

Environmental liabilities and diversity in practice under international financial reporting standards

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Abstract

Purpose – The purpose of this paper is to encourage accounting regulators to address diversity in practice in the reporting of environmental liabilities. When Canada changed to International Financial Reporting Standards (IFRS) in 2011, Canadian regulators asked the IFRS Interpretations Committee to interpret whether the discount rate to value environmental liabilities should be a risk-free discount rate. Old Canadian GAAP, and current US GAAP, allow for a higher discount rate, resulting in commensurately lower liabilities. International regulators refused to address this issue expecting no diversity in practice in Canada.

Design/methodology/approach – The focus is on a sample of Canadian oil and gas and mining firms. These domestic industries play a major role internationally and have significant environmental liabilities. The method is empirical archival, tracking firm characteristics and discount rate choice on transition to IFRS.

Findings – There is significant diversity in practice. About one-third of the sample firms choose a higher discount rate, avoiding a major increase in environmental liabilities on transition to IFRS. The evidence suggests that these firms have relatively larger environmental liabilities and that the discount rate decision is a strategic choice.

Research limitations/implications – The sample is based on one country and may only be reflecting local anomalies that have no broader implications.

Practical implications – Diversity in practice in accounting for environmental liabilities is not acceptable. Accounting regulators should act to create consistent and comparable reporting practice.

Social implications – Firms and managers facing larger environmental liabilities can choose to minimize environmental liabilities under IFRS, while it is the general public and society at large that bear the ultimate risk.

Originality/value – The paper pushes forward the debate on whether recognized environmental liabilities should reflect the interests of equity investors, or if other investors and stakeholders should be taken into account.

Keywords Environmental accounting, Discount rate, IAS 37, Environmental liabilities, Environmental provisions

Paper type Research paper

1. Introduction

In this paper we explore what is arguably the most material environmental item in relation to financial accounting: how de-commissioning costs, clean-up costs and other related environmental liabilities are recognized in the financial statements. Environmental liabilities are quite different from financial liabilities. In the case of default on financial liabilities, the creditors end up with the firm's assets and the debt is effectively discharged. Environmental liabilities do not simply disappear if the polluting firm goes into insolvency. On the contrary, they often remain with the associated asset and serve to impair any future cash flows if the firm's creditors takeover. Environmental liabilities may lead the creditor to have no desire to take over the residual assets of the firm, if they loom too large on the balance sheet. Ultimately, and in any case, all the costs associated with pollution are born by society at some level.



For firms in polluting industries, future de-commissioning and clean-up costs are often the largest unfunded liabilities recognized in the financial statements. The amount that enters the financial statements is the present-value of these liabilities and the liability duration is typically long, making them very sensitive to the discount rates used. This is an area of major divergence between generally accepted accounting principles in the USA (US GAAP) and International Financial Reporting Standards (IFRS). Before moving to IFRS, Canadian GAAP was converged with US GAAP on the reporting of environmental liabilities. Under US GAAP's Accounting Standards Codification 410: Asset Retirement and Environmental Obligations (ASC 410), the discount rate is a credit-adjusted risk-free rate, based on the risk-free rate plus an upward adjustment to reflect the firm's "own credit risk." International Accounting Standard 37: Provisions, contingent liabilities and contingent assets (IAS 37) is most often interpreted as dictating the use of a risk-free discount rate, with no adjustments for own credit risk. The International Accounting Standards Board (IASB) staff, among others, implied that this interpretation of IAS 37 creates liabilities that are roughly double those that are recognized under US GAAP (IFRS Interpretations Committee, 2010, p. 14; Schneider, 2011a, p. 4). However, IAS 37 does not explicitly state that including own credit risk is not allowed and it was argued that firms could choose to include own credit risk in the discounting of future environmental liabilities. The IFRS Interpretations Committee (IFRIC) was asked by the Canadian accounting regulator to take this issue onto its agenda. The IFRIC's official response was that it did not expect diversity in practice and that there was no need to address it.

The aim of the paper is twofold: first, we challenge the position of the IFRIC and we investigate whether there is diversity in practice associated with the move to IAS 37. Second, subject to finding such diversity, we explore its determinants, and in particular managers' choice to continue including own credit risk in discounting environmental liabilities. Since the aim of the paper is explorative and applied in nature, we unfold our research aims as research questions.

Our empirical analysis focuses on firms in the Canadian mining and oil and gas industries. We chose this setting for several reasons. First of all, because pre-IFRS Canadian GAAP converged with US GAAP on this topic, it is an ideal setting to explore what might occur if US GAAP and IFRS converge in accounting for environmental liabilities. Second, with the divergent opinions on how to handle the transition to IAS 37, the IFRS transition in Canada is appropriate to study firms' different reporting incentives and the potential impact of diversity in practice on the reporting of environmental liabilities. As the Canadian IFRS transition date approached, the oil and gas industry in particular promoted the idea that including own credit risk was allowed under IAS 37. The debate over including own credit risk became the major issue for practitioners and standards setters during the transition to IFRS in Canada. Canadian Regulators requested guidance from the IFRIC over the discount rate (Canadian Accounting Standards Board, 2010), but the IFRIC refused and the issue was left unresolved at the time of transition. The IFRIC's official position was that there would be no significant diversity in practice, Canadian firms would follow predominant practice and not include own credit risk (IFRS Interpretations Committee, 2011b, p. 4). Third, the Canadian mining and oil and gas industries play a major role internationally. Canadian capital markets have more publicly listed oil and gas companies than any other country; as of January 2012 approximately 35 percent of the world's publicly traded oil and gas companies were listed on Canadian stock exchanges (Alberta Securities Commission). In 2012, 60 percent of all funds raised worldwide in the mining industry were raised on the Toronto Stock Exchange (The Mining Association of Canada). Any results, even if only attributable to the Canadian setting, have international implications because of the large role Canadian firms play in these sectors and the large environmental liabilities associated with them.

Contrary to the IFRIC's position, we provide evidence that significant diversity in practice does exist under IAS 37. Furthermore, we are able to identify some determinants for

this diversity in practice: we find that the likelihood for firms to include own credit risk on transition to IFRS in Canada is increasing with the amount of environmental liabilities and when there is a greater exposure to US investors, after controlling for size, bankruptcy risk, leverage, media coverage, volatility and auditor. Evidence that firms in the oil and gas industry are less likely to include own credit risk than firms in the mining industry is only marginally significant. However, we note that most of the largest Canadian oil and gas companies, with significant operations in the controversial Alberta oil sands, choose to include own credit risk in discounting their environmental liabilities, while most of their smaller counterparts moved to the risk-free discount rate.

In additional analyses, we find no evidence that investors place different value-relevance on environmental liabilities based on firms using a risk-free vs credit-adjusted discount rate. This is an important additional element to understand why there is diversity in practice: if investors do not adjust for the discount rate choice under IAS 37, managers are not restricted by stock market forces in making their discount-rate choice. We investigate this in two ways. First, we explore the value-relevance of reported environmental liabilities at the IFRS transition date. Second, we further investigate whether the choice of discount rate matters. Finally, we also make a brief inquiry into whether any diversity in practice exists for non-Canadian IFRS reporters, using a web-based sample of international firms.

Our paper makes a contribution along three lines. First, to the best of our knowledge, there has been very little attention in environmental accounting literature paid to the dynamics around how environmental liabilities are actually estimated for the purposes of being disclosed on the balance sheet (Li and McConomy, 1999; Bewley, 2005). Most of the existing literature has focused on implicit environmental liabilities and voluntary disclosure. Off balance-sheet environmental liabilities have been shown to affect equity value (Barth and McNichols, 1994; Cormier and Magnan, 1997; Clarkson *et al.*, 2004) and also bond pricing (Schneider, 2011b). The role of voluntary environmental disclosure has been hotly debated, over whether it provides meaningful information (e.g. Clarkson *et al.*, 2008) or if it is just a legitimization tool (e.g. Cho *et al.*, 2012). Our study is unique in that we are not trying to assess what firms may or may not be reporting, or their reporting quality. We study the actual managers' decision on how to value environmental liabilities in their mandatory financial reporting and present evidence on why they are making these decisions. The evidence we obtain allows us to provide valuable insights, which help inform the debate on the reporting of environmental liabilities and provide an incremental contribution to the existing literature.

Second, the implications for standards setters and practice are significant. Our findings suggest that the issue of whether or not to include own credit risk for discounting future environmental liabilities under IFRS should be addressed. We provide evidence that firms do not behave uniformly and their choice is dependent on their own reporting incentives. Our evidence is aligned with the concerns of two of the big four auditing firms, who at the time of the on-going debate argued that own credit risk should not be allowed when discounting future environmental liabilities under IFRS, and that the IFRIC should clear up the potential for diversity in practice. In letters to the IFRIC, PWC stated: "we believe that the most appropriate approach is for credit risk to be excluded from the discount rate used to measure a provision" (PricewaterhouseCoopers, 2010). KPMG stated: "We are concerned that the Committee's stated intention that the Committee does not expect significant diversity in practice is unlikely to be realized" (KPMG, 2011). Despite their original position, both of these audit firms now accept either discount rate under IAS 37, on an international basis; a change brought about due to the IFRIC not addressing the issue and the ensuing diversity in practice in Canada.

Third, from a broader perspective, our purpose is to push forward the debate on how environmental liabilities enter the balance sheet. Based on our evidence and arguments,

we conclude with a normative statement that environmental liabilities are of a different nature from financial liabilities and that using own credit risk to lower on balance-sheet environmental liabilities is not appropriate. We contend that there are aspects of environmental liabilities that, in many cases, make the inclusion of own credit risk inappropriate. The key point is that these are not normal financial liabilities. They are typically backed by some form of government-required security, do not simply go away in the event that the firm cannot meet its commitments and have implications for the residual assets of the debt-holders, future owners of the firm, governments and society. We also note that a further complication to the situation results from how environmental liabilities are re-valued each period under IFRS vs US GAAP. Under US GAAP (and old Canadian GAAP), once a discount rate is associated with a particular environmental liability, the discount rate cannot be changed over the life of the liability. As a firm's credit rating declines (or increases), its new own credit-risk-adjusted discount rate only applies to discounting any new environmental liabilities that have arisen during the period. Under IFRS, all environmental liabilities are re-valued at each reporting period using the discount rate at the reporting date. This situation is fine if firms are using a risk-free discount rate. The risk-free rate is subject to less fluctuation, associated with macro-economic factors such as inflation (which is an appropriate factor to consider in discounting a future liability that is certain to occur), and it is decoupled from the credit risk of an individual firm. But current IFRS practice now allows own credit risk and if managers desire, environmental liabilities could decrease as a firm's credit risk increases (this issue is covered in more detail in Appendix 1). If standards setters choose to continue to allow own credit risk, the method of re-valuing environmental liabilities at each reporting date should not be a possibility and the standard should be changed to one that is converged with US GAAP. We consider this a second best option, the first best is for the international standards setters to clear up the diversity in practice under IAS 37, and prohibit the inclusion of own credit risk.

In the following section, we provide background information, informing readers about the discount rate debate and highlighting reasons for expecting diversity in practice. Section 3 presents our research questions coming out of the debate described in Section 2. Section 4 reviews our sample selection process and the design we use to address our research questions. In Section 5 we present the results, along with our additional analyses on value-relevance and international practice. Section 6 provides a discussion on how environmental liabilities might be appropriately reported in the financial statements and presents our concluding remarks.

2. Background

With the move to IFRS in Canada, the larger Canadian oil and gas firms were expecting increases of hundreds of millions of dollars to their on balance-sheet liabilities if they were to move to a risk-free discount rate for environmental provisions. The Canadian Association of Petroleum Producers (CAPP) identified this issue as "potentially the most material adjustment to the statement of financial position for the vast majority of CAPP's members" (CAPP comment letter to IFRIC, March 2011). Most of the largest firms in the sector, particularly those with large operations in the Alberta oil sands developments, took the position that they could include own credit risk in discounting these liabilities. The divergent positions on IAS 37 focus on the specific wording describing the appropriate discount rate under IFRS (IAS 37, para. 47):

The discount rate (or rates) shall be a pre-tax rate (or rates) that reflect(s) current market assessments of the time value of money and the **risks specific to the liability**. The discount rate(s) shall not reflect risks for which future cash flow estimates have been adjusted [emphasis added].

The key question is whether or not own credit risk is a risk specific to the entity and not a risk specific to the liability. The Canadian Accounting Standards Board sought to resolve this issue via a letter to the IFRS Interpretations Committee in October of 2010 with the following question (Canadian Accounting Standards Board, 2010, p. 2):

Issue – Can either the discount rate or the estimated future cash flows be adjusted for the entity's credit risk when a provision is measured in accordance with IAS 37 Provisions, Contingent Liabilities, and Contingent Assets?

In response to this request, the IFRIC acknowledged that IAS 37 does not “explicitly state whether or not own credit risk should be included.” However, it took the position that predominant practice was to exclude own credit risk and that Canadian firms would follow predominant practice (IFRS Interpretations Committee, 2011b, p. 3). Based on this position, it did not take the topic onto its agenda, no authoritative guidance was given and the issue was left unresolved at the time of transition. Over the course of several IFRIC meetings, a number of board members and interested parties argued that, absent authoritative guidance, firms would do as they please. As previously noted herein, these parties included two of the big four audit firms (PWC and KPMG). The other two of the big four (Deloitte and Ernst and Young) argued that own credit risk was allowed (IFRS Interpretations Committee, 2011b). CAPP and several of the large mining and oil and gas firms, made submissions arguing that own credit risk was allowed and also provided examples of IFRS reporters in the oil and gas industry that include own credit risk in their discount rate. The two audit firms with guidance against including own credit risk both changed their position after the IFRIC refused to give authoritative guidance.

Part of the IFRIC's reasoning in not addressing the ambiguity of IAS 37 was that it would be addressed shortly by the IASB (IFRS Interpretations Committee, 2010). However, more than five years after the IFRIC decision, the issue remains unresolved. The fact that diversity in practice is a concern for the industries we study is evident in much of the archival documentation reviewed for this paper. An example is the following excerpt from a comment letter by Teck Resources Limited, a large Canadian mining firm, submitted in November 2011 to the IASB, as part of the IASB's agenda consultation (Teck Resources Limited, 2011, pp. 1-2):

[...] extractive activities are a global industry and there is disparity in the accounting for and presentation of various significant items, which makes comparison of similar entities difficult. [...] We urge the IASB to address the significant divergence issues in accounting for extractive activities.

Despite various requests to provide guidance, managers have discretion to choose whether or not to include own credit risk. The next section will explore why, contrary to the IFRIC's expectations, we expect to find diversity in practice given the lack of clear guidance on the transition to IAS 37.

3. Research questions

The extensive literature on earnings management has shown that when management discretion is available, it will be used (Healy and Wahlen, 1999; Roychowdhury, 2006; Dechow *et al.*, 2010). Hilton and O'Brien (2009) provide evidence of opportunistic use of reporting regulations in the mining sector to avoid recognizing the impairment of mining assets. The opportunistic use of specific exemptions under IFRS 1 *First time adoption of International Financial Reporting Standards* (IFRS 1), and other options that present themselves upon transition have also been documented in the recent literature. Capkun *et al.* (2012), Ahmed *et al.* (2012) and Cormier *et al.* (2009) present evidence of opportunism and earnings management on transition to IFRS for European companies. This evidence is in line with studies pointing to a limited role for accounting standards in determining reporting

quality and highlighting the importance of firms' reporting incentives (Ball, 2006; Burgstahler *et al.*, 2006; Daske *et al.*, 2013). The application of accounting standards, including IFRS, involves judgment, the use of private information and thus management discretion. Many of the factors from this literature present themselves in our study.

The IFRIC's position that it expected Canadian firms to follow what it understood to be predominant practice is made quite explicit in a statement of the IFRIC Chair during the debate. The following is a direct transcription from the audio of the March 10-11 IFRIC meetings:

I'm afraid the lesson for the Canadians is if you want a rules-based system you should have stayed with US GAAP. If you want to come to a principles-based system means making judgments, but considering the way that other people around the world also come to the determination of those judgments. And if you want a rule that says, or if you want a book of rules that says, I will do it this way unless you show me where it says I can't, then I'm sorry, that's the wrong philosophy for adopting IFRS.

With the lack of guidance on IAS 37, whether to include own credit risk or adopt a risk-free rate ultimately relies on managers' reporting incentives. Our first research question focuses on this expectation and explores whether or not a significant portion of the sample firms acted to the contrary:

RQ1. Is there significant diversity in discount rate choice with the move to IAS 37?

Based on our expectation of finding diversity in practice, we are next interested in exploring what are the potential determinants of this diversity. A motivation to include own credit risk in discounting de-commissioning and clean-up liabilities is to minimize the balance-sheet impact of a large liability. This could be desirable for two different reasons. On one hand, there might be some implications for financial constraints: if managers are concerned about a firm's financial ratios (e.g. it might be under severe financial distress), they might not want to bring the increased liability onto the balance sheet. On the other hand, managers might be concerned by a political visibility argument, in that a large amount of environmental liabilities may cause public pressure.

Although minimizing on balance-sheet liabilities is something that could be desirable to a firm, there is also motivation for a firm to want to exclude own credit risk and move to a risk-free rate, driven by the desire to maximize future reported earnings. Garcia-Osma and Pope (2011) explore the IFRS transition in the EU as a means of "cleaning up" accumulated accruals bloat on the balance sheet. The more a firm "cleans up," the more discretion it has in future periods to manage earnings. A similar opportunity exists with regards to choosing a lower discount rate on transition to IAS 37. Although choosing a lower discount rate is not "cleaning up" accumulated accruals bloat, it has the same effect. A liability is being increased, some or all of which will be closed-out to retained earnings at transition due to the retrospective adoption dictated by IFRS 1. Appendix 1 describes in detail the difference between recognizing and expensing future de-commissioning and clean-up costs based on using a credit-adjusted risk-free rate under US GAAP vs a risk-free rate under IFRS. Under US GAAP and old Canadian GAAP, these liabilities are called asset retirement obligations. Under IFRS, they are called environmental provisions. Hereinafter, we will use the terms environmental provisions or liabilities interchangeably. Based on the above considerations, we pose the following research question:

RQ2a. Is the amount of environmental liabilities in the pre-IFRS period associated with the choice of the discount rate under IAS 37?

An IFRS 1 exemption for IAS 37 is available to all IFRS first time adopters, dictating retrospective adoption, but it is a simplified process. This is described in the 2011 financial statements of B2Gold Corporation (p. 29), a Canadian gold mining firm, as follows:

The Company elected to apply the exemption from full retrospective application of decommissioning provisions as allowed under IFRS 1. As such, the Company has re-measured

the provisions as at January 1, 2010 under IAS 37 "Provisions, contingent liabilities and contingent assets"; estimated the amount to be included in the cost of the related asset by discounting the liability to the date at which the liability first arose using best estimates of the historical risk-free interest rates; and recalculated the related accumulated depreciation, depletion and amortization under IFRS up to the transition date.

Thus, there is generally an entry to adjust the liability, offset by an entry to retained earnings and to the mining or oil and gas asset. Appendix 2 presents several examples of how this closeout was handled in practice. We also note that there is a specific IFRS 1 exemption dictating a modified method of retrospective adoption for the accounting for oil and gas companies using the "full cost" method of capitalizing and expensing exploration and evaluation costs. Most Canadian oil and gas firms use the full cost method and the exemption available for these firms is a full closeout to retained earnings. A \$1 million increase in the liability is offset by a \$1 million dollar decrease in retained earnings (less any tax effect). The following description from the 2011 annual report of Twin Butte Energy Limited (p. 26), a medium-sized oil and gas firm, concisely describes this:

Companies using the full cost book value as deemed cost exemption are allowed to measure the liabilities for decommissioning, restoration and similar liabilities at the date of transition and recognize directly in deficit any difference between that amount and the carrying amount determined under Previous GAAP.

There is tension between the positives of passing a portion of future expenses through to retained earnings (bypassing the income statement) and the negatives of a balance-sheet effect. Furthermore, a number of Canadian firms in the oil and gas sector are active in Alberta's oil sands and thus are heavily exposed to scrutiny for their environmental performance. Doubling the balance-sheet amount of environmental liabilities may be something to avoid if possible. Given the full cost exemption allowing a complete bypassing of the income statement, available to all but a few of the Canadian oil and gas firms, vs the related increase in balance-sheet environmental liabilities, we pose the following question:

RQ2b. Are oil and gas firms more or less likely than mining firms to move to the risk-free rate under IAS 37?

Another factor that might affect the choice of the discount rate is related to exposure to the US market. Many firms in our sample have a significant US shareholder base, as shown by the following excerpt from a CAPP comment letter to the IFRIC at the time (IFRS Interpretations Committee, 2011b, p. 9), when the debate over own credit risk was on-going:

Many of CAPP's members have a significant US shareholder and financing base. In many cases, US shareholders account for 75 percent of equity investments and are the primary source of debt financing. US investors also make major contributions to the worldwide oil and gas industry. These companies require comparability with US peers in order to gain fair access to the capital markets. Since US GAAP requires that a credit-adjusted discount rate be applied to abandonment and retirement obligations, these companies will not be comparable to US companies, as they will disclose a much higher liability for abandonment and remediation.

The same sentiment was expressed to the IFRIC by Teck Industries, a large Canadian mining firm. If firms with larger exposure to US investors wish to remain more closely aligned to US GAAP, then we would expect them to continue using an own credit risk adjustment. Therefore we pose the following research question:

RQ2c. Are firms more exposed to the US capital market more likely to use a credit-adjusted discount rate under IAS 37?

In the next section, we discuss our empirical model that includes several control variables which may affect the choice of the discount rate, as well as our sample selection and data collection procedures.

4. Research method

4.1 Empirical model

In order to investigate *RQ1*, we follow the discount rate choices of the firms in our study and determine if a significant number continue to include own credit risk in their discount rate. We will also explore at the univariate-level several company characteristics (i.e. firm size, size of environmental provisions, etc.) to compare the firms based on discount rate choice, contingent on finding diversity in practice (*RQ1*). We then explore the firm attributes discussed in *RQ2a-RQ2c* that might be determinants of this choice. Wiedman and Wier (1999) explore firm choice in on- vs off-balance sheet financing while Beatty and Weber (2006) explore the decision to take a goodwill write-down. We rely on these papers for direction in our control variables, because they are also investigating a dichotomous decision based on management discretion (using a probit model). We employ the following multi-variate probit model:

$$\begin{aligned} \text{Own Credit Risk}_i = & \beta_0 + \beta_1 \text{Environmental Provision}_i + \beta_2 \text{Oil and Gas}_i \\ & + \beta_3 \text{US Ownership}_i + \beta_4 \text{Size}_i + \beta_5 \text{Z-Score}_i + \beta_6 \text{Leverage}_i \\ & + \beta_7 \text{Media Exposure}_i + \beta_8 \text{Volatility}_i + \beta_9 \text{Auditor}_i + \varepsilon_i \quad (1) \end{aligned}$$

where i denotes firm and Own Credit Risk is an indicator variable equal to 1 if the firm continues to include own credit risk in discounting its environmental provisions upon transition to IAS 37, 0 if not (i.e. switches to the risk-free rate). The coefficients of interest for investigating *RQ2a-RQ2c* are, respectively, β_1 , β_2 , and β_3 . Environmental Provision is on balance-sheet environmental provisions scaled by market value at the close of 2010 and is meant to address the materiality of a move to a risk-free discount rate. If firms are motivated to minimize the balance-sheet impact of environmental liabilities, we expect firms with relatively larger environmental provisions prior to the move to IAS 37 to continue to include own credit risk (β_1 significant and positive). Oil and Gas is an indicator variable equal to 1 if the firm is in the oil and gas sector, 0 otherwise. If there is more incentive to bypass the income statement with the possibility to use the IFRS 1 exemption for oil and gas firms, we expect β_2 to be significant and negative. If the reported balance-sheet amount is of more concern to managers, we expect β_2 to be significant and positive, so we make no directional prediction for *RQ2b*. Finally, given statements by firms in both industries in favor of minimizing the controversial liability and maintaining comparability with US firms, we use US Ownership as a measure of relative exposure to US investors. To calculate US Ownership, we obtain the total shares reported in the 13-F filings of US institutional investors for the close of the third quarter of 2010 for each firm in our sample. A 13-F is a quarterly filing required of institutional investment managers with over \$100 million in qualifying assets. We use the 13-F for the close of the third quarter of 2010 because it would likely have been in the fourth quarter of 2010 when the discount rate was chosen. The total 13-F shares are scaled by the number of shares outstanding to give us an estimate of the percentage of total shares held by US institutional investors. We expect that a firm with higher US institutional ownership will be more likely to choose to report in a comparable fashion to US firms (β_3 significant and positive). Although we are not picking up exposure to individual US investors, US Ownership is meant as a proxy for overall exposure to US investors.

We bring several control variables into the model based on the literature. Wiedman and Wier (1999) and Beatty and Weber (2006) both use the natural log of market value as a control for firms' size. Larger firms not only will have larger environmental provisions (and omitting a control for size might bias our coefficient of interest β_1), but will also be more exposed to public scrutiny over the size of the environmental liabilities. We include this same variable (Size) as a control for size. Credit risk is another factor we wish to control for in our model. Since most of our sample firms are relatively small and do not have bank borrowing or bond issue liabilities, there is no credit rating data information available. Therefore, we adopt a modified version of the Altman *Z-score* model (Altman 1968) to estimate expected credit risk for our sample firms (*Z-score*) [1]. The Altman *Z-score* model is commonly used in the finance literature to estimate corporate default risk (e.g. Cavallo and Valenzuela, 2007; González-Aguado and Moral-Benito, 2012). Following Beatty and Weber (2006) we also control for leverage (Leverage) measured as total debt over total assets. Regardless of the ownership structure, some firms might be more familiar to the public in the US than others (e.g. firms operating in Alberta's oil sands). Thus, we include a control for relatively higher US media exposure (Media Exposure), measured as the number of articles in 2010 mentioning each respective firm in US major news and business articles scaled by each firm's non-US major news and business articles, as per the Factiva database. We control for firm risk similar to Beatty and Weber (2006) by including the standard deviation of the daily stock return for the year prior to IFRS adoption (Volatility). Finally, we have already discussed herein that two audit firms (PWC and KPMG) explicitly expressed to the IFRIC the opinion that own credit risk was not appropriate under IAS 37. Auditors from these firms may be more reluctant to allow the inclusion of own credit risk. To address this, we use an indicator variable (Auditor) equal to 1 if the auditor is PWC or KPMG, 0 otherwise. Overall, we acknowledge that it is not possible to capture all possible motivations that may be driving manager choice. Indeed, some managers may simply believe that not including own credit risk is the proper interpretation of IAS 37, and this is difficult to model. However, in the context of our research questions, Equation (1) presents a robust model and we now proceed to present our sample selection and data collection.

4.2 Sample selection and data collection

We collect as comprehensive a sample as possible of publicly traded oil and gas companies and metals mining companies listed in Canada that transferred to IFRS. Compustat and the Center for Research in Securities Prices (CRSP) cover a significant portion of publicly listed companies in Canada. However, they do not cover a large number of smaller Canadian companies. Another source of data for Canadian companies is the Report on Business (ROB) database, associated the Globe and Mail, a major Canadian newspaper. Wherever possible, we collect data from Compustat, CRSP and the ROB database. None of the detailed information on the discount rates and the related environmental liabilities is available and these data are hand-collected from the notes to the financial statements. We select all oil and gas companies and all precious and non-precious metals mining companies listed on Canadian stock exchanges with a market capitalization greater than \$50 million at the close of 2009, the year prior to the IFRS transition date (the \$50 million cut-off was chosen because most smaller firms are early stage exploration companies and have minimal, if any, environmental provisions). This gives us a sample of 146 companies. Canadian companies have the option to report under US GAAP, which includes some of the firms captured in our sample. These firms have no comparative IFRS data and are removed from the sample, bringing the sample size to 133 firms. We then also remove two firms that elected to switch to US GAAP rather than move to IFRS. At this stage we also find a number of firms that are cross-listed on other international exchanges that report based on the standards in those countries. We eliminate these firms from the sample, removing another nine firms.

We are studying the effect that the move to IFRS has on environmental liabilities, so firms that have no material environmental liabilities to report are not meaningful in our sample. Removal of these firms brings the sample size down to 104 firms. Another five firms are pulled from the sample because they are either newly formed, have been acquired or recently merged. We also do not include three firms with fiscal year-ends after June 30, 2011, because the 2011 financial statements were not available when the sample was established. Finally, we eliminate a mining company that simply expenses all environmental liabilities upon determining that they exist, *ex ante* and *ex post* IFRS, one firm that used the risk-free rate, *ex ante* and *ex post* IFRS, one firm cross-listed in South Africa that switches to the South African “risk-free” rate, resulting in no change in the discount rate used, and two firms that are spin-offs of a parent company during the study period. The final sample for Equation (1) consists of 87 firms that switched from reporting their environmental liabilities based on standards virtually identical to US GAAP to IFRS in 2011. This sample size compares favorably to other studies in the literature that take an industry-based approach, such as Cormier and Magnan (1997), Clarkson *et al.* (2004), Wier (2009) and Schneider (2011b).

The hand-collected data were compiled by two of the authors and two research assistants. We employed a three-step procedure to ensure reliability of the hand collection. The first step was a pilot test conducted over a sub-sample (ten firms) of financial statements that were coded by the coders independently. As it is a straightforward hand collection of values and does not require much interpretation, few doubts were raised during this test. The consistency of the data collected was verified and we proceeded to hand-collect the data for the rest of the sample, which was split among the coders. The second step involved one of the authors (who also participated in the first step) double-checking for accuracy the key data collected on all IAS 37 related variables (i.e. change in environmental provision, discount rate, etc.). Finally, all outliers of any kind were verified for accuracy. We believe that this three-step procedure for hand-collecting our data have delivered reliable data. In all analyses, the variables are winsorized at the 2.5 percent level giving us confidence that any results are not due to outliers, caused by coding errors or otherwise.

5. Results

5.1 Diversity in practice

The first row of Table I, Panel A, shows that of the 87 firms in our sample, 25 include own credit risk in their discount rate. In total, 29 percent do not follow what the IFRIC declared as “predominant practice” (IFRS Interpretations Committee, 2011a, p. 3). This leaves 62 firms that move to the risk-free rate, or 71 percent of the sample. We test whether or not this is significantly different from 100 percent of the firms using the risk-free rate (*RQ1*). A *t*-test, with *t*-stat -5.88 and *p*-value less than 0.01, strongly rejects a null hypothesis that assumes predominant practice is to exclude own credit risk. Qualitatively, with almost one in three of the firms including own credit risk, we conclude that there is significant diversity in practice. In Appendix 3 we present a number of the financial statement note disclosures of our sample firms. They are good examples of how different firms present directly contrary explanations of what the discount rate under IAS 37 should be.

In the second through fourth rows of Table I, Panel A, we present value-weighted descriptive results based on market value, total assets, pre-IFRS environmental provisions and undiscounted pre-IFRS environmental provisions. By all of our measures, it is clearly the larger firms that are choosing to include own credit risk. The 25 firms that include own credit risk represent 70 percent of the market value, 73 percent of the total assets, 76 percent of pre-IFRS environmental provisions and 80 percent of the pre-IFRS undiscounted environmental provisions of the total sample of 87 firms. Table I, Panel A presents the total dollar amounts associated with these variables as well. As an example of the magnitude of these amounts, the total undiscounted environmental liabilities for the 87 sample firms, at the close of fiscal 2010,

<i>Panel A: full sample of mining and oil and gas companies (n = 87)^a</i>				
	Move to risk-free rate		Include own credit risk	
Number of firms	62	71%	25	29%
Total market value	\$140,294,885	30%	\$327,367,873	70%
Total assets	\$109,985,030	27%	\$299,041,718	73%
Total environmental provisions	\$ 3,540,957	24%	\$ 11,277,103	76%
Undiscounted clean-up costs	\$ 10,424,409	20%	\$41,086,367	80%

<i>Panel B: comparison of means, full sample of mining and oil and gas companies (n = 87)</i>				
	Move to risk-free rate	Sig.	Include own credit risk	
Means	62 firms		25 firms	
Total market value	\$2,262,820	***	\$13,094,714	
Total assets	\$1,773,952	***	\$11,961,668	
Total environmental provisions	\$ 55,805	**	\$ 438,921	

Notes: Amounts are in \$CDN '000s. At December 31, 2010 \$1 CDN = US\$0.9946; For Panel A through B: market value is first-quarter-end market value after release of year-end financials of the last pre-IFRS reporting year. Total assets are for the close of the last pre-IFRS reporting year. Environmental provisions are as per pre-IFRS GAAP. Significance levels are one-tailed with the expectation that the values will be higher for firms that do not move to the risk-free rate. ^aH₀: Mean of risk-free indicator = 1; *t*-stat = -5.88; *p*-value < 0.01. ****p* < 0.01; ***p* < 0.05; **p* < 0.1

Table I.
Diversity in practice

are almost \$51.5 billion. This amount represents the firms' own estimates of the future clean-up costs. The firms including own credit risk are responsible for \$41 billion of these expected costs. The size measures presented in Table I, Panel A show that value weighting in any way simply increases the strength of our inference. We conclude there is significant diversity in practice with regards to including own credit risk when establishing the book value of reported environmental provisions upon transition to IAS 37 in Canada.

In Table I, Panel B, we compare the means of market value, total assets and pre-IFRS environmental provisions for the firms that include own credit risk vs those that use a risk-free rate. All of these size measures are significantly larger for the firms that include own credit risk in the discount rate.

In Table II we present more details in relation to the size of the firms that do or do not include own credit risk. We base it on the market value of equity; however, the results we present are similar if the comparison is based on any of the other measures used in Table I.

	Number of firms	%
<i>Panel A: total sample (n = 87)</i>		
Firms including own credit risk	25	29
Firms in top 10 market value including own credit risk	8	80
Firms in bottom 77 market value including own credit risk	17	22
<i>Panel B: oil and gas firms (n = 47)</i>		
Firms including own credit risk	12	26
Firms in top 10 market value including own credit risk	7	70
Firms in bottom 37 market value including own credit risk	5	14
<i>Panel C: mining firms (n = 40)</i>		
Firms including own credit risk	13	33
Firms in top 10 market value including own credit risk	4	40
Firms in bottom 30 market value using risk-free rate	9	30

Table II.
Firms including own credit risk in discount rate by market value

Note: Market value is first-quarter-end market value after release of year-end financials of the last pre-IFRS reporting year

Table II, Panel A presents the number of firms including own credit risk that are in the top ten market value and then the number of firms including own credit risk for the remaining 77 firms. Of the top ten firms, eight include own credit risk in their discount rate (80 percent) and of the remaining 77, 17 include own credit risk (22 percent). In Panels B and C we present the same top ten breakdown as in Panel A, based on the oil and gas sub-sample and mining sub-samples, respectively. In the oil and gas sector, seven of the top ten firms include own credit risk (70 percent) while of the remaining 40 firms, only five include own credit risk (12.5 percent). The case is different for the mining industry, where four of the top ten firms include own credit risk (40 percent), while nine of the remaining 30 include own credit risk (30 percent). Qualitatively, the oil and gas sub-sample provides some insight into *RQ2b* addressing the oil and gas full cost exemption. All of the large firms that continue to include own credit risk are active in Alberta's oil sands and have very large related environmental liabilities (and would be more concerned about public perception). Many of the smaller firms are more exploration based and would be less concerned about retrospective losses and the full closeout to retained earnings allowed under the full cost exemption (and more concerned about future earnings). We now move on to explore the results of Equation (1), our multi-variate probit model, to fully address *RQ2a-RQ2c*.

5.2 Multi-variate analysis

Table III presents descriptive statistics for the firm characteristics in Equation (1), as well as information on the discount rates used pre- and post-IFRS. With the move to IFRS, the average discount rate went from 7.74 percent (Discount Rate pre-IFRS) to 4.47 percent (Discount Rate IFRS). However, for the firms that went to the risk-free discount rate, the average is 3.56 percent

Variable	<i>n</i>	Mean (%)	Median (%)	SD (%)
Discount Rate pre-IFRS	87	7.74	8.00	1.91
Discount Rate IFRS	87	4.47	3.74	1.95
Risk-free Discount Rate IFRS	62	3.56	3.50	1.12
Own Credit Risk Discount Rate IFRS	25	6.71	6.80	1.99
Environmental Provision	87	3.06	1.66	3.14
Oil and Gas	87	54.02	n/a	n/a
US Ownership	87	7.04	0.40	12.66
Size	87	14.07	13.92	1.64
<i>Z-score</i>	87	1.25	1.20	1.31
Leverage	87	31.98	31.65	15.61
Media Coverage	87	17.23	13.93	14.43
Volatility	87	2.82	2.84	0.89
Auditor	87	41.38	n/a	n/a

Notes: Variable definitions: Discount Rate pre-IFRS and Discount Rate IFRS are the average discount rates used by sample firms to discount their environmental provisions, respectively, before and after IFRS adoption; Risk-free Discount Rate IFRS and Own Credit Risk Discount Rate IFRS are the average discount rates for firms using the risk-free rate and own credit risk, respectively; Environmental Provision is total environmental provisions scaled by market value; Oil and Gas is an indicator variable equal to 1 if the firm is in the oil and gas sector, 0 if it is in the mining sector; US Ownership is the number of shares reported in the 13-Fs of US institutional investors scaled by shares outstanding at the end of quarter 3, 2010; Size is the natural logarithm of the market value of equity, measured in \$CDN billions, at the end of the fiscal year prior to IFRS transition (typically December 31, 2010); *Z-score* is the modified Altman *Z-score* as described herein; Leverage is total liabilities, less environmental provisions, scaled by total assets; Media Coverage is the number of US media stories naming each firm, scaled by all non-US media stories naming each firm; Volatility is the standard deviation of the daily stock return for the year prior to IFRS adoption; Auditor is an indicator equal to 1 if the firm's auditor is KPMG or PWC, 0 otherwise. All continuous variables (except for the discount rates) are winsorized at 2.5 percent

Table III.
Descriptive statistics

(Risk-free Discount Rate IFRS), for the firms that included own credit risk; the average is 6.71 percent (Own Credit Risk Discount Rate IFRS). This is a greater than three percent difference and considering it relates to the discounting of some of these firms' largest liabilities, it is not an immaterial difference. Of note in our model variables is that environmental provisions (Environmental Provision) are equal to more than three percent of market value, on average, and over seven percent of the shares of our sample firms are owned by US institutional investors (US Ownership). The medians are lower, showing skewness in these variables, but they are certainly material in magnitude. As is evident from Table II, just over half of our sample is made up of oil and gas firms, while 41 percent of the sample firms are audited by either PWC or KPMG, the two firms that argued against including own credit risk.

In Table IV we present correlations between the continuous variables in Equation (1). There are several significant correlations that come out as expected. For example, larger firms have a higher *Z-score*, more US ownership, lower volatility and are subject to more US media attention (Spearman only). We do not present correlation tables for each industry, but a notable inter-industry difference is the correlation between size and US ownership, which is much higher for the oil and gas industry. None of the correlations cause us great concern with regards to potential collinearity. The only correlation above 0.50 is the rank ordered Spearman correlation between Size and *Z-score* at 0.52. It is unavoidable to have a situation where larger firms rank higher in a credit risk score.

Table V presents the results for Equation (1) and our investigation of *RQ2a-RQ2c*. The inferred answer to *RQ2a* is yes, the size of pre-IFRS environmental liabilities affects the decision on discount rate choice; firms with relatively higher environmental provisions are more likely to include own credit risk. In order to understand the economic magnitude of this association, we compute (un-tabulated) the marginal effect of a one standard deviation increase in environmental provisions (as a percentage of market value), when all other variables are set at their means, we find that the likelihood of a firm to include own credit risk increases by 15 percent. This is compelling statistical evidence supporting our descriptive results in Table I. Interpreting probit result is always a delicate issue and skewness in the data might affect the marginal effects at the means. Nonetheless, it is almost certain that our observation of firms with higher environmental liabilities making the choice to minimize the on balance-sheet liability is not random.

Moving on to *RQ2b*, the coefficient for the oil and gas industry indicator variable is negative at the 10 percent level. Thus, everything else equal, oil and gas firms are more likely to move to a risk-free rate, which maximizes the close out to retained earnings and the lowering of future environmental liability expenses. The marginal effect (un-tabulated) implies that oil and gas firms are 28 percent more likely to move to a risk-free discount rate than mining firms. We can only speculate that this might be driven by the full cost exemption available to the oil and gas industry, but it is a reasonable explanation.

	1	2	3	4	5	6	7
1. Environmental provision		0.04	-0.20*	-0.46***	0.32***	0.03	-0.27**
2. US ownership	0.07		0.46***	0.19*	0.1	0.19*	-0.19*
3. Size	-0.15	0.40***		0.52***	0.15	0.25**	-0.46***
4. <i>Z-score</i>	-0.46***	-0.01	0.41***		-0.25**	0.02	-0.03
5. Leverage	0.30***	0.14	0.13	-0.37***		0.03	-0.14
6. Media coverage	< 0.01	-0.01	0.14	< 0.01	-0.01		-0.20*
7. Volatility	-0.17	-0.08	-0.49***	-0.05	-0.02	-0.13	

Table IV.
Correlation matrix for continuous variables in Equation (1) probit model

Notes: Pearson (Spearman) correlations are reported below (above) diagonal. All variables are defined in the notes to Table III. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

	Expected sign	Coefficient
Environmental provision	+	15.01 (2.28)**
Oil and gas	±	-0.90 (-1.66)*
US ownership	+	2.78 (2.06)**
Size	+	0.20 (1.31)*
Z-score	-	0.045 (0.25)
Leverage	+	-1.48 (-1.02)
Media coverage	+	-0.28 (-0.23)
Volatility	+	-27.54 (-0.90)
Audit	-	-0.35 (-1.00)
Constant		-2.34 (-0.94)
Observations		87
Pseudo R ²		0.21

Notes: z-stats in parentheses. This table presents the probit regression results based on Equation (1). Variable definitions: the dependent variable, Own Credit Risk, is an indicator variable equal to 1 if the firm includes own credit risk in its discount rate for environmental provisions, 0 otherwise. All other variables are defined in the notes to Table III. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table V. Results for Equation (1) probit model

With respect to *RQ2c*, we show that a larger US institutional ownership base is significant and positively associated with the likelihood to include own credit risk in the discount rate, suggesting that firms exposed to the US market are likely to choose to remain more closely aligned to US GAAP. Considering this is precisely what the industry association (CAPP) told the accounting regulators these firms would want to do, the result is not surprising. The economic effect is once again significant: a one standard deviation increase in US institutional ownership when ownership and all other variables are set at their means increases the likelihood of including own credit risk in the discount rate by 11 percent (un-tabulated). Finally, among the control variables, the coefficient for *Size* is – as expected – positive and significant, at the 10 percent level. None of the other control variables are statistically different from zero. We note that although the audit firms PWC and KPMG argued that including own credit risk was not appropriate under IAS 37, whether or not they were a firm's auditor (Auditor) had no effect on the discount rate choice.

Our overall investigation of the possible determinants of the discount rate choice leads us to conclude that the size of a firm's environmental provision and its exposure to the US capital market are key determinants in managers choosing to continue to include own credit risk in discounting their environmental liabilities. Our specific research question on the oil and gas industry (*RQ2b*) supports our assertion that the full cost exemption available in this industry makes the move to a risk-free rate more desirable to the oil and gas industry.

5.3 Additional analyses[2]

Robustness checks and sensitivity analyses. Given the small sample size, we also replicate our probit analysis using approximate randomization (Noreen, 1989; Lundholm and Myers, 2002; Hammersley *et al.*, 2008). With approximate randomization, the dependent variable is randomly shuffled for all observations and then the regression model is run. We replicate this process 9,999 times and compare the coefficient estimates obtained from the observed data with the distribution of coefficient estimates generated by the randomization process. The un-tabulated tests generated by the approximate randomization procedure are consistent with those derived from the probit model suggesting our inferences are robust.

We also run the main model separately for the oil and gas ($n = 47$) and mining ($n = 40$) sectors. We still find (un-tabulated) the relative amount of environmental liabilities significantly and positively associated with using a credit-adjusted discount rate.

This continues to support our concern over the use of the discount rate to minimize on balance-sheet environmental provisions. However, for oil and gas firms, US ownership is not significant while size plays a major role. To further explore the overall role of firm size, we re-run Equation (1) using total market value as a proxy for size, rather than the logarithmic transformation as in Wiedman and Wier (1999) and Beatty and Weber (2006). Again, results are consistent with the main analysis except that the coefficient for exposure to the US market (US Ownership) is positive but not significant while size becomes significant at the 5 percent level. It is difficult to disentangle the effects of US market exposure and firm size. As a firm grows, it attracts more attention from US investors. Most likely, the result is due to the fact that the effect of exposure to the US market is subsumed by the total market value of the company. Finally, to address concerns over multicollinearity among independent variables (*Z-score* and volatility have a correlation coefficient of about 0.5), we also run model (1) omitting one or the other variable or both and results do not change.

Value-relevance. The main purpose of this paper is to present evidence on the reporting practices under IAS 37 and to discuss potential reporting standards problems as a result of these practices. However, the setting is one where an IFRS transition is covered and we would be remiss in not taking the opportunity to explore the move to IAS 37 from a market-based value-relevance perspective. We also wish to find if there is evidence of investors placing different value-relevance on environmental liabilities based on firms using a risk-free vs credit-adjusted discount rate. This is an important element to understand why there is diversity in practice: if investors do not adjust for the discount rate choice under IAS 37, managers are not restrained by stock market forces in making their discount-rate choice. We thus explore value-relevance along two different lines. First, we are interested in understanding whether the move to IAS 37 increased value-relevance for environmental liabilities. Second, given that we found diversity in practice under IAS 37, we are interested in investigating whether the market differentiates between the value-relevance of environmental liabilities based on managers' decision to include own credit risk in the discount rate.

To explore value-relevance at IAS 37 adoption, we follow the method of Barth *et al.* (2014) where the 2005 EU transition to IFRS is covered using a model based on Ohlson (1995). When firms move to IFRS, reconciliation between previous domestic accounting standards and IFRS is required for the transition date, the full year after the transition date and the closing date of that year (the official transition date is one year prior to the first full year of IFRS reporting). From this information, comparisons between the domestic GAAP financial statements and the IFRS statements for the year prior to the first IFRS reporting year can be constructed. Barth *et al.* (2014) breakout shareholders' equity and net income based on the accounting standards of each country pre-IFRS and the difference in shareholders' equity and net income caused by the move to IFRS. They then go on to breakout the shareholders' equity and net income differences based on the specific IFRSs driving these differences. We follow the same design, except that we only breakout the differences caused by IAS 37. Barth *et al.* (2014) use indicator variables for industry and country controls. We do not have to control for country effects and controlling for industry is done with a single indicator variable. The model is as follows:

$$\begin{aligned} \text{PRICE}_i = & \beta_0 + \beta_1 \text{BVE_GAAP}_i + \beta_2 \text{NI_GAAP}_i + \beta_3 \text{BVE_Diff}_i + \beta_4 \text{NI_Diff}_i \\ & + \beta_5 \text{Closeout_IAS37}_i + \beta_6 \text{NI_IAS37_Diff}_i + \beta_7 \text{Oil and Gas}_i + \varepsilon_i \end{aligned} \quad (2)$$

where *i* denotes firm and PRICE is the share price at the close of the first quarter of 2011. The right-hand side variables are for the year 2010 and are scaled by shares outstanding (Barth and Clinch, 2009). BVE_GAAP is book value of equity based on Canadian GAAP, NI_GAAP is net income based on Canadian GAAP; BVE_Diff is the change in shareholders'

equity due to transition to IFRS less Closeout_IAS37 less NI_IAS37_Diff. This removes the effect of our two IAS 37 change variables on the total change in shareholders' equity due to IFRS transition. NI_Diff is the change in net income due to transition to IFRS less NI_IAS37_Diff. Closeout_IAS37 is the difference in shareholders' equity as caused by IAS 37 at transition date. Under the full cost exemption available to oil and gas firms, this would be the entire difference between pre- and post-IFRS environmental provisions. For the other firms, part of the difference is added to property, plant and equipment, while the remainder is closed-out to shareholders' equity. NI_IAS37_Diff is the change in accretion expense plus the change in depletion expense caused by the move to IAS 37. Oil and Gas is an oil and gas industry indicator variable as in Equation (1). For brevity, we present only the results for the full sample, although results are similar on an industry basis.

Table VI, Panel A presents the descriptive statistics for the variables in Equation (2). The closeout to retained earnings (Closeout_IAS37) was on average a decrease of nine cents per share. The difference in net income due to IAS 37 (NI_IAS37_Diff), on a per share basis, is minimal. The very small average effect on income for the transition year leads us to believe it is not material as an income item at transition and that any material effect will occur in subsequent years. The unreported correlations for the variables used in Equation (2) show that share price (PRICE) is correlated in the expected positive manner with shareholders' equity (BVE_GAAP) and net income (NI_GAAP) and negatively with the closeout to retained earnings (Closeout_IAS37). While the NI_IAS37_Diff variable shows no major correlations, likely driven by the fact that many of the observations are at or near zero, there is significant negative correlation between Closeout_IAS37 and book value of equity

Panel A: sample descriptive statistics for Equation (2)

Variable	Mean	Median	SD
PRICE	16.27	9.06	16.76
BVE_GAAP	7.76	4.47	8.78
NI_GAAP	0.28	0.03	0.85
BVE_Diff	-0.37	-0.07	0.79
NI_Diff	0.06	0.01	0.45
Closeout_IAS37	-0.09	-0.01	0.19
NI_IAS37_Diff	< 0.01	< 0.01	0.01

Panel B: results of Equation (2)

	Expected sign	Coefficient	t-stat
BVE_GAAP	+	1.40***	8.14
NI_GAAP	+	4.44***	3.17
BVE_Diff	+	1.33	0.82
NI_Diff	+	1.41	0.56
Closeout_IAS37	+	1.39	0.23
NI_IAS37_Diff	+	-67.95	-0.63
Oil and Gas	?	2.05	0.98
Observations		87	
Adjusted R ²		0.72	

Notes: Panel B presents the price regression results based on Equation (2). Variable definitions: PRICE is closing share price at the end of quarter 1 for the first IFRS reporting year; BVE_GAAP is shareholder equity based on domestic GAAP; NI_GAAP is net income based on domestic GAAP; BVE_Diff is the change in shareholders' equity based on the move to IFRS, less NI_Diff_IAS37 and Closeout_IAS37; NI_Diff is the change in net income based on the move to IFRS, less NI_Diff_IAS37; Closeout_IAS37 is the closeout to retained earnings at transition date due to IAS 37; NI_IAS37_Diff is the change in accretion expense plus the change in depletion expense due to IAS 37; Oil and Gas is as described in Table III. All continuous variables (except PRICE) are scaled by shares outstanding at the close of the first quarter of the first IFRS reporting year and winsorized at 2.5 percent. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VI.
Value relevance of the IAS 37 adoption

(BVE_GAAP). The correlations are not extreme enough to cause major concern, but in any case, before running our final price regressions we used diagnostics to determine that collinearity was not affecting our results[3]. In Table VI, Panel B the results of Equation (2) are presented. The results show the expected signs and are significant at the less than one percent level for the domestic GAAP variables (BVE_GAAP and NI_GAAP). These are the key variables in the Ohlson model, and provide good explanatory power. The model has an adjusted R^2 of 0.72, but the only significant variables are shareholders' equity (BVE_GAAP) and net income (NI_GAAP). The remaining variables are not significant. The Equation (2) results imply that for the industries studied, there is no increased value-relevance with the move to IAS 37. These results are not terribly surprising, the application of IAS 37 shows significant diversity in practice and applying a coefficient to the effect of its changes is difficult. Two firms with a similar underlying liability may report a different change (or almost no change) in shareholders' equity (Closeout_IAS37) and net income (NI_IAS37_Diff) upon transition, depending on its discount rate choice. Table VI, Panel B suggests that there is no additional value-relevance of environmental provisions under IAS 37 as compared to Canadian GAAP.

Our next objective is to find evidence on whether the discount rate decision is value relevant. This analysis is key to understand if managers are constrained by the market in their discount rate choice. As in Barth *et al.* (2014, p. 305), for Equation (2) we do not make the assumption that investors have access to or use the disclosed reconciliations in the first 2011 IFRS financial statements. Therefore, if we want to investigate any investor recognition of the discount rate decision, we must analyze data after the IFRS transition. The first three years of IFRS reporting in Canada are available to us (2011-2013). We hand-collect these data in the same manner as described for the 2010 sample, following these companies in a three-year time-series. Collecting three years of data gives us a more robust sample, although we do lose firms over the time-series due to mergers and acquisitions. A total of 14 firms are part of a merger or takeover over the three years, four firms cease trading due to bankruptcy issues and one firm goes private. These firms are kept in the sample until the year they cease to trade, but results in this analysis are similar if we include only surviving firms. Our model is as follows:

$$\begin{aligned} \text{PRICE}_{it} = & \beta_0 + \beta_1 \text{BVE}_{it} + \beta_2 \text{NI}_{it} + \beta_3 \text{EP}_{it} + \beta_4 \text{Own Credit Risk}_{it} \\ & + \beta_5 \text{EP}_{it} \times \text{Own Credit Risk}_{it} + \beta_6 \text{Oil and Gas}_i + \varepsilon_{it} \end{aligned} \quad (3)$$

where i denotes firm and t denotes year. PRICE is the share price at the close of the first quarter of 2012 through 2014. The right-hand side variables are for the years 2011 through 2013 (as reported under IFRS), scaled by shares outstanding. BVE is book value of equity, plus environmental provisions, and NI is net income at fiscal year-end. EP is the total amount of environmental provisions. Own Credit Risk is an indicator variable as in Equation (1), indicating if the firm used a credit-adjusted discount rate. Our variable of interest is the interaction term between EP and Own Credit Risk and the associated coefficient, β_5 . If investors recognize the reported amounts of environmental provisions and can also differentiate between firms that do and do not include own credit risk, we expect β_5 to be significant and negative. Such a result would imply that the market picks up on the reported liability and can adjust for the firms that include own credit risk vs the risk-free rate in recognizing these liabilities on the balance sheet. We include the industry control, Oil and Gas as an oil and gas industry indicator variable as in Equations (1) and (2). We control for year fixed effects and cluster by firm using Rogers standard errors. Descriptive statistics for Equation (3) are presented in Table VII, Panel A and the results of Equation (3) are presented in Table VII, Panel B.

Panel A: sample descriptive statistics for Equation (3)

Variable	Mean	Median	SD
PRICE	12.11	6.07	13.98
BVE	8.17	5.30	8.73
NI	0.23	0.09	1.17
EP	0.80	0.25	1.05

Panel B: results of Equation (3)

	Expected sign	Coefficient	t-stat
BVE	+	0.94***	11.08
NI	+	2.69***	4.97
EP	-	1.26	1.57
Own Credit Risk	?	0.67	0.45
EP×Own Credit Risk	-	0.42	0.40
Oil and Gas	?	3.96***	3.32
Constant	?	0.800 (0.699)	0.70
Year fixed effects		Yes	
Observations		220	
Adjusted R ²		0.72	

Notes: Panel B presents the price regression results based Equation (3); Variable definitions: PRICE is closing share price at the end of quarter 1 for each of the first three IFRS reporting years; BVE is book value of equity at year-end plus environmental provisions, for the first three IFRS reporting years; NI is net income; EP is year-end environmental provisions; Own Credit Risk is an indicator variable equal to 1 if the firm includes own credit risk in the discount rate for environmental provision; Oil and Gas is an indicator variable equal to 1 if the firm is in the oil and gas sector, 0 if it is in the mining sector. All continuous variables (except PRICE) are scaled by shares outstanding at the close of the first quarter of the first IFRS reporting year and winsorized at 2.5 percent. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VII.
Value relevance of the discount rate choice

As with Equation (2), we see the usual strong results for book value of equity (BVE) and net income (NI), except that in Equation (3) they are based on IFRS. The oil and gas indicator variable is positive and significant, which is not the case in Equation (2). Although this could be attributable to the change in the composition of the sample due to the mergers and bankruptcies, it is more likely due to the increase in oil prices that occur in this period. The coefficients β_3 , and β_5 are not significant, indicating that neither the reported liability nor the different discount rates are relevant in the pricing model presented in Equation (3). This implies that either equity investors do not consider environmental provisions to be material in firm valuation, or that the reported amounts are not accurate reflections of the underlying liabilities. Further research on the relation between firm value, environmental liabilities and how they are recognized in financial statements is warranted, but it is beyond the scope of this paper. For the purpose of our investigation, we cannot provide evidence that the market constrains the choice of the discount rate under IAS 37.

International practice. When the debate over the discount rate was on-going, a number of examples of IFRS reporting non-Canadian firms including own credit risk under IAS 37 were referenced. The implication was that diversity in practice did exist internationally, and that including own credit risk in the discount rate was allowed under IFRS. In this additional analysis we explore whether diversity in practice exists under IAS 37 for IFRS reporters outside of our Canadian setting. To determine whether this is the case, we investigated the reporting practices of a sample of non-Canadian IFRS reporting firms. We focus on firms from polluting industries, including oil and gas, mining, chemicals and the energy sector. We select our sample by searching the internet for industry lists in the oil and gas, mining and several other polluting industries. For example, for oil and gas firms we rely heavily on Platts top 250 Global Energy Company Rankings. From the firms that we can identify, we then examined the notes to their financial statements to determine whether they

declare the discount rate used and whether it is based on a risk-free rate or is adjusted for own credit risk. A sample of 21 oil and gas firms, 20 mining firms and 20 firms from other polluting industries (chemical, pulp and paper and electric utilities) is identified this way, for a total of 61 firms. The sample used is by no means the detailed industry “drill-down” that we establish for the main sample of Canadian firms that we focus on herein. However, given the dominant position of the Canadian mining and oil and gas industries in company listings and the fact we cannot include US GAAP firms, such a “drill-down” does not exist in many other settings. This web-based approach will bias our sample to larger firms with a stronger web presence. Regardless, it is a robust enough sample to explore practice under IAS 37 in a non-Canadian IFRS setting, and will help us by highlighting whether there is diversity in practice outside our relatively narrow setting.

Table VIII presents the results of our survey of IFRS reporting firms in the oil and gas, mining and other polluting industries (chemical, pulp and paper and energy utilities). Of the 61 firms, we could identify nine firms that included own credit risk (15 percent). However, of these nine firms, seven were in the oil and gas sector. Of these seven, at least two (Eni SpA and Statoil) are larger than Canada’s largest oil and gas firm (Suncor) and are also active in Canada’s oil sands. One-third of the 21 non-Canadian oil and gas firms in our sample are using own credit risk in their discount rate. We conclude that there are enough oil and gas firms including own credit risk that a Canadian oil and gas firm would be justified in pointing to international practice as a reason for including own credit risk. This is what the Canadian oil and gas industry did when presenting its arguments to the IFRIC and we believe this is a major reason we find significant diversity in practice in the oil and gas industry upon transition to IAS 37. The story is somewhat different for the mining industry. Of the 20 mining firms we sampled, we could identify none that included own credit risk. This puts the Canadian mining industry in a weaker position as compared to the oil and gas industry. However, if an audit firm allows an oil and gas firm to include own credit risk, the same audit firm would not be able to tell a mining company it could not do the same: in other words, once the practice is adopted by one industry, an auditor would not be able to deny its adoption by a firm in a similar industry. So we conclude that existing practice under IFRS was a driver in allowing Canadian oil and gas and mining firms to include own credit risk when discounting their environmental provisions under IAS 37.

6. Discussion, limitations and conclusions

Before presenting some of our study’s limitations and our overall conclusions, we first enter into a discussion on what the appropriate discount rate for an environmental liability should be. Our study shows that there is diversity in practice, and therefore diversity in opinion, on how to discount environmental liabilities. A major objective of this study is to continue the discussion on this topic so that it will be addressed. Underlying the strict technical debate of whether own credit risk could be included in the discount rate under IAS 37 is the debate over whether it is theoretically appropriate and in the best public interest. We begin this

Table VIII.
Discount rate
used by a sample
of non-Canadian
IFRS firms

	No. of firms	Do not include own credit risk	Include own credit risk	% including own credit risk
Oil and gas	21	14	7	33
Mining	20	20	0	0
Other	20	18	2	10
Total	61	52	9	15

Note: The “Other” category includes firms from the chemical, pulp and paper and electric utilities industries

discussion by presenting one of the most controversial comments that came out of the IFRIC discount rate debate, made by the IFRIC chair, at the meetings of March 9-10, 2011:

[...] if I can make an observation at all about what I know of the extractive activity and also the Canadian situation. If you are about to adopt IFRS, I would encourage you to adopt it in the same way the rest of the world appears to have adopted it rather than continuing to use a Canadian GAAP type of approach and then finding perhaps in a year or two years' time that you've got to change accounting for your provisions. But the key issue I think is the more I see one industry and particularly in one country but certainly one industry complaining, I have to question why they are complaining and what the change is. Many in the extractive industry for environmental reasons have to post a bond or a Government guarantee or some other assurance that they will be able to meet their environmental obligation when it falls due several years into the future. They do that because not to put too fine a point on it, people in the extractive industry, especially the smaller ones, exploit, pillage, rape and then disappear with all the money and leave the mess behind for other people to clean up.

It is our understanding that in general, neither the Canadian oil and gas industry, nor Canadian regulators appreciated these somewhat disparaging remarks. However, the IFRIC chair does capture some of the key points that make environmental obligations different from a firm's financial liabilities. As discussed in the "introduction", environmental liabilities do not just go away in the event that the firm cannot make good on its commitments. If shareholders manage to walk away from responsibilities associated with environmental liabilities they often fall to the creditors, and from there they fall to governments and society in general. Hence, environmental liabilities can be described as a liability that is not just attributable to the equity holders. Should accounting regulators believe that financial statements only reflect the liabilities directly attributable to equity holders, then including own credit risk is appropriate. However, then the full re-valuation of environmental provisions under IAS 37 at each reporting date (as described in Appendix 1) is not appropriate and the standard should be changed to align with US GAAP on this point. With own credit risk allowed under IAS 37, if a firm approaches bankruptcy environmental provisions can be wiped off the balance sheet. We struggle to believe this was the actual intention of the IASB and the IFRIC.

Like all papers, ours is not without limitations. We acknowledge that we are dealing with a one-country sample, based on two industries and only one year of sample data. Thus, in many ways, we could only be addressing anomalies that have no broader implications, although we do provide evidence that diversity in practice is also common in the international sample. Furthermore, with a small sample size, power becomes an issue with regards to finding statistical significance. However, we have a compelling setting in which to study this environmental accounting issue. The Canadian economy is by no means a small one and the two industries we study loom large both within the Canadian economy and internationally. They are highly integrated with the US firms operating in the mining and oil and gas industries (particularly oil and gas) and also have a disproportionate share of environmental liabilities with regard to the overall world economy. Thus, generalizing our results and observations is reasonable, particularly given that we are comparing a form of accounting standards similar to US GAAP and the move to IFRS.

The results of our study provide evidence that Canadian oil and gas and mining firms made discretionary choices when adopting the IFRS reporting requirements for environmental liabilities (IAS 37). Our key objective was to explore whether there is diversity in practice and we found that there is. In the lead-up to IFRS transition, a number of Canadian firms made it clear they felt including own credit risk was allowed under IAS 37, and we show they followed this up in practice. These firms include many of the large oil and gas companies operating in Alberta's oil sands, have very large environmental provisions, and a large US investor base. The overall results of our probit model in

Equation (1) imply there was opportunism when choosing the discount rate. Finding no value-relevance in the accounting information with the move to IAS 37, nor an ability by the market to differentiate between the discount rate used (as presented in Equations (2) and (3)), is also consistent with diversity in practice and opportunistic behavior. Based on the evidence, our main conclusion is that, until the discount rate issue is addressed, IAS 37 is not a quality standard; not because it leaves discretion to the management *per se* but because it does not take into account the nature of environmental liabilities and their recognition as a matter of public interest. The way in which environmental liabilities are accounted for is extremely material to extractive industries, and in a more general sense, to the investing community and to the public in general. It is difficult to determine what the principles are behind IAS 37 when it comes to “risks specific to the liability.” Ambiguity in a standard that allows a large liability to differ by upwards of 100 percent based on firm choice should be dealt with. Although principles-based accounting standards imply that the IFRIC does not take on the interpretation of every technical detail in accounting standards, the interpretation of IAS 37 was identified as a major issue when IFRS was being adopted in Canada. Of the 21 interpretations the IFRIC has issued to date, two have directly addressed issues related to extractive activities[4]. Canadian standards setters went to the IFRIC for guidance but no guidance was given based on the assumption that there would be no diversity in practice. Our results show that this is not true. In our IFRS transition setting we are looking at a standard that is very material to extractive industries and a country that is a major player in these industries. Our study cannot (nor does it aim to) provide evidence on whether the move to IFRS was good or bad, but it does provide detailed evidence on the move to IAS 37 and challenges a public interest issue that has not been addressed by the standards setters. Our study helps to keep the debate on this issue open and encourages readers to contemplate it. The ultimate goal is to get standards setters to make on balance sheet environmental liabilities directly reflect the true nature of these liabilities. No matter what one would wish, they do not simply go away if an entity is unwilling or unable to pay for them.

Notes

1. Altman (1968, 2003) explicitly mentions that it is important to include a market measure. In the original Altman *Z-score* model, market value is scaled by total liabilities. All other variables (working capital, retained earnings, EBIT and sales) are scaled by total assets. In our setting, many firms have very low levels of debt, so the sample cannot be scaled by total liabilities since the denominator is close to zero for these firms and the *Z-score* will be extremely distorted. Mining and oil and gas firms in their early stages often find it difficult to issue debt and there are incentives in the Canadian tax system encouraging equity investing. For example, a type of equity known as a flow-through share is available to investors in exploration phase mining and oil and gas firms. These firms may pass through losses and the costs of some capital expenditures through to the flow-through shareholders, which may then be used to lower the individuals' taxable income. Therefore, a significant portion of our sample has very low liabilities. So, scaling by total assets is our only viable option if we want to include a market measure in our *Z-score* calculation. To address this modification of the Altman *Z-score* model, we also include leverage in our model to be sure we capture direct exposure to creditors for those firms that do carry higher debt.
2. For the sake of brevity, we do not tabulate all information relating to the additional analyses. However, they are available from the authors upon request.
3. Our primary method of diagnostics was to explore the variance inflation factors and the ability of each independent variable to be explained by the other right-hand side variables.
4. These are IFRIC 1 Changes in Decommissioning, Restoration and Similar Liabilities and IFRIC 20 Stripping Costs in the Production Phase of a Surface Mine.

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Further reading

International Accounting Standards Board (IASB) (2001), *IAS 37 Provisions, Contingent Liabilities, and Contingent Assets*, IFRS Foundation, London.

International Accounting Standards Board (IASB) (2004), *IFRS 1 First-time Adoption of International Financial Reporting Standards*, IFRS Foundation, London.

Appendix 1. Divergence between US GAAP and IFRS, discount rate

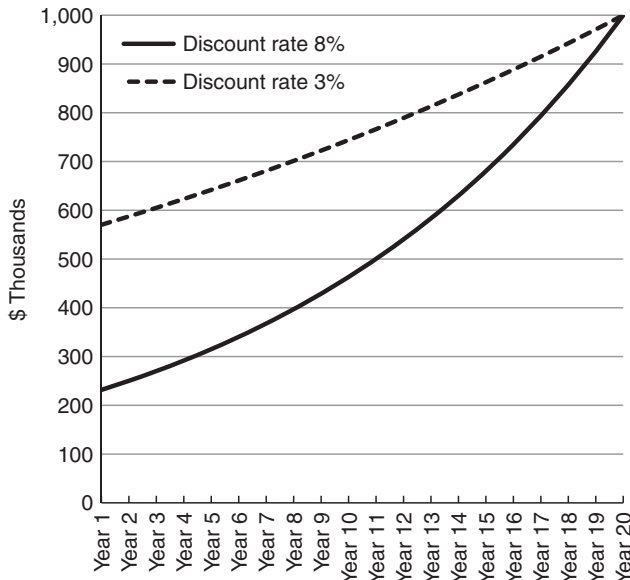
Readers of US GAAP financial statements will be used to seeing most on balance-sheet environmental liabilities fall under the term asset retirement obligations (AROs) as defined under Accounting Standard Codification 410, Asset Retirement and Environmental Obligations. Under IFRS, AROs are considered provisions and fall under the more general International Accounting Standard 37: Provisions, Contingent Liabilities and Contingent Assets (IAS 37). Provisions will also include restructuring costs and possible legal settlements and are presented as a more aggregated number; however, they are required to be broken out in the notes to the financial statements such that it is evident what would be AROs under US GAAP. For extractive industries, provisions tend to be dominated by environmental provisions, with litigation provisions typically coming second. When an environmental liability (provision or ARO) is recognized as a liability, there is an offsetting entry to the associated asset (e.g. the mine or oil well). This asset is then written-off via depreciation or depletion. The other income statement expense is accretion expense, which is the discount rate multiplied by the opening value of the liability (conceptually, this is the change in the present-value of the liability with the passage of time). As the accretion expense passes through the income statement, the liability increases until it ultimately reaches the full undiscounted amount of the estimated liability. Figure A1 presents a comparison of the book value of an environmental liability based on a credit-adjusted discount rate and a risk-free one. The timeline until the expected clean-up is 20 years. It presents a \$1 million estimated clean-up cost and a credit-adjusted risk-free rate of 8 percent vs a risk-free rate of 3 percent, assuming no change in estimate or discount rate over the 20-year timeline. Given that the ultimate destination of both liabilities is the \$1 million estimated clean-up cost, the line in Figure A1 associated with the three percent risk-free rate is virtually flat while the one associated with the credit-adjusted risk-free rate of eight percent is quite concave.

US GAAP requires that the original discount rate sticks with the original liability as time passes. Under IFRS the entire provision is re-valued each reporting period. For example, assume a \$1 million liability was originally discounted at 6 percent and there are ten years left in the timeline. Also assume the related firm's credit standing changes due to a commodity crash and the firm changes to a 9 percent credit-adjusted rate. Under US GAAP, the 6 percent would still apply to the original \$1 million and the on balance-sheet amount would be \$558,395 and continue to grow at the 6 percent rate for the next ten years. Under IFRS, if the firm includes own credit risk, the provision would be re-valued to \$422,411 based on the 9 percent discount rate. This provision would now grow at the 9 percent rate until the discount rate changes again. Thus, including own credit risk under IFRS can cause significant swings in the on balance-sheet amount of environmental liabilities. Swings can occur using the risk-free rate, but they are much smaller and not related to the firm's credit standing.

The specifics of a transition to IFRS are dictated by IFRS 1. The general principle is that IFRS is prospectively adopted, whereby the financial statements are adjusted so that they are the same as if the firm had been using IFRS all along. In Figure A1, the point on the line where the switch to IFRS would occur is based on the number of years left until the clean-up. Given the higher degree of concavity for the credit-adjusted rate, the more years left until the clean-up is to occur, the greater the relative difference between the on balance-sheet liability recognized. Thus, a transition to a risk-free rate with 20 years left until the expected clean-up increases the liability by 146 percent (from \$232,000 to \$570,000), whereas a transition with ten years left increases the liability by 61 percent (from \$463,000 to \$744,000). The other main effect on the financial statements *vis-à-vis* the discount rate is the difference in the expense amounts that flow-through the income statement.

Appendix 2. Examples of the closeout of the change in environmental provisions

At transition date, the change in the liability is offset by a mix of adjusting the book value of the asset causing the environmental damage, adjusting the accumulated depreciation (or more typically depletion) and adjusting retained earnings (or deficit). In the case of Teck Resources presented below,



Notes: Figure A1 presents a comparison of on balance sheet year-end environmental provisions (AROs) over a 20-year period assuming a \$1 million estimated clean-up cost at the end of Year 20 (assuming no change in estimate or discount rate over the 20-year timeline). The dashed line is associated with a three percent discount rate; the solid line is associated with an eight percent discount rate. What is evident is the greater concavity associated with the eight percent rate. If this liability were associated with an IFRS transition from an eight percent credit-adjusted risk-free rate to a three percent risk-free rate, IFRS 1 would dictate a move from the solid line to the dashed line based on the number of years left until the clean-up is to occur. Thus, if the transition occurred with ten years left until the clean-up, the transition would be from a liability of around \$463,000 to \$744,000

Figure A1.
Comparison of
year-end
environmental
provisions
(AROs), 20 years

they continued to use a credit-adjusted risk-free rate, actually increasing the discount rate used at transition (Teck Resources Limited, 2011, annual report, p. 115):

The adjustment on transition to IFRS measures the decommissioning and restoration provision (referred to as an Asset Retirement Obligation under Canadian GAAP) in accordance with IAS 37, Provisions, Contingent Liabilities and Contingent Assets (“IAS 37”). We applied the IFRS 1 exemption to not retrospectively apply IFRIC 1, Changes in Existing Decommissioning, Restoration and Similar Liabilities. This optional exemption allowed us to apply a short-cut method and record an adjustment for the opening depreciated cost of the decommissioning and restoration asset under IFRS on transition. Accordingly, we recorded an adjustment to increase the decommissioning and restoration provision asset by \$65 million and an adjustment to reduce the decommissioning and restoration provision liability by \$110 million for a total adjustment that increased equity by \$175 million on transition to IFRS. As at December 31, 2010, the adjustment to equity includes those noted above for decommissioning and restoration provisions and the adjustments described below in the comprehensive income reconciliation.

In this case, the estimation under the short-cut method implies that under IFRS there would have been \$65 million less in depletion expense (reflected in the decrease in the restoration provision asset) and

\$110 million less in accretion expense (reflected in the decrease in the liability). These cumulative expense differences are closed-out to retained earnings at transition (reflected in the increase in shareholders' equity). Another good example is Suncor Energy Inc., where a credit-adjusted discount rate is also used, but the discount rate is slightly less for IFRS as opposed to the average discount rate used under Canadian GAAP at transition. The resulting difference in the environmental provision is \$296 million. However, there is also an estimated cumulative increase in depletion expense of \$690 million, for a total decrease to retained earnings of \$986 million.

These are two examples of the IFRS 1 exemption short-cut method, and they have closeouts greater than the change in the liability. In most cases, the close out to retained earnings is less than the change in the liability. For example, Hudbay Minerals Inc. has an increase in liability at transition of \$31 million, with an offsetting reduction in shareholders' equity of \$7 million and an increase in the mining assets of \$24 million. Finally, some firms do not change the discount rate at all, reflecting no changes at all with regards to environmental liabilities.

Appendix 3. Panel A: SAMPLE disclosures of conflicting IAS 37 interpretations

The asset retirement obligation liability and related property, plant and equipment were re-measured on transition at January 1, 2010, and, as applicable, at the end of each reporting period thereafter, to reflect the current *risk-free interest rate*. Prior to the transition to IFRS, these were measured using a credit-adjusted interest rate [...] [emphasis added] (Canadian Oil Sands, 2011, Annual Report, p. 23).

Under IFRS, the provision has been discounted using a *weighted average credit adjusted risk-free rate* of 6.7% at January 1, 2010 (Canadian GAAP – 6.6%) and 5.3% at December 31, 2010 (Canadian GAAP – 6.6%) [emphasis added] (Talisman Energy, 2011, Annual Report, p. 44).

Under IFRS, estimated cash flows are discounted using the *credit-adjusted risk-free* rate that exists at the balance sheet date [emphasis added] (Suncor Corporation, 2011, Annual Report, p. 98).

Twin Butte has selected to use the *risk-free rate* for discounting purposes as we believe this accurately represents a market-based rate for such a liability [...] [emphasis added] (Twin Butte, 2011, Annual Report p. 25).

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