earnings announcement date may not adequately capture D&Os' private information on earnings surprise. To address this concern, we measure the market reaction over a longer window ([-30, +2]) and redefine *SURPRISE* and *NEG_SURPRISE*. Results are qualitatively similar.

involve both a breach of the duty of loyalty and an intentional fraud (or a knowing violation of law). This implies that D&Os are no longer liable for a violation of the duty of care, among others (Barzuza, 2012). We argue that this law change has a similar effect on reducing D&Os' personal legal liabilities as an increase in the D&O insurance coverage. Importantly, the legislation process was short such that firms are unlikely to anticipate the change and quickly reincorporate in Nevada before the law change (Donelson and Yust, 2014).[13] Thus, the change (in D&Os' legal liabilities) is due to an exogenous change in law rather than a firm's choice or D&Os' risk anticipation.[14]

We conduct a difference-in-differences test to determine whether the change in the cost of equity of Nevada-incorporated firms after the law change is greater than the change in the cost of equity of matched firms. We start from a list of Nevada-incorporated firms and verify whether they were incorporated in Nevada before the law change by manually checking each firm's 10-K filing before the law change. The sample period includes three years before (years 1998 to 2000) and three years after (years 2002 to 2004) the law change. Observations in year 0 (year 2001) are excluded. The cost of equity is measured at the end of June each year. The control sample is constructed by choosing non-Nevada-incorporated firms from the same industries as the Nevada-incorporated firms, with similar size (i.e., size difference no more than 20% of the size of the Nevada firm), and with the closest average cost of equity during the pre-change period. The final sample consists of 30 pairs of firms (274 observations).[15]

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[13] Specifically, the law change was first discussed by the Nevada Senate Judiciary Committee on May 22, 2001. It was passed by the Nevada legislators on June 3, 2001 and was eventually signed into law by the Governor on June 15, 2001. Nevada made this swift law change because it wanted to retain and/or attract more firms that choose Nevada as the incorporation state so that the short-term budget shortfall could be reversed. In the longer run, Nevada also wants to strategically compete with other states (e.g., Delaware) as an incorporation state. See Barzuza (2012) for a detailed discussion.

[14] In addition, as the law change reduces the legal liabilities of D&Os, there is no obvious reason for Nevada-incorporated firms to significantly increase their D&O insurance after the law change.

[15] The 30 treatment firms in the final sample spread over 13 industries based on the Fama and French 48 industry classification, although a high proportion of firms operate in the entertainment industry (6 firms, or 20% of the sample) and the transportation industry (7 firms, or 23% of the sample).

Results are reported in Table 7. Both Columns (1) and (2) show a positive coefficient on the interaction between *POST* (the indicator for the period after the law change) and *NV* (the indicator for Nevada-incorporated firms). According to Column (2), the coefficient is 1.352% (t = 2.564), indicating that the change in the cost of equity for Nevada-incorporated firms after the law change is 1.352% greater than that for matched firms.

It is possible that the above result is driven by a contemporaneous adverse change in economic conditions of Nevada. To address this concern, we repeat the test after excluding Nevada firms whose headquarters are located in Nevada and their matched control firms. This step reduces the sample to 22 pairs of firms (197 observations). Inference based on results in Columns (3) and (4) is qualitatively the same.

Overall, results reported in Sections 5.4 and 5.5 suggest that the positive association between D&O insurance and the cost of equity is unlikely to be due to risk anticipation alone.[16]

6. Channels through which D&O insurance increases the cost of equity

In this section, we provide evidence on the reporting/disclosure quality and risk-taking channels that we formulate in hypothesis development. Specifically, we examine whether D&O insurance is associated with proxies for financial reporting quality, stock liquidity, analysts' forecast properties and stock beta. Such evidence can help shed light on the underlying economic mechanisms through which D&O insurance affects the cost of equity.

6.1. D&O insurance and the absolute value of discretionary accruals

As we have argued earlier, D&O insurance can increase the cost of equity through affecting a firm's financial reporting and disclosure. Prior studies find that D&O insurance

[16] Our results are related to Donelson and Yust (2004) who find that firm value and operating cash flows of Nevada-incorporated firms decrease after the law change relative to a matched sample of non-Nevada-incorporated firms. Our results suggest that the decrease in firm value is not only due to lower cash flows but also due to a higher discount rate.

reduces accounting conservatism (Chung and Wynn, 2008) and the tendency to issue bad news management earnings forecasts (Wynn, 2008). Prior studies also find D&O insurance increases the incidence of accounting restatements (Kim, 2006). While material accounting irregularities can lead to lawsuits, many securities class actions involve less serious allegations (Kim and Skinner, 2012). Therefore, we examine the association between D&O insurance and discretionary accruals to determine whether D&O insurance is linked to less egregious earnings management. In addition, Hutton et al. (2009) suggest that discretionary accruals are associated with price crash, which is an important trigger of shareholder litigation (Kim and Skinner, 2012).

We estimate the following regression to determine whether D&O insurance is associated with earnings management as reflected in the absolute value of discretionary accruals:

$$\begin{aligned}\text{Ln}|PADAC_{i,t+1}| = {} & \gamma_0 + \gamma_1 DIOCOV_{i,t} + \gamma_2 ACCR_{i,t} + \gamma_3 SIZE_{i,t} + \gamma_4 Q_{i,t} + \gamma_5 MA_{i,t+1} + \\ & \gamma_6 FINANCE_{i,t+1} + \gamma_7 LITRISK_{i,t} + \gamma_8 MISS\_LITRISK_{i,t} + \gamma_9 LEV_{i,t} + \gamma_{10} LOSS_{i,t+1} \\ & + \gamma_{11} STDROA_{i,t} + \gamma_{12} CFO_{i,t+1} + \gamma_{13} R\&D_{i,t+1} + Industry\ and\ Year\ Indicators + \varepsilon_{i,t+1}, \end{aligned} \quad (3)$$

where $\text{Ln}|PADAC|$ is the logarithm of the absolute value of performance adjusted discretionary accruals developed by Kothari et al. (2005). We follow Ashbaugh et al. (2003) and use a logarithm transformation to correct for a violation of normality. Following Ali et al. (2007), we control for lagged accruals (*ACCR*), logarithm of total assets (*SIZE*), market-to-book (*Q*), litigation risk (*LITRISK*), leverage (*LEV*), whether a firm reports a loss (*LOSS*), past volatility of return on assets (*STDROA*), operating cash flow (*CFO*), and R&D intensity (*R&D*). In addition, we include two indicators for M&A and external financing activities (*MA* and *FINANCE*) to control for accruals management due to future acquisitions and financing activities. Detailed variable definitions are provided in the notes to Table 8.

Results are reported in Panel A, Table 8. We find that the coefficient on *DOICOV* is positive and significant (0.832, $t = 3.233$), consistent with the notion that high D&O insurance coverage is associated with a low level of financial reporting quality.

6.2. D&O insurance and stock illiquidity

Poor financial reporting shown above and other reporting and disclosure problems documented in prior studies (e.g., Chung and Wynn, 2008; Wynn, 2008) can result in a higher level of information asymmetry and hence a lower level of stock liquidity. We test the association between D&O insurance and stock illiquidity by estimating the following model:

$$ILLIQ_{i,t+1} = \beta_0 + \beta_1 DOICOV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 Q_{i,t} + \beta_4 LEV_{i,t} + \beta_5 ROA_{i,t} + \beta_6 \text{Ln}PRICE_{i,t} + \beta_7 SDRET_{i,t} + Year\ and\ Industry\ Indicators + \varepsilon_{i,t+1}. \quad (4)$$

Following Daske et al. (2013), we employ two proxies to measure stock illiquidity. The first is (logarithm transformed) bid-ask spread and the second is (logarithm transformed) Amihud's (2002) illiquidity measure. Their detailed definitions are outlined in notes to Table 8. Following Amihud (2002), we require a firm-year to have data for at least 200 trading days, and exclude stocks with price lower than \$5 at the beginning of a fiscal year to avoid microstructure issues associated with low-price stocks. We control for the logarithm of total assets (*SIZE*), market-to-book (*Q*), leverage (*LEV*), profitability (*ROA*), stock price (Ln*PRICE*) and daily stock return volatility (*SDRET*). Results are reported in Panel B, Table 8. We find that *DOICOV* loads significantly positively in both models (1.000, $t = 2.547$, and 3.625, $t = 4.381$, respectively). Therefore, the evidence is consistent with the notion that D&O insurance reduces stock liquidity.

6.3. D&O insurance and analysts forecast properties

If D&O insurance increases a firm's incentives to engage in low-quality reporting and disclosure, its level of information asymmetry should be higher. As a result, analysts and investors face a higher estimation risk when evaluating the firm, leading to larger forecast errors and a larger dispersion. We test this prediction by estimating the following model:

$$FERR_{i,t+1}\ or\ FDISP_{i,t+1} = \beta_0 + \beta_1 DOICOV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 CORR_{i,t} + \beta_4 STDROA_{i,t} + \beta_5 |\Delta EPS_{i,t+1}| + \beta_6 R\&D_{i,t} + \beta_7 ROA_{i,t} + Year\ and\ Industry\ Indicators + \varepsilon_{i,t+1}. \quad (5)$$

Following Lang and Lundholm (1996) and Ali et al. (2007), *FERR* is the 12-month average of the absolute values of analysts' earnings forecast errors, and *FDISP* is 12-month average of the inter-analyst dispersions of earnings forecasts. We scale them by stock price at the end of the previous fiscal year. Following Ali et al. (2007), we control for the logarithm of total assets (*SIZE*), past correlation between earnings and stock returns (*CORR*), past volatility of return on assets (*STDROA*), absolute value of change in EPS ($|\Delta EPS_{i,t+1}|$), R&D intensity (*R&D*) and profitability (*ROA*). Panel C, Table 8 reports the results. Coefficients on *DOICOV* are positive and significant in both regressions (0.036, t = 2.049, and 0.033, t = 3.654, respectively), consistent with the notion that that estimation risk is higher for firms with a higher level of D&O insurance.

Taken together, the above evidence is consistent with our hypothesis that D&O insurance increases the cost of equity by lowering financial reporting and disclosure quality, leading to a lower level of stock liquidity and a higher estimation risk.

6.4. D&O insurance and risk-taking

We estimate the following regression to determine whether D&O insurance is associated with a firms' exposure to market risk as measured by stock beta:

$$FBETA_{i,t} = \beta_0 + \beta_1 DOICOV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 Q_{i,t} + \beta_4 LEV_{i,t} + \beta_5 R\&D_{i,t} + \beta_6 CAPX_{i,t} + \beta_7 \text{Ln}CASHCOMP_{i,t} + \beta_8 DELTA_{i,t} + \beta_9 VEGA_{i,t} + \beta_{10} OUTDIR_{i,t} + \beta_{11} DOOWN_{i,t} + Year\ and\ Industry\ Indicators + \varepsilon_{i,t}, \quad (6)$$

where $FBETA_{i,t}$ is future stock beta estimated using a market model with monthly stock returns over the future 24 months (years t+1 to t+2). We follow Lin et al. (2013) and control for the logarithm of total assets (*SIZE*), market-to-book (*Q*), leverage (*LEV*), R&D intensity (*R&D*), capital expenditure (*CAPX*), risk-taking incentives or disincentives proxied by the cash compensation (Ln*CASHCOMP*), delta (*DELTA*, CEO's portfolio sensitivity to a $1 increase in the stock price) and vega (*VEGA*, CEO's portfolio sensitivity to a 1% change in

stock return volatility). We also follow Ashbaugh et al. (2005) and control for the proportion of outside directors (*OUTDIR*) and D&Os' total stock ownership (*DOOWN*).

Results are reported in Table 9. The coefficient on *DOICOV* is positive and significant (0.648, $t = 1.928$).[17] This evidence is consistent with our hypothesis that D&O insurance encourages D&Os' risk-taking, though we acknowledge that it can also be consistent with the risk anticipation argument.

6.5. D&O insurance and future cash flows

As discussed in hypothesis development, risk-taking induced by D&O insurance may or may not benefit shareholders. If risk-taking benefits shareholders, D&O insurance should have a positive cash flow effect even though the cost of equity is also high as firms undertake more risky positive-NPV projects. However, our event study shows that investors read an increase in D&O insurance coverage negatively, suggesting that either D&O insurance does not increase future cash flows or the increase is not sufficiently large to offset the inflated discount rate. Nevertheless, we conduct a more direct test by examining the association between D&O insurance and future operating performance. If D&O insurance encourages risk-taking that benefits shareholders, it should be positively associated with future operating performance. Following Core et al. (2006), we measure operating performance by industry adjusted operating income before depreciation scaled by average assets (adjusted *ROA*). Specifically, we estimate the following regression:

$$\begin{aligned} Adj.\ ROA_{i,t+N} = {} & \beta_0 + \beta_1 DOICOV_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 Q_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CAPX_{i,t} + \beta_6 R\&D_{i,t} + \\ & \beta_7 DIVYLD_{i,t} + \beta_8 STDRET_{i,t} + \beta_9 XLIST_{i,t} + Year\ Indicators + \varepsilon_{i,t+N}, \end{aligned} \quad (7)$$

where $Adj.\ ROA_{t+N}$ is the industry adjusted *ROA* of year $t+N$ ($N = 1, 2, 3$). We control for the logarithm of assets (*SIZE*), Tobin's Q (*Q*), leverage (*LEV*), capital expenditure (*CAPX*), R&D intensity (*R&D*), dividend yield (*DIVYLD*), stock return volatility (*STDRET*), a cross-listing

[17] Lin et al. (2013) find that D&O insurance is positively associated with future stock return volatility and idiosyncratic risk. We find similar results in our study.

indicator (*XLIST*) and year fixed effects. Table 10 reports results for the OLS, Fama-MacBeth and firm fixed effects regressions. The coefficient on *DOICOV* is never significantly positive and is significantly negative in the Fama-MacBeth Regression at the 5% level in the regression of $Adj.ROA_{t+1}$. Thus, there is no evidence that D&O insurance encourages risk-taking that benefits shareholders.[18]

6.6. Cross listing and the association between D&O insurance and the cost of equity

As some firms in our sample are cross listed in the US, it is natural to examine whether cross listing affects the association between D&O insurance and the cost of equity. Compared with Canada, the US has a more litigious environment (Baginski et al., 2002). The disciplining role of shareholder litigation is stronger in the US than in Canada. Therefore, the protection afforded by D&O insurance should be more important to D&Os when a firm is cross-listed in the US. Investors therefore should require a higher risk premium associated with D&O insurance for cross-listed firms.[19] We thus expect the positive association between D&O insurance and the cost of equity to be more pronounced in firms cross-listed in the US.

To test this prediction, we add an interaction term between cross-listing (*XLIST*) and *DOICOV* in Equation (1). Results are reported in Table 11. The coefficient on *DOICOV* is significantly positive (4.227, $t = 1.866$), suggesting that D&O insurance is positively associated with the cost of equity for non-cross-listed Canadian firms. The coefficient on *XLIST*×*DOICOV* is positive and significant (7.268, $t = 2.012$), suggesting that the association is more pronounced in cross-listed firms, supporting our prediction.

[18] If risk-taking does not improve cash flow but increases the cost of equity, firm value should be lower. Consistent with this prediction, we confirm that firm value measured by industry adjusted Tobin's Q is negatively associated with D&O insurance. This evidence is also consistent with the findings in Table 4 that the market reacts negatively to an increase in D&O insurance.

[19] Wynn (2008) also finds that liability coverage has a larger effect on disclosures of firms cross listed in the US.

7. Conclusion

In this study, we hypothesize that D&O insurance increases a firm's cost of equity by providing incentives for D&Os to lower care and vigilance in financial reporting/disclosure and to take more risks. We find that D&O insurance coverage is positively associated with the ex ante cost of equity. Investors also react negatively to the announcement of an increase in D&O insurance. In addition, a high level of D&O insurance is associated with low financial reporting quality, low stock liquidity, low analysts forecast accuracy and high forecast dispersion. We also find that D&O insurance is positively associated with a firm's stock beta but is not positively associated with future cash flows or firm value. Overall, our evidence is consistent with the notion that D&O insurance shields D&Os from the discipline of shareholder litigation and lowers their level of care and vigilance in business decisions. Conceivably, the risk anticipation argument can also be a plausible explanation for our results. While we conduct extensive robustness tests and find no evidence consistent with the risk anticipation argument, we acknowledge that we are unable to completely rule it out.

Given that our findings suggest an unintended consequence of D&O insurance, one may wonder why firms still purchase D&O insurance. A reason is that D&O insurance is often required by risk-averse D&O candidates. Second, the purchase of D&O insurance is invariably a decision of the board in practice and hence agency incentives can play a role. Third, securities litigation, and particularly a secondary market lawsuit, is subject to pocket-shifting (some shareholders gain at the expense of others) (Baker and Griffith, 2010). As a result, shareholders can have different views about D&O insurance, depending on their investment strategies and specific circumstances (e.g., the timing). Therefore, we are unlikely to observe a corner solution of zero D&O insurance.

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TABLE 1
Summary Statistics

Panel A: Summary statistics for D&O insurance and the cost of equity

Variable	Mean	Std. Dev	Percentiles 25th	50th	75th	*N*
D&O insurance						
DINS (0/1)	0.709	0.454	0.000	1.000	1.000	2,856
COVER_LIMIT (C$mm)	44.748	70.869	0.000	20.000	50.000	2,814
DOICOV	0.045	0.076	0.000	0.020	0.051	2,805
Cost of equity						
$R_{AVG} - R_F$ (in %)	7.392	5.356	3.924	6.061	9.306	2,135

Panel B: Cost of equity ($R_{AVG} - R_F$) by *DOICOV* groups

	N	Mean	Median	Std. Dev.	*t*-value (L-H)	*z*-value for Wilcoxon test
Full sample:						
Low *DOICOV* (L)	1,052	6.854	5.700	5.040	-4.473***	-4.930***
High *DOICOV* (H)	1,052	7.889	6.402	5.530		

Panel A presents summary statistics for variables on D&O insurance and the cost of equity. Panel B compares equity risk premium ($R_{AVG} - R_F$) between low coverage and high coverage groups. *DINS* (0/1) is an indicator variable that equals one if a firm has D&O insurance in the fiscal year and zero otherwise. *COVER_LIMIT* is the limit on the personal coverage portion of a D&O insurance policy in C$mm. *DOICOV* is the insurance coverage ratio, defined as *COVER_LIMIT* scaled by the average market value of common equity in the fiscal year. R_{AVG} is the mean value of the implied cost of equity based on Gebhardt et al. (2001) (R_{GLS}), Claus and Thomas (2001) (R_{CT}), Ohlson and Jeuttner (2005) and implemented by Gode and Monanham (2003) (R_{OJ}), and the modified PEG model in Easton (2004) (R_{MPEG}). We require that all of the four cost of equity estimates be non-missing in computing R_{AVG}. R_F is risk free rate, defined as the yield to maturity of zero-coupon 10-year Canadian government bond. *, **, *** indicate significance at the 0.10, 0.05 and 0.01 level (two-tailed), respectively.

TABLE 2
D&O Insurance Coverage and the Cost of Equity

Y= $(R_{AVG} - R_F)_{t+1}$	OLS regression (1)	Fama-MacBeth regression (2)	Firm fixed effects regression (3)	Control for determinants of D&O insurance & cash holdings (4)
$DOICOV_t$	6.931***	7.527***	8.919***	5.606***
	[3.755]	[3.343]	[3.492]	[3.053]
$UBETA_{t+1}$	0.660**	0.631*	-0.207	0.623*
	[2.109]	[2.076]	[-0.753]	[1.853]
STD_RESRET_{t+1}	9.599***	11.645**	8.117***	6.123**
	[3.817]	[3.004]	[3.011]	[2.285]
LnMV_t	-0.357***	-0.433***	-0.273	-0.861***
	[-2.620]	[-4.246]	[-0.888]	[-3.418]
LnBM_t	0.682***	0.686***	0.373	0.244
	[3.043]	[3.109]	[1.173]	[0.888]
LEV_t	4.547***	4.227***	2.525**	5.072***
	[5.731]	[6.431]	[2.317]	[5.810]
$RATING_t$	-0.064	-0.012	0.041	-0.089
	[-0.810]	[-0.246]	[0.395]	[-1.026]
$MISS\_RATING_t$	-0.682	-0.120	0.658	-0.960
	[-0.625]	[-0.179]	[0.433]	[-0.784]
Ln$RET12_{t+1}$	-1.887***	-1.748***	-2.108***	-1.843***
	[-8.065]	[-4.461]	[-8.423]	[-6.958]
$FBIAS_{t+1}$	-12.577***	-11.690***	-7.799***	-12.797***
	[-6.335]	[-4.810]	[-3.513]	[-6.011]
$FLTG_{t+1}$	7.464***	8.289***	7.376***	8.110***
	[11.390]	[15.948]	[9.781]	[14.833]
$XLIST_t$	-0.160	-0.049	0.129	0.060
	[-0.473]	[-0.430]	[0.251]	[0.163]
$CASH_t$	-0.306	-0.803	0.335	-0.053
	[-0.238]	[-1.118]	[0.258]	[-0.033]
Additional controls	No	No	No	Yes
Year fixed-effects	Yes	No	Yes	Yes
Industry fixed-effects	Yes	Yes	No	Yes
Firm fixed-effects	No	No	Yes	No
Adj.R^2	0.638	0.742	0.777	0.653
N	2,025	2,025	2,025	1,566

R_{AVG} is the mean value of the implied cost of equity based on Gebhardt et al. (2001) (R_{GLS}), Claus and Thomas (2001) (R_{CT}), Ohlson and Jeuttner (2005) and implemented by Gode and Monanham (2003) (R_{OJ}), and the modified PEG model in Easton (2004) (R_{MPEG}). R_F is risk free rate. *DOICOV* is the insurance coverage ratio. *UBETA* is market beta divided by one plus the ratio of long-term debt to market value of equity, where the market beta is estimated by the market model using previous 60 monthly returns (at least 24 monthly observations). *STD_RESRET* is the standard deviation of the residual monthly returns in the market model. Ln*MV* is the natural log of the market value of equity at the fiscal year end. Ln*BM* is the natural log of the ratio of book value of equity to market value of equity. *LEV* is defined as long-term debt divided by the sum of long-term debt and market value of equity. Ln*RET*12 is the natural log of one plus the compounded stock returns during the previous 12 months. *FBIAS* is actual EPS from IBES minus forecasted EPS from IBES, scaled by price. When actual EPS from IBES is missing, actual EPS from COMPUSTAT is used. *CASH* is cash & cash equivalent scaled by book value of total assets. *XLIST* is an indicator variable that equals one if a firm is cross listed in the US and zero otherwise. *RATING* is S&P long-term credit rating for issuer (#SPLTICRM). We convert the letter ratings into numbers as follows: 22 = AAA, 21 = AA+, 20 = AA, 19 = AA-, 18 = A+, 17 = A, 16 = A-, 15 = BBB+, 14 = BBB, 13 = BBB-, 12 = BB+, 11 = BB, 10 = BB-, 9 = B+, 8 = B, 7 = B-, 6 = CCC+, 5 = CCC, 4 = CCC-, 3 = CC, 2 = C, 1 = below C. *RATING* is set to 0 if missing. *MISS_RAGING* is an indicator variable that equals one for the observations missing *RATING*. Additional controls in Column (4) include the proportion of outside directors, research and development scaled by sales, return on assets, indicators for having M&As or divestitures in the previous year, and an indicator for reporting the existence of lawsuits in the previous year, board size, and stock ownership of directors and officers, operating cash flow/assets, volatility of operating cash flow, and capital expenditure/assets. *t*-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 3
Lead-lag Analysis of a Change in D&O Insurance Coverage and a Change in the Cost of Equity

Y= $\Delta(R_{AVG} - R_F)$ $[t+\tau]$ (in %)	τ = +1	τ = -1	τ = -2
	(1)	(2)	(3)
$\Delta DOICOV$ $[t]$	13.806**	9.212	-2.620
	[1.973]	[1.375]	[-0.468]
$\Delta UBETA$ $[t+\tau]$	-0.296	-0.160	0.355
	[-0.775]	[-0.416]	[0.797]
ΔSTD_RESRET $[t+\tau]$	8.609	8.373**	5.489
	[1.484]	[1.994]	[0.828]
ΔLnMV $[t+\tau-1]$	-0.104	-0.144	-0.260
	[-0.293]	[-0.388]	[-0.745]
ΔLnBM $[t+\tau-1]$	-0.363	-0.086	0.104
	[-1.345]	[-0.296]	[0.309]
ΔLEV $[t+\tau-1]$	1.014	0.611	1.459
	[1.016]	[0.620]	[1.436]
ΔLn$RET12$$[t+\tau]$	-1.953***	-1.863***	-2.015***
	[-9.367]	[-9.233]	[-8.878]
$\Delta FBIAS[t+\tau]$	-5.598***	-6.794**	-6.260***
	[-2.945]	[-2.255]	[-2.624]
$\Delta FLTG[t+\tau]$	6.454***	5.830***	5.816***
	[8.329]	[7.213]	[6.065]
$\Delta CASH$ $[t+\tau-1]$	2.795**	2.406**	2.485**
	[2.325]	[2.056]	[2.039]
$\Delta RATING$ $[t+\tau-1]$	0.179	0.273	0.331
	[1.185]	[1.574]	[1.450]
$MISS\_\Delta RATING[t+\tau-1]$	0.134	0.117	0.105
	[1.075]	[0.930]	[0.742]
Year fixed effect	Yes	Yes	Yes
Adj.R^2	0.543	0.511	0.493
N	1,441	1,243	1,048

$\Delta DOICOV$ of year t is defined as the change in dollar amounts of D&O insurance from year t-1 to year t, scaled by the average market value of equity of year t. For other variables, $\Delta X[t+\tau]$ is defined as the change of variable X from year $t+\tau-1$ to year $t+\tau$. See the note to Table 2 for the definitions of R_{AVG}, R_F, $UBETA$, STD_RESRET, LnMV, LnBM, LEV, Ln$RET12$, $FBIAS$, $FLTG$, $CASH$, $RATING$. $MISS\_\Delta RATING$ is a dummy variable that equals one if $\Delta RATING$ is missing, and zero otherwise. We then set $\Delta RATING$ as 0 if missing. t-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 4
Market Reactions to Changes in D&O Insurance Coverage in Proxy Circulars

	Full sample	Excluding observations with confounding earnings news
Y = $CAR[T_P\text{-}2, T_F\text{+}2]$	[1]	[2]
Intercept	0.062***	0.066***
	[3.350]	[2.744]
$\Delta DOICOV_t$	-0.243**	-0.292**
	[-2.113]	[-2.145]
LnMV_t	-0.006**	-0.007**
	[-2.303]	[-2.097]
LnBM_t	0.024***	0.021***
	[5.280]	[4.162]
Adj.R^2	0.037	0.031
N	3,124	2,440

This table presents results of market reactions to releases of proxy circulars that contain D&O insurance information. The dependent variable is the cumulative abnormal return (*CAR*) over the window [T_P-2, T_F+2]. Abnormal return is the prediction error of a market model estimated using daily returns over event day -281 to -31 before the proxy circular date (T_P). We require at least 60 daily return observations to estimate the market model. $\Delta DOICOV$ of year t is the change in D&O insurance coverage between year t-1 and year t, scaled by the average market value of equity over year t. Ln*MV* is the logarithm of the market value of common shares outstanding measured at the end of year t. Ln*BM* is the logarithm of the ratio of the book value of equity to market value of common shares outstanding measured at the end of year t. The sample "excluding observations with confounding earnings news" removes the observations whose announcement dates of annual earnings are missing or fall within the period between three days before the proxy circular date (T_P) and three days after the filing date (T_F). t-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

TABLE 5
D&O Insurance Coverage and the Cost of Equity: Controlling for Expected Litigation Risk

Panel A: level regressions

Y= $(R_{AVG} - R_F)_{t+1}$	Coeff.	*t*-stat
$DOICOV_t$	6.748***	[3.654]
$LITRISK_t$	1.557**	[2.464]
$MISS\_LITRISK_t$	0.994**	[2.452]
Controls in Table 2, Column (1)	Yes	
Adj.R^2	0.641	
N	2,025	

Panel B: change regressions

Y= $\Delta(R_{AVG} - R_F)_{t+1}$	Coeff.	*t*-stat
$\Delta DOICOV_t$	12.732*	[1.890]
$\Delta LITRISK_t$	0.424	[0.835]
$MISS\_\Delta LITRISK_t$	-0.178	[-0.439]
Controls in Table 3	Yes	
Adj.R^2	0.584	
N	1,441	

R_{AVG} is the mean value of the implied cost of equity based on Gebhardt et al. (2001) (R_{GLS}), Claus and Thomas (2001) (R_{CT}), Ohlson and Jeuttner (2005) and implemented by Gode and Monanham (2003) (R_{OJ}), and the modified PEG model in Easton (2004) (R_{MPEG}). R_F is risk free rate. *DOICOV* is the insurance coverage ratio. *LITRISK* is a proxy for ex-ante litigation risk constructed using the regression coefficients of the variables in Model 3 of Table 7 in Kim and Skinner (2012). *ΔLITRISK* is the change in *LITRISK* from the previous year to the current year. *LITRISK* and *ΔLITRISK* are set to zero if missing. *MISS_LITRISK* (*MISS_ΔLITRISK*) are indicators that equals one if *LITRISK* (*ΔLITRISK*) is missing, and zero otherwise. *t*-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 6
The Effect of D&Os' Private Information on the Association between D&O Insurance and the Cost of Equity

Panel A: Level regressions

Y= $(R_{AVG} - R_F)_{t+1}$	*HIGH* = 1 if *SURPRISE* is above sample median (1)	*HIGH* = 1 if *NEG_SURPRISE* is above sample median (2)	*HIGH* = *CEO_TRADE* (3)	*HIGH* = *CEO_SELL* (4)	*HIGH* = *CEO_SELL2* (5)
$DOICOV_t$	5.959**	4.863**	7.525*	7.881*	6.051**
	[2.193]	[2.011]	[1.806]	[1.935]	[2.186]
*DOICOV *HIGH (0/1)*	1.731	4.435	3.739	3.990	3.467
	[0.458]	[1.530]	[0.584]	[0.477]	[0.632]
HIGH (0/1)	-0.044	-0.121	0.038	-0.221	-0.037
	[-0.187]	[-0.649]	[0.122]	[-0.524]	[-0.106]
Controls in Column (1), Table 2	Yes	Yes	Yes	Yes	Yes
Adj.R^2	0.614	0.615	0.637	0.637	0.609
N	1,760	1,760	772	772	1,297

Panel B: Change regressions

Y= $\Delta(R_{AVG} - R_F)_{t+1}$	*HIGH* = 1 if *SURPRISE* is above sample median (1)	*HIGH* = 1 if *NEG_SURPRISE* is above sample median (2)	*HIGH* = *CEO_TRADE* (3)	*HIGH* = *CEO_SELL* (4)	*HIGH* = *CEO_SELL2* (5)
$\Delta DOICOV_t$	13.464*	18.331***	29.430*	26.172	15.018*
	[1.779]	[2.697]	[1.819]	[1.584]	[1.657]
*ΔDOICOV *HIGH (0/1)*	6.675	-2.574	-8.459	6.377	8.887
	[0.476]	[-0.184]	[-0.374]	[0.212)	[0.484]
HIGH (0/1)	-0.257	0.096	0.007	-0.417	0.085
	[-1.614]	[0.631]	[0.029]	[-1.302]	[0.301]
Controls in Table 3	Yes	Yes	Yes	Yes	Yes
Adj.R^2	0.571	0.571	0.541	0.542	0.579
N	1,291	1,291	604	604	1,028

R_{AVG} is the mean value of the implied cost of equity. R_F is risk free rate. We compute cumulative abnormal return over [-2, +2] around each quarterly earnings announcement made in fiscal year t+1. *SURPRISE* is the median value of the absolute value of the cumulative abnormal returns. To compute *NEG_SURPRISE*, we set all positive cumulative abnormal returns to zero and recalculate the median value. *CEO_TRADE* is an indicator variable that equals one if a CEO conducts open-market transactions (purchase or sell) in year t, and zero otherwise. *CEO_SELL* is an indicator variable that equals one if a CEO has net sell (i.e., total sell greater than total purchase) in year t, and zero otherwise. *CEO_SELL2* is an indicator variable that equals one if a CEO's stock ownership at the end of year t is less than that at the end of year t-1 and year t is not the last year of the CEO's term, and zero otherwise. t-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 7
The Effect of Nevada's Lowering Directors' and Officers' Legal Liabilities on the Cost of Equity

	All Nevada firms and matched control firms		Excluding Nevada firms headquartered in Nevada and the corresponding matched control firms	
Y= $(R_{AVG} - R_F)_{t+1}$	(1)	(2)	(3)	(4)
Nevada firms (NV)	-0.770	-0.265	-1.134	-0.670
	[-0.987]	[-0.485]	[-1.244]	[-1.140]
$POST_{t+1}$	-1.021	-0.144	-1.010	-0.161
	[-1.514]	[-0.302]	[-1.279]	[-0.361]
$NV*POST_{t+1}$	1.610**	1.352**	2.003**	1.632***
	[2.035]	[2.564]	[2.230]	[3.245]
$UBETA_{t+1}$		0.066		0.251
		[0.176]		[0.601]
STD_RESRET_{t+1}		24.448		8.501
		[1.549]		[0.495]
LnMV_t		-0.699***		-0.759***
		[-3.467]		[-3.669]
LnBM_t		0.257		-0.043
		[0.543]		[-0.098]
Ln$RET12_{t+1}$		-2.696***		-2.599***
		[-6.324]		[-6.426]
LEV_t		-0.272		3.845
		[-0.135]		[1.612]
$FBIAS_{t+1}$		-25.660***		-22.747***
		[-3.297]		[-2.900]
$FLTG_{t+1}$		9.543***		10.657***
		[2.764]		[2.758]
$CASH_t$		-3.595***		-2.123
		[-2.766]		[-1.536]
$RATING_t$		0.014		-0.003
		[0.081]		[-0.014]
$MISS\_RATING_t$		0.352		0.025
		[0.168]		[0.008]
Adj.R^2	0.005	0.468	0.007	0.498
N	274	274	197	197

In this table we examine the change in the cost of equity for firms incorporated in Nevada (treatment firms) compared with the change in the cost of equity for a matched control sample three years before and three after the Nevada law change in 2001. The control sample is constructed by choosing a non-Nevada incorporated firm from the same industry, with similar firm size (we require the ratio of market value of non-Nevada firm to that of Nevada firm is between 0.8 and 1.2), and with the closest average cost of equity over the pre-event period. R_{AVG} is the mean value of the implied cost of equity based on Gebhardt et al. (2001) (R_{GLS}), Claus and Thomas (2001) (R_{CT}), Ohlson and Jeuttner (2005) and implemented by Gode and Monanham (2003) (R_{OJ}), and the modified PEG model in Easton (2004) (R_{MPEG}). R_F is risk free rate. The cost of equity is estimated at the end of June of each year. See the note to Table 2 for the definitions of other variables. *t*-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 8
D&O Insurance and Earnings Management, Stock Illiquidity, and Analyst Forecast Properties

Panel A: absolute value of performance-adjusted abnormal discretional accruals

Y =Ln |*PADAC*|$_{t+1}$	Coeff.	*t*-stat
DOICOV$_t$	0.832***	[3.233]
ACCR$_t$	-0.397*	[-1.724]
SIZE$_t$	-0.049**	[-2.249]
Q$_t$	0.049**	[2.284]
MA$_{t+1}$	0.066	[1.270]
FINANCE$_{t+1}$	0.087	[1.590]
LITRISK$_t$	0.218**	[2.069]
MISS_LITRISK$_t$	0.178*	[1.663]
LEV$_t$	-0.278	[-1.504]
LOSS$_{t+1}$	0.041	[0.633]
STDROA$_t$	1.255	[1.213]
CFO$_{t+1}$	0.654***	[2.590]
R&D$_{t+1}$	0.001	[0.059]
Industry and year fixed effects	Yes	
Adj.R^2	0.092	
N	2,467	

Panel B: stock illiquidity

Y =	*SPREAD*$_{t+1}$	*ILLIQUID*$_{t+1}$
	(1)	(2)
DOICOV$_t$	1.000**	3.625***
	[2.547]	[4.381]
SIZE$_t$	-0.407***	-1.175***
	[-14.707]	[-23.776]
Q$_t$	-0.093***	-0.335***
	[-4.515]	[-9.153]
ROA$_t$	-0.199**	-0.657***
	[-1.974]	[-3.491]
Ln(*PRICE*$_t$)	-0.052	-0.098
	[-1.093]	[-1.164]
SDRET$_t$	0.174**	0.202
	[2.468]	[1.506]
LEV$_t$	0.943***	2.005***
	[5.379]	[5.383]
Industry and year fixed effects	Yes	Yes
Adj.R^2	0.665	0.796
N	2,258	2,244

Panel C: analysts' forecast error and dispersion

Y =	$FERR_{t+1}$	$FDISP_{t+1}$
$DOICOV_t$	0.036**	0.033***
	[2.049]	[3.654]
$SIZE_t$	-0.002***	0.000
	[-2.843]	[-0.478]
$CORR_t$	0.006**	0.002*
	[2.451]	[1.674]
$STDROA_t$	0.110*	0.091***
	[1.882]	[2.970]
$\lvert\Delta EPS_{t+1}\rvert$	0.375***	0.107***
	[17.117]	[9.146]
$R\&D_t$	-0.010***	0.008***
	[-2.592]	[3.406]
ROA_t	-0.074***	0.000
	[-5.290]	[0.051]
Industry and year fixed effects	Yes	Yes
Adj.R^2	0.593	0.539
N	1,893	1,814

PADAC is performance adjusted discretional accruals. We estimate the following regression for Canadian firms within each year and industry defined by Fama-French 30 industry classification:
$ACCR_{i,t} = \delta_0 + \delta_1 (1/AT_{i,t-1}) + \delta_2 (\Delta SALE_{i,t} - \Delta AR_{i,t}) + \delta_3 PPE_{i,t} + \delta_4 ROA_{i,t} + \varepsilon_{i,t}$.
AT is total assets. *ACCR* is change in non-cash working capital (((#ACT–#CHE) – (#LCT–#DLC))) minus depreciation expense (#DP), scaled by $AT_{i,t-1}$. $\Delta SALE_{i,t}$ is change in net sales in year *t* scaled by $AT_{i,t-1}$. $\Delta AR_{i,t}$ is change in net accounts receivable scaled by $AT_{i,t-1}$. PPE_t is net property, plant and equipment of year *t* scaled by $AT_{i,t-1}$. ROA_t is income before extraordinary items of year *t* scaled by $AT_{i,t-1}$. $PADAC_{i,t}$ is defined as the residual term, $\varepsilon_{it,}$. $FERR_{t+1}$ is the 12-month average of the absolute value of analyst forecast error for earnings for year *t*+1 scaled by the price at the end of year *t*, where forecast error is defined as actual earnings minus the median analyst forecast. $FDISP_{t+1}$ is the 12-month average of the standard deviation of individual analyst earnings forecast for earnings of year *t*+1, scaled by the price at the end of year *t*. Earnings forecasts data are obtained from the IBES summary file. *SPREAD* is the logarithm of the median daily bid-ask spread in a fiscal year. Daily bid-ask spread is defined as closing ask price minus closing bid price scaled by the average of closing ask and bid price. *ILLIQUID* is the logarithm of the median value of the ratio of daily absolute return to the trading volume in a fiscal year (Amihud, 2002). *SIZE* is the logarithm of total assets. *Q* is Tobin's Q, defined as market value of common equity plus book value of total assets and minus book value of common equity, scaled by book value of total assets. *M&A* is an indicator variable that equals one if a firm engages in mergers and acquisition in a year and zero otherwise. *FINANCE* is an indicator variable that equals one if a firm raised finance in a year and zero otherwise. *LITRISK* is a proxy for ex-ante litigation risk constructed using the regression coefficients of the variables in Model 3 of Table 7 in Kim and Skinner (2012). *LITRISK* is set to zero if missing. *MISS_LITRISK* is an indicator that equals one if *LITRISK* is missing, and zero otherwise. *LEV* is defined as the ratio of long-term debt to the sum of long-term debt and market value of equity. *LOSS* is an indicator variable equals one if net income is negative and zero otherwise. *CFO* is operating cash flows scaled by lagged total assets. *R&D* is R&D expenditure scaled by sales, and missing value is set to zero. *PRICE* is share price at a fiscal year end. *SDRET* is the standard deviation of daily returns over a fiscal year. *CORR* is the Pearson correlation coefficient between earnings per share scaled by year-beginning price and stock returns over a fiscal year, computed using data in the previous ten years. *STDROA* is standard deviation of quarterly *ROA* over the previous five years, where quarterly *ROA* is defined as income before extraordinary items scaled by assets. $\lvert\Delta EPS_{i,t+1}\rvert$ is the absolute value of the difference in earnings per share between years *t* and *t*+1, scaled by stock price at the end of year *t*.
t-statistics reported in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 9
D&O Insurance and Stock Beta

Y = $FBETA_t$	Coeff.	t-stat
$DOICOV_t$	0.648*	[1.928]
$SIZE_t$	-0.003	[-0.112]
Q_t	0.054**	[2.243]
LEV_t	-0.191	[-0.907]
$R\&D_t$	1.576***	[2.966]
$CAPX_t$	0.505	[1.331]
Ln$(CASHCOMP_t)$	-0.011	[-0.829]
$DELTA_t$	-0.236*	[-1.838]
$VEGA_t$	0.835	[0.944]
$OUTDIR_t$	-0.237	[-1.099]
$DOOWN_t$	-0.001	[-0.449]
Year fixed effects	Yes	
Industry fixed effects	Yes	
Adj.R^2	0.237	
N	2,139	

This table presents results of the regression of a firm's future exposure to market risk measured by stock beta on D&O insurance coverage. $FBETA_t$ is future stock beta estimated using a market model with monthly stock return over future two years t+1 to t+2, requiring 24 monthly returns. $DOICOV_t$ is the insurance coverage ratio. *SIZE* is the natural log of total assets. *Q* is the market to book value ratio, defined as market value of common equity plus book value of total assets and minus book value of common equity, scaled by the book value of total assets. *LEV* is the debt ratio. *R&D* is R&D expenditure scaled by sales, and missing value is set to zero. *CAPX* is capital expenditure scaled by total assets. Ln*CASHCOMP* is the natural log of one plus CEO's salary in cash, bonus and other annual compensation. *DELTA* is CEO's portfolio sensitivity to a $1 increase in the stock price (in million). *VEGA* is CEO's portfolio sensitivity to a 1% change in stock return volatility (in million). *OUTDIR* is the proportion of outside directors on the board. *DOOWN* is the portion of company shares owned by directors and officers. t-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.

TABLE 10
D&O Insurance and Future Operating Performance

Y =	*Adj. ROA*$_{t+1}$			*Adj. ROA*$_{t+2}$			*Adj. ROA*$_{t+3}$		
	OLS Regression (1)	Fama-MacBeth Regression (2)	Firm Fixed Effects Regression (3)	OLS Regression (4)	Fama-MacBeth Regression (5)	Firm Fixed Effects Regression (6)	OLS Regression (7)	Fama-MacBeth Regression (8)	Firm Fixed Effects Regression (9)
DOICOV$_t$	-0.012	-0.132**	0.023	0.026	-0.036	0.011	0.026	-0.025	0.037
	[-0.234]	[-2.109]	[0.422]	[0.489]	[-0.764]	[0.200]	[0.396]	[-0.455]	[0.482]
SIZE$_t$	-0.008*	-0.009***	-0.003	-0.007	-0.008***	-0.011*	-0.007	-0.008***	-0.022***
	[-1.905]	[-4.274]	[-0.479]	[-1.540]	[-3.121]	[-1.729]	[-1.360]	[-3.248]	[-2.802]
Q$_t$	0.040***	0.042***	0.032***	0.030***	0.032***	0.015***	0.024***	0.024***	0.008
	[7.265]	[11.948]	[6.492]	[4.477]	[7.814]	[2.836]	[3.151]	[5.457]	[1.517]
LEV$_t$	-0.063***	-0.066***	-0.013	-0.052**	-0.056***	0.025	-0.031	-0.037*	0.072**
	[-2.884]	[-3.980]	[-0.600]	[-2.094]	[-3.640]	[0.911]	[-1.075]	[-1.825]	[2.219]
CAPX$_t$	0.033	0.027	0.038	0.053	0.061*	0.017	0.066	0.069*	0.024
	[0.750]	[0.684]	[0.587]	[1.082]	[1.882]	[0.263]	[1.136]	[1.774]	[0.399]
R&D$_t$	0.173	0.228***	-0.333**	0.276	0.245***	-0.165	0.352*	0.345***	-0.033
	[1.135]	[3.365]	[-2.436]	[1.593]	[2.904]	[-0.922]	[1.765]	[6.445]	[-0.135]
DIVYLD$_t$	0.003	-0.012	-0.075	-0.198*	-0.216***	-0.186	-0.308**	-0.460***	-0.329**
	[0.033]	[-0.153]	[-0.687]	[-1.745]	[-3.333]	[-1.139]	[-2.088]	[-4.579]	[-1.995]
STDRET$_t$	0.092	0.144**	0.069	0.025	0.026	0.043	0.000	-0.017	0.025
	[1.300]	[2.162]	[0.828]	[0.323]	[0.753]	[0.474]	[0.002]	[-0.273]	[0.272]
XLIST$_t$	0.025**	0.020***	-0.038	0.029**	0.027***	-0.038	0.031**	0.030***	-0.028
	[2.294]	[3.348]	[-1.437]	[2.444]	[4.471]	[-1.543]	[2.285]	[4.695]	[-1.127]
Year fixed-effects	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Firm fixed-effects	No	No	Yes	No	No	Yes	No	No	Yes
Adj.R^2	0.263	0.321	0.751	0.197	0.241	0.733	0.159	0.206	0.733
N	1,915	1,915	1,915	1,720	1,720	1,720	1,460	1,460	1,460

ROA is defined as operating income before depreciation divided by average total assets. Industry-adjusted *ROA* (i.e., *Adj.ROA*) is defined as *ROA* minus the median *ROA* of all firms in the same fiscal year and in the same industry. *DOICOV*$_t$ is the insurance coverage ratio. *SIZE* is the natural log of total assets. *CAPX* is capital expenditure scaled by total assets. *LEV* is defined as the ratio of long-term debt to the sum of long-term debt and market value of equity. *R&D* is R&D expenditure scaled by net sales, and missing value is set to zero. *DIVYLD* is total dividends scaled by the market value of common equity at the end of the fiscal year. *STDRET* is standard deviation of monthly returns over the 60 months ending at the fiscal year end. *XLIST* is an indicator variable that equals one if a firm is cross listed in the US and zero otherwise. *t*-statistics reported in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.

TABLE 11
D&O Insurance and the Cost of Equity and Cross Listing in the US

$Y = (R_{AVG} - R_F)_{t+1}$	Coeff.	*t*-stat
$DOICOV_t$	4.227*	[1.866]
$XLIST_t$*$DOICOV_t$	7.268**	[2.012]
$XLIST_t$	-0.509	[-1.588]
$UBETA_{t+1}$	0.662**	[2.156]
STD_RESRET_{t+1}	9.747***	[3.937]
LnMV_t	-0.339**	[-2.563]
LnBM_t	0.696***	[3.100]
LEV_t	4.229***	[5.429]
$RATING_t$	-0.033	[-0.419]
$MISS\_RATING_t$	-0.244	[-0.228]
Ln$RET12_{t+1}$	-1.870***	[-8.119]
$FBIAS_{t+1}$	-12.596***	[-6.414]
$FLTG_{t+1}$	7.443***	[11.367]
$CASH_t$	-0.384	[-0.297]
Industry and year fixed effects	Yes	
Adj.R^2	0.640	
N	2,025	

This table examines whether the association between D&O insurance and the cost of equity varies between firms that are only listed in Canada and firms that are also cross listed in the US. R_{AVG} is the mean value of the implied cost of equity based on Gebhardt et al. (2001) (R_{GLS}), Claus and Thomas (2001) (R_{CT}), Ohlson and Jeuttner (2005) and implemented by Gode and Monanham (2003) (R_{OJ}), and the modified PEG model in Easton (2004) (R_{MPEG}). R_F is risk free rate. *DOICOV* is the insurance coverage ratio. *UBETA* is market beta divided by one plus the ratio of long-term debt to market value of equity, where the market beta is estimated by the market model using previous 60 monthly return (at least 24 monthly observations). *STD_RESRET* is the standard deviation of the residual monthly returns in the market model. Ln*MV* is the natural log of the market value of equity at the fiscal year end. Ln*BM* is the natural log of the ratio of book value of equity to market value of equity. *LEV* is defined as long-term debt divided by the sum of long-term debt and market value of equity. Ln*RET*12 is the natural log of one plus the compounded stock returns during the previous 12 months. *FBIAS* is actual EPS from IBES minus forecasted EPS from IBES, scaled by price. When actual EPS from IBES is missing, actual EPS from COMPUSTAT is used. *CASH* is cash & cash equivalent scaled by book value of total assets. *XLIST* is an indicator variable that equals one if a firm is cross listed in the US and zero otherwise. *RATING* is S&P long-term credit rating for issuer (#SPLTICRM). We convert the letter ratings into numbers as follows: 22 = AAA, 21 = AA+, 20 = AA,19 = AA-, 18 = A+, 17 = A, 16 = A-, 15 = BBB+, 14 = BBB, 13 = BBB-, 12 = BB+, 11 = BB, 10 = BB-, 9 = B+, 8 = B, 7 = B-, 6 = CCC+, 5 = CCC, 4 = CCC-, 3 = CC, 2 = C, 1 = below C. *RATING* is set to 0 if missing. *MISS_RAGING* is an indicator variable that equals one for the observations missing *RATING*. *t*-statistics in the brackets are based on standard errors adjusted for clustering at the firm level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level (two-tailed), respectively.