

Weakened Linkages between Regulatory Disclosures and Financial Reporting: Evidence from IFRS Adoption

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Abstract

Firms are often subject to industry- or jurisdiction-specific disclosure requirements designed and mandated by distinct regulators alongside the applicable accounting standards. However, empirical evidence on the linkages between regulatory disclosures and financial statements remains limited. This study shows how a change in the financial reporting regime (from Canadian GAAP to IFRS) weakens the linkage between Canadian oil and gas (O&G) firms' reserve disclosures and their financial reports. While Canadian GAAP explicitly required companies to consider reserve disclosures when preparing financial statements (e.g., depreciation and impairment tests), IFRS adoption relaxed such integration, despite the reserves information generally being viewed as economically relevant. We exploit this weakening of the formal linkage between the two reporting systems in our study. Consistent with prior literature, we find that reserve estimates by Canadian O&G firms are value relevant, however, their value relevance decreases significantly in the post-IFRS period, indicating that investors place less weight on reserve information once its connection to the financial statements is weakened. We also find weakened capital market reactions (abnormal returns and liquidity) to the release of reserve news in the post-IFRS period for Canadian O&G firms. We examine two channels to explain the observed effects: (i) increased information processing costs and (ii) lower information reliability. Our tests indicate that both higher processing costs and lower perceived reliability explain the post-IFRS decline in reserve informativeness. Our results are relevant in contexts where both mandatory economically relevant disclosures (R&D projects, mineral reserves, GHG emissions) and accounting numbers are independently provided to users.

Keywords: Financial statement linkages; supplemental regulatory disclosure; IFRS adoption; oil and gas reserves; information processing costs; value relevance

JEL Classification: G14; L71; M41; M48

1 INTRODUCTION

Corporate reporting is shaped by multiple regulators whose mandates differ based on their statutory objectives, the users they prioritize, and the specific reporting channels they oversee (Agarwal et al., 2014). Alongside applicable accounting standards, securities regulators often require supplemental regulatory disclosures. A central but underappreciated design feature of reporting regulation is whether mandated supplemental disclosures have an explicit financial-statement linkage, that is, whether accounting standards formally require disclosed quantities to serve as direct inputs into audited financial statement measurement. When such linkages exist, they create traceability: investors can map the disclosed information into the assumptions and outcomes embedded in the financial statements, and the translation from disclosed fundamentals to recognized numbers is more transparent and verifiable. When accounting standards weaken or remove these explicit linkages, it becomes more difficult for external investors to assess the quality of the resulting financial statement estimates.

This study examines the capital market effects of weakened financial-statement linkages between supplemental regulatory disclosures and accounting numbers following a change in financial reporting regimes. Specifically, we investigate the mandatory adoption of IFRS by Canadian oil and gas (O&G) firms, a setting in which firms are required to disclose reserve quantities as supplemental industry-specific information outside the financial statements. Under the prior regulatory framework (i.e., Canadian GAAP), these reserve disclosures were explicitly used in accounting measurements such as depreciation and impairment tests. IFRS adoption relaxed this requirement, thereby weakening the formal linkage between reserve disclosures and reported accounting numbers. At the same time, O&G firms remained subject to the same jurisdictional reserve disclosure requirements under local securities regulation, allowing for examination of whether investors use reserve disclosures

differently when those disclosures remain mandatory but are no longer formally linked to reported accounting numbers.

In the O&G industry, reserves represent firms' most significant assets, yet their carrying amounts are based on modified historical costs that may diverge from underlying economic value (Badia et al., 2020).¹ Since historical cost accounting cannot fully capture the economic significance of reserves, regulators mandate additional disclosures on reserve quantities and other attributes to support investor decision-making. Accordingly, prior literature suggests that such disclosures enhance investors' ability to forecast firms' future performance and assess their risk exposure (Boone, 2002; Patatoukas et al., 2015). However, whether and how weakened linkages between these disclosures and the financial statements affect the financial reporting environment remains an open empirical question.

We propose two non-mutually exclusive mechanisms through which weakened linkages between supplemental regulatory disclosures and financial reporting reduces the informativeness of such disclosures. First, weakened linkages increase information processing costs (Blankespoor et al., 2020).² When supplemental regulatory disclosures, such as reserve estimates, are clearly tied to financial statement items, users can more readily assess their implications for earnings and cash flows, increasing the likelihood of incorporating them into their decision-making. In contrast, reducing the linkages between reserve disclosures and financial reporting obstructs this mapping, increasing the cognitive effort required to interpret the financial significance of reserve information. In line with this argument, prior research shows that supplementary disclosures are more value-relevant when they are located within the

¹ That is, "[proved oil and gas reserve quantities] is important to users in understanding the extent and value of an enterprise's oil- and gas-producing activities." (SFAS 69). In our sample, proved reserves correspond to 81 percent of total assets.

² According to Blankespoor et al. (2020), processing costs comprise awareness costs, acquisition costs, and integration costs. We propose that financial-statement linkages mainly influence integration costs by affecting how easily users can relate regulatory disclosures to financial outcomes, but weaker links and reduced mapping can also increase awareness and acquisition costs as such information becomes less visible and accessible when increasingly separated from financial reporting.

financial reports and aid interpretation of financial statement items (e.g., Sarath and Natarajan, 1996; Guay et al., 2016; Çetin, 2025; DeFond et al., 2025). We refer to this as the “processing cost” channel.

Second, stronger linkages may enhance the perceived reliability of supplemental regulatory disclosures. Financial statements are subject to significant scrutiny by management and external auditors, making them less prone to measurement error (Bratten et al., 2013). The audit oversight allows users to cross-verify other disclosed information with financial statement inputs, thereby increasing their confidence in the data (Gigler and Hemmer, 1998; Lundholm, 2003; Ball et al., 2012). Indeed, survey evidence from the O&G industry confirms that analysts’ reliance on reserve disclosures depends on perceived credibility; when credibility is low, analysts reduce attention to these disclosures (Fox, 2017). Furthermore, Clinch and Magliolo (1992) find that the value relevance of reserve quantities disclosed under SFAS 69 in the U.S. is contingent on their reliability. We thus refer to this as the “reliability” channel.

Alternatively, weaker financial-statement linkages may have little effect on the processing costs or reliability of reserve disclosures. First, supplemental regulatory disclosures, such as reserve estimates for O&G firms, may contain crucial insights into firms’ performance and future cash flows that are central to valuation. Thus, investors may continue to rely on such information even at higher processing costs. Moreover, in our setting, IFRS adoption might improve the overall information environment through greater transparency (e.g., Barth et al., 2008; Yip and Young, 2012), thereby reducing investors’ general processing costs and mitigating additional frictions created by the loss of linkages. Finally, in Canada, O&G reserve estimates continue to be governed by local disclosure regulation, reviewed by qualified external engineers, and subject to oversight by securities regulators. Those assurances may sustain the reliability of reserve information even when it is no longer connected to audited financial

statement numbers. Thus, our central question is whether weaker financial-statement linkages reduce the informativeness of reserve estimates, and if so, through which mechanisms?

Using U.S. O&G firms as controls, we isolate the impact of the weakened financial-statement linkage between supplemental regulatory and financial reporting disclosures. Prior to Canada's IFRS adoption, the two countries had broadly similar reserve disclosure regimes and comparable accounting guidance for O&G activities. Unlike Canadian GAAP and U.S. GAAP, IFRS is not industry-specific and does not require reserve information to be embedded in the financial statements, serving as an exogenous shock to financial statement linkages. Our main analysis is based on an entropy-balanced sample comprising 119 Canadian and 95 U.S. O&G firms, covering the period from 2009 (the first year the U.S. implemented a reserve disclosure rule similar to Canada's) to 2013.

Consistent with the findings of prior literature (e.g., Boone, 2002; Patatoukas et al., 2015; Badia et al., 2020), we document that reserve estimates by Canadian O&G firms are value relevant. However, their value relevance decreases significantly in the post-IFRS period, consistent with investors placing less weight on reserve information once the linkage to the financial statements is weakened. We also find weaker capital market reactions (abnormal returns and liquidity) to the release of reserve news in the post-IFRS period for Canadian O&G firms. Our main results are robust to the use of alternative measures, additional controls, and to estimating the models based on quarterly rather than annual data. Moreover, a falsification test on O&G royalty trusts (Patatoukas et al., 2015), which adopted IFRS at the same time but whose reserve disclosures map directly to asset values by construction, making the financial-statement linkage effectively irreducible, shows no decline in reserve relevance, ruling out generic IFRS accounting changes as the driver of our main results.

We next conduct a series of empirical tests to shed light on the channels through which the reduced linkages affect the value relevance of reserve estimates. First, a textual analysis of

extractive-activity notes shows that the specificity of reserve-related accounting policies declines post-IFRS, and firms reference a broader set of previously prohibited under Canadian GAAP reserve categories (e.g., probable and possible reserves) as inputs to financial reporting, reducing consistency. These changes likely directly affect investor information processing costs, providing a potential explanation for the documented decline in the value relevance of reserve disclosure. Consistently, we find that the decline in the value relevance of reserves is more pronounced for firms exhibiting larger reductions in the specificity and consistency of their reserve-related accounting policies.

Turning to the reliability channel, we consider two industry-specific proxies related to the verifiability and discretion embedded in reserve estimates: the likelihood of negative reserve revisions and the dispersion between proved and probable reserves. Similar to financial statement restatements, negative revisions of previously disclosed reserves signal that prior disclosures were less reliable, and subject to a higher degree of managerial discretion in reserve classification. Similarly, a wider dispersion between proved and probable reserves reflects greater scope for judgment in reserve classification, as probable reserves are inherently less verifiable. (Badia et al., 2020). We find that both the likelihood of negative revision and estimate dispersion increase post-IFRS, in line with weakened links reducing the verifiability of reserve estimates and increasing the scope for discretionary classification.³ We also find more pronounced declines in value relevance for reserve components that are less verifiable.

Furthermore, the share of reserve-related questions during earnings call Q&As falls post-IFRS, especially in the fourth quarter when reserves are updated, and among analysts with less firm-specific experience. This pattern is inconsistent with an explanation purely based on mildly increased processing costs, which would predict that analysts should devote more Q&A

³ While these revisions and changes in reserve-category dispersion do not necessarily reflect real disclosure manipulation, they are consistent with reserve disclosures becoming less verifiable once the linkage to financial statement measurement is weakened, making it harder for outside investors to distinguish changes driven by fundamentals from those driven by discretionary disclosure choices.

time to clarifying reserve information. However, these results are consistent with survey evidence showing that analysts tend to discount reserve disclosures that they perceive as unreliable rather than investing additional effort to process them (Fox, 2017), supporting the reliability channel. Finally, we conduct additional tests and find no evidence of concurrent changes in accounting quality or international investor ownership that could serve as alternative explanations. Together, our tests of the mechanisms indicate that both higher processing costs and lower perceived reliability help explain the post-IFRS decline in reserve informativeness.

Our findings have implications that extend well beyond the O&G industry. We show that formal financial-statement linkages make supplementary regulatory disclosures more useful to investors, and that accounting standard changes can create externalities by decoupling previously integrated disclosures, even when the underlying disclosure requirements remained unchanged. These insights are directly relevant to ongoing standard setter efforts to develop formal linkages across parallel reporting regimes, most visibly in the sustainability space. Recent joint interoperability guidance between the IFRS Foundation and European Financial Reporting Advisory Group (EFRAG) and alignment efforts between the IFRS Foundation and the Global Reporting Initiative (GRI) explicitly aim to reduce fragmentation and advance the decision-usefulness of sustainability disclosures for investors (IFRS, 2024a; 2024b). We find that stronger formal linkages between supplementary disclosures and the financial statements have consequences for whether investors can effectively use these disclosures.

Our study contributes to the literature in three ways. First, we provide new evidence on the informational effects of explicit mapping between supplemental regulatory disclosures and financial statements. Prior research has largely examined how financial reporting regulations influence firms' voluntary disclosure practices (e.g., Einhorn, 2005; Guay et al., 2016; Noh et al., 2019; Hribar et al., 2022), but little is known about the consequences of changing the linkages between supplemental regulatory disclosures and financial statements. Wang et al.

(2024) find stronger market reactions when UK Strategic Report narratives are more closely aligned with financial information, and DeFond et al. (2025) show that institutional investors increase holdings more when sustainability disclosures under the EU's Non-Financial Reporting Directive (NFRD) are embedded in annual reports. Both results are consistent with lower investor information processing costs. We extend this literature by examining a distinct and largely unexplored question: how weakening the *formal* accounting linkages that connect supplementary regulatory disclosures to audited financial statement measurement affects their informativeness. Our findings show that such linkages are crucial for the decision usefulness of supplemental regulatory information.

Second, we respond to the call by Leuz and Wysocki (2016) for research examining specific properties of regulation, such as the amount of detail and guidance, to better understand the mechanisms through which regulatory changes have an impact. In our setting, industry reserve disclosures remain jurisdictionally mandated, but a shift in accounting standards decouples them from financial statements. Our results show that even when regulatory disclosure requirements remain constant, changes in accounting standards can create externalities by weakening linkages and mapping, illustrating how regulations initiated and developed by different regulatory bodies can have unintended consequences for one another.

Third, we add to the accounting literature on extractive industries. While O&G reserves are the primary productive assets of firms operating in this industry, prior studies find conflicting results on the relevance of reserve disclosures (See Gray et al., 2019, for a review). Focusing on the Canadian setting, Badia et al. (2020) document that National Instrument (NI) 51-101 (*Standards for Oil and Gas Activities*) effectively improved O&G reserve value-relevance since its adoption in 2003, while explicitly cautioning whether this result persists under IFRS (p. 1745). They study stricter reserve disclosure requirements (probability thresholds for proved reserves) in the pre-IFRS period. We address a fundamentally different

question over a different time period: whether post-IFRS delinking of reserve disclosures from financial statements reduces their informativeness. We provide direct evidence that decoupling supplemental regulatory disclosures from the financial statements under IFRS lowers their value relevance, even when the underlying disclosure requirements remain unchanged. Together, the two papers establish that both the quality of reserve disclosure rules (Badia et al., 2020) and their formal linkage to accounting numbers, independently matter for investor decision-making.

Finally, our study informs the broader policy debate about why some economically significant reporting domains remain standard-setting “outliers” under IFRS, and why coordination across regulators is difficult. The IASB’s decision to conclude its extractive activities project without issuing new recognition, measurement, or disclosure requirements rests in part on the view that investors can accommodate diversity and that additional standard-setting would impose meaningful costs (IASB, 2023). Yet the history of reserve reporting suggests that the location and required linkages of reserve information have long been contested, including prior U.S. efforts to embed reserve-based measures more directly into reporting and later retrenchment toward standardized supplementary disclosures (Gray et al., 2019). Our evidence adds a distinct economic consequence to this debate. More broadly, this evidence helps explain why a rigorous IFRS approach to extractive activities could have implications beyond the industry and beyond IFRS jurisdictions, potentially raising the stakes for convergence with other regimes (e.g., the continued coexistence of alternative accounting models in U.S. GAAP). Thus, our study contributes to understanding not only the informational role of explicit linkages, but also the real spillovers that arise when accounting standards and specialized disclosure regulation evolve in parallel rather than in coordination.

2 INSTITUTIONAL SETTING

2.1 O&G Reserve Disclosure Regulations

O&G reserves are broadly defined as resources economically viable to extract and serve as a direct indicator of potential future economic inflows, thereby playing a crucial role in assessing the prospects of O&G businesses (Gray et al., 2019). Due to the high level of uncertainty and subjectivity involved in valuing reserves, they do not meet the general asset recognition criteria in the 2018 IFRS Conceptual Framework for Financial Reporting; instead, they are reported outside the financial statements. The carrying amount of assets arising from the firm's extractive activities, as reported on the balance sheet, is based on historical costs incurred during the extractive activities of the firm, and therefore does not represent the current value of the underlying reserves. The accounting treatment of these costs depends on the firm's chosen method for capitalization, and the degree to which capitalized amounts are subsequently amortized or impaired based on the firm's reserve base.

Although the value of reserve estimates is not reported as part of the financial statements, they are fundamental to O&G firms' operations and valuation, providing investors with information about the scale and quality of their resource base. In our sample, proved reserves correspond to 81 percent of total assets, on average. Prior research documents that disclosed reserve estimates are significantly associated with stock prices and returns, indicating that the market views reserve disclosures as value relevant (Clinch and Magliolo, 1992; Boone, 2002; Spear, 1994; 1996; Patatoukas et al., 2015; Badia et al., 2020).

Regulation of O&G reserve disclosure relies heavily on the industry-specific expertise of geologists, metallurgists, and engineers. In Canada, NI 51-101 was issued in 2003 to enhance the faithful representation and comparability of reserve estimates. NI 51-101 builds on the *Canadian Oil and Gas Evaluation (COGE) Handbook*, jointly prepared by the Society of Petroleum Evaluation Engineers and the Canadian Institute of Mining, Metallurgy, and Petroleum, which prescribes the technical procedures for estimating and classifying reserves. In the U.S., the SEC introduced a comparable framework, the *Modernization of Oil and Gas*

Reporting (MOGR), in 2009. Both frameworks define “proved” reserves as those with at least a 90 percent probability of being produced. These proved reserves constitute the key economic input for valuation models and are a central component of investors’ cash flow forecasts (Badia et al. 2020).⁴

In both jurisdictions, listed O&G firms must disclose proved reserves, reconcile year-over-year reserve changes, and report standardized measures of future net revenues. They are also required to obtain third-party verification by independent qualified reserves evaluators and provide management and board attestation of the reliability of the disclosures.

2.2 Accounting for Extractive Activities under Canadian GAAP and IFRS

Prior to 2011, in accordance with Canadian GAAP, Canadian publicly traded O&G firms recorded their petroleum exploration and evaluation activities at historical cost applying either the successful efforts (SE) or the full cost (FC) method. Under the FC method, all costs associated with exploration are capitalized for the appropriate geographic cost center, which is generally a country. Under the SE method, costs of drilling exploratory and exploratory-type geographic tests are capitalized, pending proved reserves. If no reserves are found, these costs are expensed (KPMG, 2017, 406). Both methods include specific guidance on incorporating regulatory disclosures of O&G reserves into the preparation of financial statements. For example, the depreciation, depletion, and amortization (DD&A) expense is calculated by dividing the net capitalized costs by the total proved reserves; the result is then multiplied by

⁴ Consistent with the notion that these two regulations share important commonalities, Canadian reserve disclosures are permitted in the US instead of MOGR. Moreover, rule-making in the U.S. explicitly mentions their adoption of COGE’s definition of reserves and convergence with Canada (see MOGR Final Rule, p. 45). Despite the similarity in the reserve disclosure rules across the U.S. and Canada, NI 51-101 and MOGR differ in several ways. First, NI 51-101 also mandates the disclosure of “proved and probable” reserves, whereas this disclosure is voluntary in the U.S. Second, NI 51-101 encourages the establishment of reserve committees and mandates external evaluators to audit reserve disclosures, whereas MOGR only requires disclosing the person in charge of auditing reserve amounts and procedures involved. Finally, while NI 51-101 requires a specific declaration of endorsement of the reserve disclosures made by managers and directors, MOGR accepts a generic declaration regarding financial information in the 10-K. Even though there are certain differences between the reserve disclosure regulation in Canada and the U.S., the parallel trends analysis presented in Figure 1 does not indicate any significant pre-IFRS differences.

the volume of reserves produced during the reporting period. Moreover, Canadian GAAP requires firms to use conservative estimates, “proved” reserves, at varying unit of account levels (e.g., well, project, property, and country) as the base value for depreciation and impairment tests of their on-balance extractive assets. It prescribes the units-of-production method as the depreciation method.⁵

In 2011, most Canadian publicly traded companies were required to adopt IFRS.⁶ For O&G firms, one critical consequence of IFRS adoption was the elimination of the formal linkages between the preparation of financial statements and the industry-specific reserve guidance. Under Canadian GAAP, proved reserves as disclosed under NI 51-101 were used as direct inputs into financial statement measurement. For example, extractive assets were assessed for impairment based on the value of proved reserves, using “country” or “property-to-property” as the unit of account for the impairment test and DD&A expense was calculated on the basis of total proved reserves. Under IFRS, critical jurisdictional regulatory disclosures, such as O&G reserve estimates, remained under local regulations under NI 51-101, but were no longer formally linked to the numbers in the financial statements. Notably, neither IFRS 6, which is the specific standard on exploration and evaluation of mineral resources (including petroleum), nor the general IFRS standards, mandate the use of reserve estimates in financial statement preparation. For example, there is no explicit link between DD&A expenses and the value of proved reserves and the unit of account for impairment shifts to a broader and non-industry specific category — “cash-generating unit.”⁷ Appendix A summarizes and compares the accounting requirements under Canadian GAAP and IFRS.

⁵ “Proved” reserves are defined by NI 51-101 in Canada, and by MOGR “Modernization of Oil and Gas Reporting” in the U.S., as reserves with at least a 90 percent probability of being actually recovered.

⁶ Foreign companies that file with the U.S. Securities and Exchange Commission as well as rate-regulated companies (e.g., utilities) are allowed to report under U.S. GAAP.

⁷ In connection with the decision to switch from Canadian GAAP to IFRS, Canadian Accounting Standards Board (AcSB) staff prepared a high-level comparison between Canadian GAAP and IFRS (AcSB, 2008), where they explicitly state that “[...] some portions of Section 3061 and all of AcG-16 and EIC-126 are more comprehensive

The weakened linkages between financial statements and reserve estimates have also elicited concerns among various stakeholders. Auditors, for instance, have highlighted the growing ambiguities regarding the categorization of reserves associated with extractive assets as an area of concern (Deloitte, 2010) and recommended that the IASB collaborate more closely with industry specialists to broaden the existing IFRS framework. A further indication that this might be a problem appeared in an Agenda Paper based on outreach to primary users and other stakeholders (IASB, 2021). The report states that most stakeholders were concerned with the lack of clarity of Reserves & Resources (R&R) information used in financial statements (p. 9). Overall, the survey evidence suggests that investors encounter challenges in integrating reserve estimates with financial statements (IASB, 2021). A more detailed account of these concerns is outlined in Appendix B.

Canada's mandatory IFRS adoption by O&G firms provides a clean setting to test our question. First, listed Canadian O&G firms have long been subject to both financial reporting standards (Canadian GAAP, followed by IFRS) and jurisdictional regulatory requirements (i.e., NI 51-101). Second, under Canadian GAAP, reserve estimates were explicitly mapped to financial statements, while under IFRS, this link is weakened because IFRS offers general principles without references to the use of local regulatory disclosures when preparing financial statements. Third, IFRS adoption did not affect reserve reporting under NI 51-101 and permitted prior reserve disclosures to remain unchanged, which enables us to assess the effects of reduced linkages on the informativeness of reserve disclosures.

3 RELATED STUDIES AND HYPOTHESIS DEVELOPMENT

3.1 Prior Literature

than IAS 16 [Property, Plant and Equipment] with respect to mineral resources. Section 3061 does not contain an exemption from applying the GAAP hierarchy to develop accounting policies for exploration and evaluation activities" and "some portions of Section 3061 and all of AcG-16 and EIC-126 are more comprehensive than IFRS 6 [...] as IFRS 6 only provides guidance during the exploration and the evaluation of mineral resources up to the point that technical feasibility and commercial viability of extracting is demonstrated." (AcSB, 2008, 12–13).

Changes in accounting regulation can affect how different sources of information interact within the reporting system (e.g., Ball et al., 2000; Leuz et al., 2003; Burgstahler et al., 2006). Focusing on the banking industry, a growing number of studies demonstrate that changes in mandatory disclosure requirements can influence other existing information channels, thus highlighting the broader effects of regulatory changes on the overall information environment (e.g., Costello et al., 2019; Bischof et al., 2022; Bertomeu et al., 2023; Kim and Kim, 2024). For example, Bischof et al. (2022) examine banks that must comply with both IFRS 7 (Financial Instruments: Disclosures) and Pillar 3 of the Basel II Accord requirements. Their results suggest that the standing of the body issuing the disclosure requirements is strongly related to banks' incentives, with banks complying more strongly with Pillar 3 requirements than with IFRS 7. The setting in Bischof et al. (2022) differs from ours in that they study "competing" risk disclosures in terms of timing or content from two different bodies, whereas there is only one regulatory body requiring O&G disclosures. Moreover, while their focus is on compliance with disclosure requirements, we instead investigate the value-relevance of reduced mapping between supplemental regulatory disclosures and financial reporting.

Conceptually, better mapping should lower users' acquisition and integration costs (Blankespoor et al., 2020), improve perceived reliability (Bratten et al., 2013; Ball et al., 2012), and make supplementary data more value-relevant when interpreting earnings and book values (Sarath and Natarajan, 1996; Guay et al., 2016). For example, studies on intangible assets show that R&D and SG&A expenditures are more value-relevant when their associated future benefits are recognized in the balance sheet (Aboody and Lev, 1998; Banker et al., 2019). Çetin (2025) finds that the adoption of ASC 606 enhances informativeness only when revenue recognition is supported by accompanying disclosures, highlighting that the joint presentation of related information reduces information asymmetry. Similarly, recent evidence shows that investors place greater weight on sustainability information when it is reconciled with financial

statements (e.g., Wang et al., 2024; Barth et al., 2024). In line with these insights, standard setters have dedicated efforts to enhance connectivity between the management report, sustainability statements, and financial statements: the ISSB's IFRS S1/S2 call for consistency with financial-statement assumptions and cross-referencing to the primary statements.

Empirical evidence on the informational consequences of linkages between financial statements and local regulatory disclosures is limited. Wang et al. (2024) find that greater alignment between narrative in Strategic Reporting (SR) and financial information is associated with stronger market reactions. DeFond et al. (2025) provide evidence that institutional investors increase holdings more when sustainability disclosures under the EU's NFRD are located within annual reports, suggesting that combined reporting reduces investors' information processing costs. However, both settings focus on the location or narrative alignment of qualitative disclosures and do not involve explicit linkages that prescribe how disclosed quantities feed into audited financial statements. We contribute to this nascent literature by examining the informational consequences of weakening the formal prescriptive maps between supplemental regulatory disclosures and financial reporting upon the adoption of new accounting standards.

3.2 Hypothesis Development

We posit that weakening the links between jurisdictional regulatory disclosures and the financial statements reduces the value relevance of the former. First, prior research finds that supplementary disclosures are more value-relevant when they help in interpreting the financial statement information (e.g., Sarath and Natarajan, 1996; Guay et al., 2016). Consequently, reducing mapping might increase users' information processing costs, making it more difficult to extract and interpret reserve disclosures and evaluate their financial implications. Second, audited financial statements enhance the credibility of complementary disclosures by providing “confirmation” through independent verification by the firm's auditor (Gigler and Hemmer,

1998; Ball et al., 2012). While Canadian O&G firms are required to engage an independent qualified reserve evaluator, typically a geoscientist or an engineer, to assess and report on their reserve estimates, these disclosures are not part of the financial statement audit unless included in the annual report (e.g., in the financial statement notes). Without the explicit verification offered by financial statement audits, users may find it more difficult to cross-check reserve information for consistency with accounting information, potentially undermining their confidence in incorporating reserve information in their decision-making process. Thus, the weakened linkages between financial statements and reserve disclosures stemming from IFRS adoption could reduce the perceived usefulness and credibility of these disclosures, making them less relevant for decision-making. We therefore state our hypothesis as follows:

Hypothesis: IFRS adoption has a negative effect on the value relevance of reserve estimates.

This prediction is consistent with investors discounting supplemental regulatory information that they do not perceive as directly mapped to financial reporting. However, it is also plausible that the relevance of reserve disclosures remains unchanged following IFRS adoption. First, even though IFRS does not require firms to refer to reserve-related information in their financial statements, they may voluntarily continue to do so. Indeed, the principle-based nature of IFRS and the additional flexibility allowed by IFRS 6 grant firms substantial reporting discretion, including the option to refer to local GAAP when making judgment calls (e.g., Christensen and Nikolaev, 2013; Hail et al., 2010). Under this scenario and considering that reserve disclosure regulation under NI 51-101 remains unchanged during the period, the overall information environment might remain stable. Moreover, reserve disclosures contain significant information pertaining to firms' future cash flows (e.g., Patatoukas et al., 2015; Badia et al., 2020), making the reserve disclosures directly relevant to investors, even when their mapping to the financial statements is weakened. Finally, prior studies demonstrate considerable capital market benefits associated with IFRS adoption (e.g., Barth et al., 2008;

Yip and Young, 2012). By enhancing the overall information environment, IFRS may improve users' ability to evaluate a firm's performance using multiple information sources, including reserve disclosures. Therefore, it is not ex-ante clear whether the relevance of reserve estimates would be significantly affected by changes in accounting regulations, and if so, in what way.

4 RESEARCH DESIGN AND SAMPLE SELECTION

4.1 Model Specification

To empirically examine the relation between IFRS adoption and the value relevance of supplemental regulatory disclosures in the O&G industry, we follow prior studies (e.g., Patatoukas et al., 2015; Badia et al., 2020) and test the association between reserve levels and stock prices by implementing an adapted version of the Ohlson model (Ohlson, 1995):⁸

$$P_{it} = \alpha + \beta_1 RSV_{it} + \beta_2 Post_t + \beta_3 RSV_{it} \times Post_t + \beta_4 BVE_{it} + \beta_5 EPS_{it} + \varepsilon \quad (1)$$

where P_{it} is the stock price three months after the fiscal year-end; RSV_{it} is the O&G proved reserves estimate in barrels of oil equivalent (BOE) from that fiscal year, scaled by the number of shares outstanding at fiscal year-end; $Post_{it}$ is 1 in the post-IFRS period, and 0 before that; BVE_{it} is the book value of equity scaled by the number of shares outstanding at fiscal year-end; EPS_{it} is the signed earnings per share. Because reserve estimates in dollar terms are subject to several assumptions, such as future oil prices, extraction costs, production schedules, and discount rates, in our main tests, we use physical reserve amounts, BOE, scaled by the number of shares. This approach aims to better capture the market reaction to the most fundamental and less subjective estimates of O&G reserves (Badia et al., 2020; Ferguson et al., 2020). Our results are robust to defining RSV_{it} in monetary units. Appendix C provides detailed variable definitions. A significant positive coefficient of RSV_{it} would indicate that reserves are used by the market to assess the value of company i . The variable of interest is the interaction term

⁸ We follow the valuation framework of Ohlson (1995), which remains the standard approach for examining the value relevance of accounting and disclosure variables in the literature (e.g., Barth et al., 2023).

between *RSV* and *Post*. If IFRS adoption, our proxy for the weakening linkages between regulatory disclosures and financial reporting, is associated with the value relevance of reserves, the coefficient of the interaction term, β_3 , should be significant.

A caveat with this approach is the absence of a control sample, as virtually all publicly traded O&G firms in our sample transitioned to IFRS in 2011. Estimating the effects of IFRS credibly requires a counterfactual benchmark group that is often challenging to identify (Leuz and Wysocki, 2016). To overcome this constraint, we apply a difference-in-differences (DiD) methodology, employing U.S. O&G firms as the control sample. Several considerations make this comparison feasible for the purposes of our study.

First, the U.S. is Canada's largest trading partner and general economic shocks affect both countries in similar ways. For example, commodity price shocks, particularly the volatility in oil prices over our window, affect both samples contemporaneously, attenuating concerns that any changes in value relevance that we capture merely reflect oil-price turbulence rather than the IFRS shock to the linkage between supplemental disclosures and the financial statements. Second, the two countries' energy markets are highly integrated through an extensive O&G pipeline network, implying that shocks to fossil fuel demand and supply are likely to affect both markets similarly. Third, Canada and the U.S. are institutionally comparable with common-law jurisdictions, developed equity markets, extensive disclosure obligations, sector-specific reserve disclosure rules, and strong enforcement during our sample period (e.g., Burnett et al. 2015; Anantharaman and Chuk 2018), as reflected in SEC scrutiny and CSA staff reviews and sanctions under NI 51-101. In both jurisdictions, reserve disclosures are subject to third-party evaluation by independent engineers or auditors.

Most importantly, reserve disclosure regulations in Canada and the U.S. exhibit notable similarities. Both countries traditionally require O&G firms to disclose quantitative reserve estimates, referred to as "proved" reserves. Both NI 51-101 in Canada and MOGR in the U.S.

establish bright-line probability thresholds, defining proved reserves as those with at least a 90 percent likelihood of being produced.

We introduce an indicator variable, CA , set to one for the Canadian firms in our sample, to the interaction item in Model (2) as follows:

$$P_{it} = \alpha + \beta_1 RSV_{it} + \beta_2 RSV_{it} \times Post_t + \beta_3 RSV_{it} \times CA_i + \beta_4 Post_t \times CA_i + \beta_5 RSV_{it} \times Post_t \times CA_i + \beta_6 BVE_{it} + \beta_7 EPS_{it} + \varepsilon \quad (2)$$

where all variables are as previously defined. The main coefficient of interest is the slope coefficient β_5 , which measures the differential effect of O&G reserve level on firm value for Canadian firms following IFRS adoption. We include firm- and year-fixed effects and cluster the standard errors by firm.

4.2 Data and Descriptive Statistics

We obtain a sample of publicly traded O&G firms headquartered in Canada and the U.S. during the period 2009–2013 from Compustat. We start from 2009, as it is the year when the U.S. adopted reserve disclosure regulation similar to NI 51-101. Reserve reporting regulations in Canada have remained largely unchanged since 2003 and in the U.S. since 2009. Prior to Canada's adoption of IFRS in 2011, the two countries shared similar accounting guidance, further enhancing the comparability of their O&G firms. We use fiscal years rather than calendar years to measure firm-level variables to ensure that the post-IFRS adoption period is correctly captured at the firm level.

For Canadian firms, we obtain O&G reserves-related data from CanOils Database Ltd.⁹ For observations with missing data, we hand-collect data from the Annual Information Forms (AIF), Annual Reports, and Forms 51-101 (Statement of Reserves Data and Other Information), F2 (Report of Independent Qualified Reserves Evaluator or Auditor), and F3 (Report of

⁹ CanOils is a commercial database that gathers financial information from annual financial statements and yearly O&G reserves disclosures from the annual filings required by the securities regulatory authorities for O&G companies listed on the TSX and TSX-V. This database is used by prior studies on Canadian O&G disclosures (Badia et al., 2020; 2021).

Management and Directors) on the System for Electronic Document Analysis and Retrieval (SEDAR) website. We obtain reserves-related and fundamental data for U.S. O&G firms from Compustat, Capital IQ, and firms' annual reports. Analyst-related data is obtained from IBES and conference call data from Refinitiv. Appendix C reports the data sources for all variables used in the analysis.

To avoid self-selection bias, we only include O&G firms subject to mandatory IFRS adoption in 2011 and exclude IFRS adopters that are cross-listed in the U.S. and have the option to report under U.S. GAAP.¹⁰ We exclude integrated oil companies, funds, holdings, exploration service companies, and consultancies as they have less exposure to the financial statement and disclosure mandates. We further exclude firms reporting zero sales and depreciation throughout our sample period, as this indicates, based on standard accounting practices under both Canadian GAAP and IFRS, that the firm has likely not developed any O&G reserves yet. We drop observations with missing stock prices, net income, or book value of equity. Finally, we restrict the sample to firms with continuous data coverage throughout the sample period to ensure that each firm is observed both before and after IFRS adoption. The resulting sample comprises 119 listed Canadian O&G firms with 595 firm-year observations around IFRS adoption. Our control sample comprises 95 U.S. O&G firms (475 firm-year observations) around IFRS adoption. Table 1 presents the data selection process.

Table 2 presents the descriptive statistics for the main characteristics of Canadian and U.S. firms in our sample. The descriptive statistics indicate that Canadian O&G firms report considerably lower reserves and leverage (*Lever*), have lower book value of equity (*BVE*) and greater lagged turnover (*Lag_turnover*), are less profitable (*EPS*), and more likely to engage a Big 4 auditor (*Big*) compared to their U.S. counterparts. In contrast, U.S. O&G firms tend to

¹⁰ All cross-listed Canadian O&G firms in our sample switched to IFRS in 2011 or during the following years. Our inferences are not sensitive to including them in our sample.

have higher lagged valuations (Lag_mv) and are more closely held. To enhance the comparability between the two groups and to reduce the DiD estimator's sensitivity to the functional form assumption of the OLS regression, we perform entropy balancing based on the main independent variables used in the analysis, i.e., reserves (RSV), book value (BV), earnings per share (EPS), lagged valuations (Lag_mv), lagged return volatility (Lag_ret_vol) and lagged turnover ($Lag_turnover$), resulting in more balanced covariates as indicated in Table 2.

5 MAIN RESULTS

5.1 Value Relevance of Reserve Estimates Around IFRS Adoption

In this section, we examine whether adopting IFRS results in weaker reserve disclosure relevance by analyzing the empirical association between O&G reserve levels and stock prices around IFRS adoption. Table 3, Columns (1) to (4), reports the results of the analyses focusing on the Canadian firms only. Column (1) shows a significant and positive association between share prices and reserve levels before IFRS adoption, consistent with the findings of Badia et al. (2020) who examine the period between 2002 and 2011. Earnings (EPS) and book value of equity (BV) are also significantly associated with share prices in the expected direction. In contrast, Column (2) indicates that the coefficient of RSV loses significance in the post-IFRS period, providing some initial evidence in support of our prediction.

Column (3), which pools observations across both periods, shows a significant negative coefficient of the interaction term, $Post \times RSV$, confirming a significant decrease in reserve value relevance after IFRS adoption. Column (4) presents the results from a fully interactive model, which includes interactions between the $Post$ indicator and both EPS and BVE , allowing their coefficients to vary between the two periods. As IFRS adoption likely affects the accounting numbers, this specification accounts for shifts in the relative importance of earnings and book value. The results consistently show that value relevance declines after IFRS adoption.

The documented decrease in reserve relevance after IFRS adoption could be driven by a time trend that is irrelevant to IFRS adoption. To mitigate such concerns, we estimate Eq. (2), which employs a sample of U.S. firms as the control sample. Table 3, Column (5) presents the result from the DiD specification on the entropy balanced sample. The insignificant coefficient of $CA \times RSV$ supports the premise of no significant differences between Canadian and U.S. O&G firms' reserve relevance prior to IFRS adoption. The negative and significant coefficient of $Post \times CA \times RSV$ indicates that Canadian O&G firms, on average, experienced a decline in reserve value relevance compared to their U.S. peers following IFRS adoption. The results from the full interaction model, presented in Column (6), are consistent with this conclusion.

The validity of the DiD estimation relies on the parallel-trends assumption. That is, absent IFRS adoption, the value relevance of O&G reserve estimates would have evolved similarly for the U.S. and Canadian firms. To test this, we modify Equation (2) by replacing the main interaction with interactions between the country indicator, reserve level, and individual year indicators. Figure 1 reveals that the parallel trend assumption has not been violated.

5.2 Robustness

5.2.1 Stock price reactions and stock liquidity effects of reserve information around IFRS adoption

To corroborate the inferences from the value-relevance tests, we next analyze the stock price reactions to the release of reserve information. If the decline in linkages between supplemental reserve disclosures and the financial statements contributes to less informative reserve estimates, we expect stock prices to be less sensitive to the changes in the disclosed amounts of proved reserves post-IFRS adoption. To test this, we estimate the following model in the pre- and post-IFRS periods:

$$\begin{aligned}
 Abn_Ret_{i,t} = & \alpha + \beta_1 \Delta RSV_{i,t} + \beta_2 \Delta RSV_{i,t} \times Post_{i,t} + \beta_3 \Delta RSV_{i,t} \times CA_i + \beta_4 Post_{i,t} \times CA_i \\
 & + \beta_5 \Delta RSV_{i,t} \times Post_{i,t} \times CA_i + \beta_n \sum Control_{i,t} + \varepsilon
 \end{aligned} \tag{3}$$

where $Abn_Ret_{i,t}$ is the market-adjusted return of firm i over the $(-5, +5)$ - day window around the annual O&G reserve announcement date t ;¹¹ $\Delta RSV_{i,t}$ is the percentage change in proved reserves fractionally ranked by year, as a proxy for reserve news; $\sum Control_{i,t}$ is a vector of control variables based on prior literature (e.g., Badia et al., 2020).¹²

Table 4, Columns (1) and (2) present the results of estimating Eq. (3) for the pre- and post-periods, respectively, using the sample of Canadian firms. The coefficients on ΔRSV are positive and significant in both periods, though smaller in magnitude post-IFRS (β_1 equals 0.03 pre-IFRS and 0.01 post-IFRS). Columns (3) and (4) pool the observations across both periods and confirm this pattern, as indicated by the negative and significant interaction between ΔRSV and $Post$. Columns (5) and (6) extend this analysis by including U.S. peers and similarly report that the coefficient on the interaction item $\Delta RSV \times Post \times CA$ is negative and significant, indicating a declining value relevance of reserve information.

In additional analyses, we assess whether this reduced informativeness extends to market liquidity. Using different proxies (bid-ask spread, illiquidity, zero-return days, and total trading costs), we find that the association between liquidity and reserve changes also weakens following IFRS adoption for Canadian firms relative to U.S. peers (untabulated). These results reinforce that reserve information becomes less informative to market participants once its linkage to the financial statements is weakened.

5.2.2 Within-country quarter analysis

A potential limitation of our main tests is that market expectations regarding reserve levels are unobservable. Following Badia et al. (2020), we address this by conducting a within-country quarter analysis that does not rely on market expectations. In particular, since reserve

¹¹ When O&G reserve announcement dates are missing, we use O&G reserves filing dates. In the U.S., O&G reserves are reported in the annual report. In Canada, O&G reserves are reported in AIF 51-101F1, which is typically filed on the same day as the annual report.

¹² The pre-period in this analysis is limited to a single year (capturing the stock reaction to reserve changes from 2009 to 2010) due to the U.S. adoption of MOGR in 2009. The results of this analysis should be interpreted with this caveat in mind.

information is disclosed on an annual basis, we compare the liquidity effect in the quarter of reserve disclosure (typically Q4) with the other quarters, before and after IFRS adoption. Untabulated results show greater liquidity effects in Q4 compared to the other quarters, which is indicative of Q4 reporting being more informative. This difference becomes insignificant post-IFRS, consistent with a decline in the informativeness of reserve disclosures.

5.2.3 Additional controls and alternative reserve measures

Several concurrent accounting changes accompanied IFRS adoption, including the shift from FC and SE methods, broader reserve bases for impairment, changes in the unit of account, and the introduction of impairment reversals. To the extent these changes affect financial statement numbers, they are absorbed by *BVE* and *EPS* in our model. Our inferences are further robust to directly controlling for the accounting method applied for evaluation and exploration costs (FC or SE).

A potential concern is that our BOE-based reserve measure conflates oil and gas quantities using energy-content rather than price ratios, which could mechanically weaken the reserve-to-value mapping in Canada relative to the U.S. if the two countries differ in their oil-versus-gas composition and relative commodity prices shift over the sample period. If this dynamic were driving our results, we would expect them to disappear when reserves are measured in monetary units, which automatically adjust for relative oil and gas prices. Our inferences are robust to this alternative measure, which mitigates this concern. Our results also remain robust to controlling for additional reserve-related information (i.e., probable reserves and reserve dispersion). Due to space constraints, these results are untabulated.

5.2.4 Falsification test

In order to strengthen our identification strategy, we follow Patatoukas et al. (2015) and re-estimate our main tests on a restricted sample of O&G royalty trusts, whose primary assets are proved reserves. For these firms, reserve disclosures map directly to asset values by

construction, so the financial-statement linkage is effectively irreducible regardless of the accounting standards applied. This design feature makes royalty trusts a useful benchmark for ruling out alternative explanations for our results. In particular, if the decline in value relevance documented for ordinary O&G firms reflected generic IFRS accounting changes, such as changes in capitalization methods or pricing assumptions, rather than the weakening of the linkage between reserve disclosures and financial statements, we would expect a similar decline for royalty trusts, who adopted IFRS at precisely the same time. Consistent with the linkage interpretation, in untabulated tests, we do not find any significant changes in reserve relevance around IFRS adoption for royalty trusts.

6 ADDITIONAL ANALYSES

To understand why reserve disclosures become less informative after IFRS adoption, we next examine the two potential mechanisms introduced earlier. Specifically, we test whether the decline in value relevance reflects non-mutually exclusive elements of higher processing costs and/or lower reliability of reserve disclosures.

6.1 Test of “processing cost” channel: Changes in consistency and specificity of extractive activities disclosures

The processing-cost channel predicts that when IFRS weakens the explicit linkage between reserve estimates and financial statements, investors face higher cognitive costs in reconciling reserve information with accounting numbers. To assess this, we examine changes in the specificity and consistency of extractive-activity note disclosures. Under Canadian GAAP, firms were required to explicitly describe how reserve estimates fed into key accounting figures such as depreciation, depletion, and impairment. IFRS, by contrast, provides only broad guidance, giving firms considerably more discretion on whether and how they explain these relationships. Firms that continue to provide detailed, consistent explanations should mitigate the increase in processing costs, whereas less specific or inconsistent disclosures make it harder

for users to link reserves to financial outcomes. We, therefore, evaluate the specificity and consistency of extractive activity disclosures in the annual reports of Canadian O&G companies using textual analysis.

We begin with a qualitative review of the annual reports of 20 firms randomly selected from our sample to get an in-depth understanding of their reserve-related accounting practices during the IFRS transition.^{13,14} Appendix D includes excerpts from these firms' financial statement notes. Our preliminary evidence suggests that firms' disclosures regarding how depreciation and impairment costs are calculated became less specific under IFRS. For example, under Canadian GAAP, firms typically directly tied DD&A and impairment-to-proved reserves, while under IFRS the language becomes vaguer and often references the sum of proved and probable reserves or even broader categories. This shift reduces both within- and across-firm comparability and echoes investors' concerns that the information used in the preparation of financial statements might be inconsistent under IFRS since firms use broader classifications of reserves (IASB, 2021, 8).

To move beyond illustrative examples, we next compile descriptive evidence on how firms refer to reserve categories in their accounting-policy notes before and after IFRS adoption. We hand-collect note disclosures pertaining to the accounting for extractive activities from firms' annual reports. Table 5, Panel A reports the frequency with which reserve categories are referenced in four accounting-policy contexts: capitalization of oil and gas properties, depreciation, depletion and amortization (DD&A), impairment, and asset retirement obligations (ARO). Two patterns stand out. First, explicit references to proved reserves decline sharply post-IFRS, especially in DD&A and impairment disclosures, where such references

¹³ The accounting practices for extractive activities are usually reported separately under Canadian GAAP and within *PPE*, *Intangibles*, and *Impairments* under IFRS.

¹⁴ The firms include: ShaMaran Petroleum Corp, Transglobe Energy, Lightspeed Discoveries, Touchstone Exploration, Ivanhoe Energy, Tudor Corporation, First Start Resources, Paramount Resources, Cenovus Energy, Suncor Energy, Canadian Natural Resources Limited, Imperial Oil, Enbridge Inc., Tourmaline Oil, Enerplus Corporation, Whitecap Resources, MEG Energy, Crescent Point Energy, Strathcona Resources, and Ovintiv Inc.

were most closely tied to financial statement measurement under Canadian GAAP. Second, references to other reserve categories increase post IFRS, particularly in DD&A and impairment discussions. For example, in DD&A disclosures, references shift sharply from proved reserves: proved mentions fall by 65.7 percentage points (71.1% to 5.4%), while probable-reserve references rise from 4.1% to 16.7% (a 12.6 percentage-point increase, roughly quadrupling). A similar shift appears in impairment disclosures, where proved-reserve references abruptly decline from 75.6 percent to 10.9 percent and probable-reserve references increase from 17.7 percent to 35.0 percent (roughly doubling).

The decline in explicit reserve references, and especially in references to proved reserves in accounting-policy notes, indicates a reduction in the *specificity* of firms' explanations of how reserve information enters financial statement measurement. At the same time, the increased use of broader and less verifiable categories such as probable reserves is consistent with lower *consistency*, because firms move away from the proved-reserve-based language that characterized the pre-IFRS regime and adopt a wider range of reserve inputs in describing accounting measurement. Indeed, investors expressed concerns to the IASB that, under IFRS, firms may rely on a broader and less uniform set of reserve inputs in preparing financial statements (IASB 2021, 8).¹⁵ Together, Panel A provides direct descriptive support that IFRS adoption weakened the clarity and uniformity of reserve-to-accounting mapping in firms' note disclosures.

To provide more systematic evidence, we construct two textual measures motivated by the descriptive patterns. The first measure, *Specificity*, is defined as the frequency of reserve-

¹⁵ Shifting from proved-only to proved-plus-probable (or possible) reserve inputs undermines consistency because these categories are more assumption-driven and discretionary. A broader reserve base makes the depletion denominator and impairment triggers more volatile and management-dependent, weakening both within-firm time-series and cross-firm comparability. Although possible-reserve references remain uncommon, they increase post-IFRS which is consistent with concerns raised in the IASB's investor outreach (2021) and with the IASB's call for evidence on the extent of practice diversity.

related words in each note, scaled by the count by the total number of words in the note.¹⁶ Higher values indicate more specific disclosures. The second measure, *Consistency*, captures the frequency of different classifications of reserves (e.g., proved versus probable versus possible reserves) mentioned in firms' accounting policy disclosures. We calculate *Consistency* as the number of words related to probable and possible reserves, scaled by the total number of words in the notes and multiplied by minus one. A lower value of *Consistency* implies that the firm uses more diverse classifications of reserves in preparing its financial statements. We follow Hope et al. (2016) to control for other firm characteristics that might affect disclosure specificity and consistency.

Table 5, Panel B, reports findings from the textual analysis on the sample of Canadian O&G firms. Consistent with the descriptive evidence, Columns (1) and (2) indicate that IFRS adoption is associated with a measurable decline in the specificity and consistency of reserve-related disclosures among the sample firms, consistent with the notion that the weakened linkages between reserve disclosures and financial statements have contributed to changes in firms' reporting practices in ways that may increase the information-processing costs and reduce the decision-usefulness of financial reports.

An alternative interpretation of the decline in specificity is that it simply reflects reduced duplication. That is, firms might have stopped repeating reserve-related information in the financial statements without any loss of decision-relevant content because it is already disclosed in AIF 51-101 under NI 51-101. We do not find this interpretation compelling for two reasons. First, AIF 51-101 does not specify what DD&A rate was applied, which reserve

¹⁶ To construct a dictionary of reserve-related words, we rely on the COGE Handbook. The dictionary, presented in Appendix E, includes terminology specifically related to different reserve and resource types (proven, probable, possible), accounting method applied under Canadian GAAP (SE, FC, area of interest, etc.), the accounting unit of reserve estimates (well, projects, property, country, etc.), and the reserve quantity in units (BOE, Bbf, Mcf, etc.). For example, "[t]he Company applies the full cost method of accounting for O&G assets, where they are depreciated using the unit of production method based on proved reserves using estimated future prices and costs" is considered to be more specific and informative to the financial statement users than "[t]he recoverable amount of an asset or cash-generating unit estimated based on the value a potential purchaser would ascribe to it."

categories were used in the depletion base, or the unit of account for determining impairment, which collectively represent the translation map necessary to connect raw reserve estimates to audited financial statements under Canadian GAAP. Second, if the decline in specificity simply reflects relocation of unchanged information, it should not be associated with a decline in value relevance. The cross-sectional results in Panel C show that firms with larger decreases in specificity and consistency also exhibit significantly greater declines in the value relevance of reserves as indicated by the significant and negative coefficients on $Post \times RSV$ in Columns (2) and (4), which is inconsistent with a duplication explanation.

6.2 Test of “reliability” channel: Verifiability of reserve disclosures

Next, we examine the “reliability” channel by testing for changes in the verifiability and discipline of reserve estimates around IFRS adoption. Weakened linkages between financial reporting and reserve disclosures post-IFRS may limit users’ ability to cross-check information and verify firms’ disclosure practices, reducing the discipline surrounding reserve disclosure practices. We proxy for this channel using two measures: reserve estimate revisions and reserve estimate dispersion. We recognize that both measures may also reflect greater underlying economic uncertainty rather than changes in disclosure quality per se. We therefore interpret them as proxies for the reliability, verifiability, and discipline of reserve disclosures rather than as direct evidence of opportunistic behavior.¹⁷

We first test whether Canadian O&G firms are more likely to report negative reserve revisions post-IFRS. Similar to downward earnings restatements, negative revisions may signal that previously disclosed reserve estimates were less stable ex post and may have overstated firms’ underlying reserve position. Following Badia et al. (2020), we therefore treat the incidence of negative reserve revisions as a proxy related to the reliability and discipline of

¹⁷ Our interpretation of the reliability channel does not require revisions or reserve-category dispersion to reflect pure mismeasurement or manipulation. Rather, we expect that weakened financial-statement linkage reduces the verifiability of reserve disclosures and opens greater scope for discretionary reporting, making subsequent changes harder for outside investors to attribute to either underlying economics or reporting choices.

reserve disclosures. Table 6, Panel A, Columns (1), shows that the probability of negative reserve revisions increases post-IFRS, after controlling for other firm characteristics associated with reserve reporting incentives (Badia et al., 2020). In Columns (2) and (3), we further examine cross-sectional variation based on changes in firms' reserve-related note disclosures. *High_Specificity_Dcline* is an indicator equal to one for firms with an above-median decline in disclosure specificity, and *High_Consistency_Dcline* is an indicator equal to one for firms with an above-median decline in disclosure consistency. We find that the post-IFRS increase in negative reserve revisions is particularly pronounced among firms that reduce the specificity of their reserve disclosure (Column (2)), suggesting that higher declines in specificity reduce transparency and may enable greater managerial discretion in reserve classification. We do not find significant results for higher declines in consistency.

Zooming in on technical revisions, which are more closely tied to engineering reassessments of previously disclosed reserve estimates and are therefore less likely to be driven mechanically by acquisitions, dispositions, or production changes, Column (4) shows that the incidence of negative technical reserve revisions also increases post-IFRS. In Column (5), we further estimate a difference-in-differences specification using U.S. O&G firms as a control group. The post-IFRS increase in negative revisions remains stronger for Canadian firms, reinforcing the interpretation that the result is not solely driven by common changes in reserve economics over the sample period. Together, the results support the view that weakened linkages under IFRS reduce users' ability to verify and cross-validate reserve information, leading to greater uncertainty about disclosure quality.

Our second proxy for the reliability channel is reserve estimate dispersion. A larger value of *RSV_Dispersion*, defined as $(Probable - Proved) / Probable\ Reserves$, indicates that probable reserves are larger relative to proved reserves. This measure captures the extent to which firms' reserve base is tilted toward categories that are inherently less verifiable and more

discretionary. Because probable reserves are more sensitive to managerial assumptions and estimation choices than proved reserves, a wider gap between proved and probable reserves is consistent with greater scope for discretion in reserve classification. Notably, IFRS does not directly change reserve classification rules. Rather, by weakening the linkage between reserve disclosures and financial statement measurement, IFRS likely reduced the discipline surrounding firms' use of less verifiable reserve categories in the broader reporting environment. Indeed, U.S. regulators do not permit disclosure of probable reserves as a part of audited financial disclosures due to concerns that it could be misleading (SEC 2008).

Table 6, Panel B, Columns (1) – (3), report that reserve dispersion significantly increases after IFRS adoption. To examine whether the result is concentrated where reporting discipline weakens most, in Columns (2) and (3), we conduct cross-sectional analyses based on firm disclosure specificity and consistency.¹⁸ Column (3) shows that firms that broaden the reserve categories referenced in their accounting notes to include probable and possible reserves as financial statement inputs report significantly larger probable–proved spreads, consistent with weakened linkages and greater reliance on less verifiable reserve categories.

Additionally, we examine whether the market's weighting differs across the individual components of reserve disclosures (discoveries, acquisitions, dispositions, production, recoveries, and revisions), which as shown by prior work (Spear 1994; 1996) vary in their degree of subjectivity. Untabulated results show that before IFRS adoption, several components (discoveries, acquisitions, dispositions, and production) are significantly associated with share prices. Post-IFRS, most of these relations weaken, with only production remaining significant. The decline is most pronounced for forward-looking and subjective components, suggesting that weakened linkages make it harder for investors to assess the

¹⁸ Because U.S. firms are not required to disclose probable reserves mandatorily, we cannot implement a U.S. difference-in-differences test for this measure.

reliability of these estimates, a plausible explanation for why they might place less weight on them. Curiously, the association between revisions and share price becomes significant only after IFRS adoption, consistent with investors becoming more skeptical of disclosure quality in the post-IFRS environment. Thus, results are consistent with weakened financial-statement linkages reducing the post-IFRS verifiability and discipline of reserve disclosures.

6.3 Joint test of “processing cost” and “reliability” channels: Reserve-related questions during earnings conference call

We next examine changes in the content of the questions-and-answers (Q&A) segments from earnings conference calls, which is an interactive disclosure channel that helps understand how investors and analysts respond to changes in reporting practices (Bushee et al., 2018). Survey evidence suggests that the extent to which analysts use reserve estimates depends on their perceived reliability: when reserve information is deemed less verifiable, analysts may discount it (Fox 2017). Thus, the “reliability” channel predicts fewer reserve-related questions during the Q&A segments post-IFRS. Alternatively, higher processing costs can push reserve discussion in opposite directions: analysts may ask more questions to translate reserves into earnings implications or ask fewer if complexity raises the cost of doing so within a fixed Q&A timeframe. Accordingly, the processing-cost channel yields no unambiguous prediction for reserve-related Q&A discussions.

Using conference call transcript data from Refinitiv, we construct a continuous measure, *CCQA_reserve*, based on the frequency of reserve-related questions in the Q&A section, scaled by the total number of questions. In our sample, on average, 20% of questions in the Q&A section contain at least one reserve-related word. Table 7 presents the results of comparing

reserve-related question frequency pre- and post-IFRS adoption.¹⁹ Columns (1) and (2) show a significant decline in the frequency of reserve-related questions post-IFRS. Columns (3) – (5) reveal that such decreases are concentrated in the fourth quarter. Since reserve estimates are annually updated in the fourth quarter, the significant decrease in reserve discussions in fourth-quarter conference calls is consistent with the conjecture that users are less likely to connect reserves with the annual performance under IFRS. Column (6) uses U.S. peers as a benchmark and reports consistent evidence that investors and analysts of Canadian firms are less likely to discuss reserve estimates under IFRS compared to those of their U.S. peers.

While these findings do not unequivocally support either mechanism, they are more consistent with the “reliability” channel. Untabulated tests further show that analysts with limited firm-specific experience exhibit a sharper decline in reserve-related questions, suggesting that those less able to verify or interpret complex reserve information are less likely to rely on reserve estimates post-IFRS adoption. Furthermore, we observe an increase in analyst forecast dispersion, implying decreased reliance on publicly available reserve information.

6.4 Test of alternative channel: Changes in foreign investors

Our proposed channels rely on the premise that investors would continue to rely on standalone reserve estimate disclosures absent any frictions. However, prior IFRS research finds that converged standards reduce information barriers for foreign investors, facilitating cross-border investments (e.g., Amiram, 2012; Florou and Pope, 2012). If IFRS adoption attracted more foreign investors to the Canadian O&G sector, these investors may face higher costs in understanding local reserve disclosure practices compared to domestic investors. Thus, our findings may reflect increased awareness and processing costs borne by these new market

¹⁹ In Canada, the disclosure of conference call transcripts is not mandatory, so we are not able to collect the transcripts for all firms in our sample. This presents a potential selection bias in our regression estimates, contingent on the reasons behind the missing conference call transcripts. Following Loughran and McDonald (2011), we control for the length, tone, and uncertainty of the management presentation and reserve-related questions, as well as the frequency of reserve-related words in management presentation sections. We also include quarterly firm characteristics and yearly reserve news.

participants. To investigate this channel, we collect ownership information from Thomson Reuters Mutual Funds. In line with prior studies in the Canadian setting (e.g., Khan et al., 2020), we do not find significant changes in foreign institutional investments following IFRS adoption.

6.5 Test of alternative channel: Changes in accounting quality

The decrease in informativeness of reserve estimates post-IFRS adoption could also be driven by other information effects of IFRS adoption unrelated to O&G reserves. For example, if IFRS enhances accounting quality, users may put less weight on reserve estimates (i.e., a substitution effect). Prior studies report limited evidence of changes in accounting quality in Canada for the population of non-financial firms (e.g., Burnett et al., 2015). Nevertheless, we conduct additional analyses (untabulated) to explore whether contemporaneous changes in accounting quality confound our inferences in our context and, consistent with prior studies, we do not find evidence of significant changes in accounting quality.

7 CONCLUSION

This study examines whether IFRS adoption, by weakening the linkages between mandated reserve disclosures and financial reporting, reduces the informativeness of reserve information. We find that reserve disclosures become less value relevant following IFRS adoption, suggesting that investors discount supplemental regulatory information that is no longer mapped to financial statements. IFRS adoption is also associated with less specific and consistent disclosure of how reserves feed into financial statement preparation. We also find evidence consistent with a decline in the verifiability and discipline of reserve disclosures post-IFRS, implying that lower reliability of reserves is a plausible mechanism for our main findings. Together, these results highlight the information costs of decoupling supplemental regulatory disclosures from financial reporting.

Although our tests focus on oil and gas reserves, the mechanism is broader. Reserves are forward-looking, regulator-verified disclosures that become most decision-useful when

users can trace them through explicit accounting guidance and policy disclosures into audited financial statement outcomes (e.g., DD&A and impairment). When that formal mapping weakens, investors must do more translation and rely more on managerial judgment, which can erode the information content of the supplemental regime, even if the disclosure mandate itself is unchanged. The same design friction arises whenever economically meaningful metrics are reported in parallel channels (e.g., R&D/innovation pipelines, patent portfolios, domain- or jurisdiction-specific performance measures, and sustainability metrics) while recognition and measurement in the financial statements remain indirect. In these settings, the missing ingredient is often not more disclosure, but a credible, transparent bridge into audited financial reporting that improves monitorability and comparability. This highlights the cost of stand-alone supplements and the importance of coordination across standard setters and regulators.

Thus, these insights have direct implications for standard setters. The IASB has considered expanding IFRS 6 to include more guidance on reserve disclosures (IASB, 2021), partly in response to investor concerns about the lack of clarity in how reserve information feeds into financial statement preparation. Our results support these concerns and highlight the need for greater coordination between accounting standards and industry-specific disclosure frameworks, such as CRIRSCO (Committee for Mineral Reserves International Reporting Standards) and PRMS (Petroleum Resources Management System). More broadly, while IFRS adoption is often credited with improving comparability and transparency, our evidence points to potential costs in the form of reduced information quality for economically relevant supplemental disclosures that fall outside IFRS's core scope. This consideration makes our results relevant not only to the extractive industries but to any setting where economically significant but largely unrecognized assets such as R&D, brand value, and mineral reserves are typically omitted or loosely integrated with the financial statements.

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Appendix A: Main differences between Canadian GAAP and IFRS related to the use of reserves as inputs to the financial statements

	Canadian GAAP		IFRS
	(1)	(2)	(3)
Accounting standards	Accounting guideline AcG-16, Oil and Gas Accounting – Full Cost	FAS 19 – Financial Accounting and Reporting by Oil and Gas producing companies (Successful Efforts)	IFRS 6 for the expenditures incurred in exploration for and evaluation of mineral resources
Initial recognition criteria	All costs associated with property acquisition, exploration, and development activities should be capitalized at the country level	Acquisition costs should be capitalized when incurred. Exploration costs, other than exploration drilling costs, should be charged to expense when incurred. The costs of drilling exploratory wells should be capitalized, pending the determination of whether the well has found proved reserves . The capitalized costs of unsuccessful exploratory wells, net of any salvage value, should be charged to expense	The IASB Framework and other sections provide guidance for the development and production phases. The entity is to determine a policy specifying which expenditures are recognized as exploration and evaluation assets. IFRS 6 exempts an entity from applying paragraphs 11 and 12 of IAS 8 to exploration and evaluation assets, which effectively permits the previous practices to continue
Cap unit	Country or property	Property-by-property	Unspecified
Impairment	A ceiling test that the capitalized costs cannot exceed the present value (10 percent discount factor) of estimated proved reserves . Impairment is tested at the country level	The undiscounted net future cash flows are based on total proved and risk-adjusted probable and possible reserves . Future prices and costs should be in nominal dollars and must reflect management's best estimates. The impairment should be on a field-by-field basis	IFRS 6 does not explicitly require impairment testing of E&E assets. Under IAS 36, impairment is recognized either on conversion to IFRS or subsequently if an asset or cash-generating unit's carrying amount exceeds the higher of fair value less costs to sell or value-in-use.
Depreciation, depletion & amortization (DD&A)	Unit-of-production method using total proved reserves for that cost center	Unit-of-production method using total proved reserves	No DD&A for E&E stage assets, no specified depreciation methods for development stage firms

Note: Comparison of accounting standards under Canadian GAAP (1) and (2) and IFRS (3) on how to use reserve estimates as inputs to the financial statements.

Appendix B: Market participants' reflections on the linkages between reserve estimates and financial statements

A central premise of our study is that investors are affected by changes in linkages between financial statements and supplementary O&G reserve estimate disclosures. While we build on existing literature on perceived reliability and processing costs (Bratten et al., 2013; Blankespoor et al., 2020), this appendix provides further supporting evidence drawn from the IASB survey, auditors' comment letters, and key audit matters.

Example from IASB Investor Survey (2021)

[29] Many stakeholders, in particular preparers and national standard-setters, said R(eserve)&R(esource) information can be used as inputs for financial statement items subject to significant judgements and assumptions. These stakeholders said diversity can arise because the information used in the preparation of financial statements might be inconsistent.

[30] Overall most stakeholders said they were concerned about the lack of clarity about R&R information used in financial statements. For example: [...] whether the R&R information used was consistent with that reported outside financial statements (that is, a few stakeholders were uncertain how to reconcile R&R information disclosed and/or used in financial statements with that disclosed outside financial statements).

Deloitte Comment Letter to the IASB Extractive Activities Discussion Paper (2010)

[...] There is diversity in how the depreciable amount is amortised. Some entities use a measure of reserves, others a measure of resources and others a mixture of both (e.g. reserves plus 'high-confidence' resources). In some cases, reserves are not proven at all, e.g. large scale coal operations, underground mines 'open at depth' (i.e. the resource extends significantly below the depth to which drilling and other exploratory activities have currently been undertaken). As a result of these factors, the depreciation calculations for extractives projects can be complex.

[...] In practice, there is uncertainty as to whether only the cash flows from currently accessible reserves can be included in the calculation of value in use for extractive assets, potentially leading to an impairment loss, or whether future capital expenditure and cash flows from reserves accessible as a result of that expenditure can be included in the value in use calculation by reference to IAS 36.49.

Key audit matter for impairment of upstream oil and gas property, plant, and equipment assets – from BP's Audited Annual Report (2021)

[...] We identified three key management estimates in management's determination of the level of impairment test [...] Reserves and resources estimates - A key input to certain CGU impairment assessments is the oil and gas production forecast, which is based on underlying reserves estimates and field specific development assumptions. Certain CGU production forecasts include specific risk adjusted resource volumes, in addition to proven and/or probable reserves estimates, that are inherently less certain than reserves; and assumptions related to these volumes can be particularly judgemental. There is a risk that material misstatements could arise from unreasonable production forecasts for individually material CGUs and/or from the aggregation of systematic flaws in bp's reserves and resources estimation policies across the OP&O and G&LCE segments.

Appendix C: Variable definitions and data sources

Variable	Definition	Data Source
<i>Abn_Ret</i>	Market-adjusted return of firm <i>i</i> over the (−5, +5) - day window around the annual O&G reserve announcement date	Compustat/CRSP
<i>Accrual</i>	Earnings less cash flow from operations, scaled by end-of-year total assets	Compustat
<i>Analyst_acc</i>	Difference between the mean EPS forecast and the announced EPS, scaled by the stock price at the beginning of the fiscal year. Missing data is replaced by zero	IBES
<i>Analyst_missing</i>	Indicator set to 1 if <i>Analyst_acc</i> is missing and zero otherwise	IBES
<i>Big</i>	Indicator set to 1 if the firm's auditor is one of the big four audit firms, and 0 otherwise	Compustat
<i>BM</i>	Ratio of the book value of equity to the market value of equity	Compustat
<i>BVE</i>	Book value of equity at fiscal year-end scaled by the number of shares	Compustat
<i>CA</i>	Indicator that equals 1 for Canadian firms, and 0 for U.S. firms	Compustat
<i>CCQA_reserve</i>	Number of questions containing reserve-related words, scaled by the total number of questions in the Q&A section in a conference call	Refinitiv
<i>Close</i>	Percentage of closely held shares of the firm	WorldScope
<i>Consistency</i>	Negative of the frequency of terms related to probable and possible reserves in the firm's reserve-related accounting policy note, scaled by the total number of words in the note. Lower values indicate a broader use of reserve categories and thus less consistent reserve-related accounting policy disclosures.	Annual report
<i>Dissue</i>	Percentage change in total liabilities	Compustat
<i>EPS</i>	Annual earnings before extraordinary items scaled by the number of shares outstanding at fiscal year-end	Compustat
<i>Gas_return</i>	Return on the HH Index compounded over the (−5, +5)-day window around the annual disclosure of O&G reserves (in percent)	Federal Reserve Bank of St. Louis, FRED
<i>Growth</i>	Percentage change in sales	Compustat
<i>High Consistency Decline</i>	Indicator variable that equals one for firms with an above-median decline in <i>Consistency</i> from the pre-IFRS to the post-IFRS period, and zero otherwise.	Annual report
<i>High Specificity Decline</i>	Indicator variable that equals one for firms with an above-median decline in <i>Specificity</i> from the pre-IFRS to the post-IFRS period, and zero otherwise.	Annual report
<i>Illiquidity</i>	Proxy for illiquidity based on factor analysis on bid-and-ask spread, price impact, zero return days, and transaction costs	Compustat
<i>Lag mv</i>	Stock price times the number of shares outstanding measured at the end of the last quarter	Compustat
<i>Lag turnover</i>	Quarterly median of the daily turnover from last quarter (i.e., trading volume divided by the market value at the end of each trading day)	Compustat
<i>Lag ret vol</i>	Standard deviation of daily stock returns in last quarter	Compustat

<i>Length</i>	Log of the number of all words in notes to financial statement	Compustat
<i>Lever</i>	Ratio of year-end total liability to book value of equity	Compustat
<i>Loss</i>	Indicator variable that equals one if net income is less than 0, and 0 otherwise	Compustat
<i>Oil_return</i>	Return on the WTI Index compounded over the (–5, +5)-day window around the annual disclosure of O&G reserves (in percent)	Federal Reserve Bank of St. Louis, FRED
<i>P</i>	Stock price per share as of three months after fiscal year end	Compustat
<i>Post</i>	Indicator that equals 1 for fiscal years after IFRS adoption (2011, 2012, 2013), 0 if it is 2009 or 2010	Compustat
<i>Q_4</i>	Indicator variable that equals 1 if the earnings conference call transcript is from the fourth quarter, and 0 otherwise	Refinitiv
<i>Q&A_Length</i>	Log of the number of words or number of questions in the Q&A section of the conference call transcript.	Refinitiv
<i>RoA</i>	Ratio of net income to total assets at prior year's end	Compustat
<i>RSV</i>	“Proved” reserve estimates disclosed annually, measured as barrels of oil equivalent (BOE), scaled by the number of shares	CanOils Capital IQ, Compustat, and Forms 51-101
<i>RSV_Revision</i>	Indicator variable that equals 1 if there is a negative reserve revision in year $t + 1$	CanOils Capital IQ, Compustat, and Forms 51-101
<i>RSV_Dispersion</i>	Dispersion of the distribution of the quantity of the “proved” and “probable” O&G reserves, scaled by the quantity of the “probable” reserves ((Probable – Proved) / Probable))	CanOils Capital IQ, Compustat, and Forms 51-101
ΔRSV	The percentage change in proved reserves, fractionally ranked by year	CanOils Capital IQ, Compustat, and Forms 51-101
<i>RSV_rank</i>	RSV decile-ranked by year	CanOils Capital IQ, Compustat, and Forms 51-101
<i>RSV_Pres</i>	Frequency of reserve-related words in the management presentation section of the earnings conference call transcript, scaled by the total number of words in the presentation.	Refinitiv
<i>SD_earn</i>	Standard deviation of quarterly earnings in the past 3 years	Compustat
<i>SD_return</i>	Standard deviation of monthly stock returns in year $t-1$	Compustat
<i>Size</i>	Logarithm of market value of equity at the end of the fiscal year	Compustat
<i>Specificity</i>	Frequency of reserve- and extractive-activity-related terms in the firm's reserve-related accounting policy note, scaled by the total number of words in the note. Higher values indicate more specific disclosures.	Annual report
<i>Technical_Revision</i>	Indicator variable that equals 1 if there is a negative technical reserve revision in year $t + 1$	CanOils Capital IQ, Compustat, and Forms 51-101

<i>Tone</i>	Net tone of the management presentation section of the earnings conference call transcript, measured using the Loughran and McDonald (2011) dictionary.	Refinitiv
<i>Uncertainty</i>	Frequency of uncertainty-related words in the management presentation section of the earnings conference call transcript, measured using the Loughran and McDonald (2011) dictionary.	Refinitiv

Appendix D: O&G accounting policy notes from annual reports

Firm	Annual report notes in 2009 / 2010	Annual report notes in 2011 / 2012	Comments
First Start Resources	<p>The Company utilizes the full cost method to account for its investment in oil and gas properties...The cost of the oil and gas properties with proved reserves will be depleted and charged to operations using the unit-of-production method based on the ratio of current production to estimated proved oil and gas reserves.</p> <p>In applying the full cost method, the Company performs an annual cost centre impairment (ceiling) test...The ceiling test is based on estimates of proved reserves, production rates, oil and gas prices, future costs and other relevant assumptions.</p>	<p>Capitalized costs of the exploration and evaluation asset are reclassified as mining assets and amortized using the unit of production method. When an exploration and evaluation asset is abandoned, all related costs are written off to operations.</p> <p>An impairment review is performed, either individually or at the cash-generating unit level, when there are indicators that the carrying amount of the asset may exceed its recoverable amount. To the extent that this occurs, the asset is written down to its estimated net realizable value.</p>	<p><i>The firm stops referring to proved reserves for amortization and impairment test.</i></p>
Touchstone Exploration	<p>An impairment loss may be indicated when the carrying value of a cost centre exceeds the estimated undiscounted future net cash flows associated with the cost centre's proved reserves ... Reserves are determined pursuant to National Instrument 51-101, Standards of Disclosure for Oil and Gas Activities.</p>	<p>To test impairment, costs are allocated into cash generating units ("CGUs") based on their ability to generate largely independent cash inflows. The determination of CGUs is subject to judgment. The transfer of exploration assets to property, plant and equipment is based on management's judgment of technical feasibility and commercial viability.</p>	<p><i>After IFRS adoption, the firm stopped referring to NI 51-101 and related concepts.</i></p>
ShaMaran Petroleum Corp	<p>Capitalized costs of proved oil and gas properties are depleted using the unit of production method based on estimated gross proved reserves of petroleum and natural gas as determined by independent engineers. Successful exploratory wells and development costs and acquired resource properties are depleted over proved developed reserves. Acquisition costs of unproved reserves are not depleted or amortized while under active evaluation for commercial reserves.</p>	<p>The Company applies the full cost method of accounting for exploration and evaluation ("E&E") costs in accordance with the requirements of IFRS 6 Exploration for and Evaluation of Mineral Resources [...] Oil and gas assets are depreciated using the unit of production method based on proved and probable reserves using estimated future prices and costs.</p>	<p><i>The firm refers to FC method as accounting policy, even though it changes the depreciation base.</i></p>

Appendix E. Dictionary and Measurement for Textual Analyses

A. Construction and Pre-processing

- Source & scope: Terms are drawn from COGEH/NI 51-101 terminology and common O&G accounting language.
- Pre-processing: Lowercase; strip punctuation; normalize hyphens/spaces (e.g., “proved-and-probable” → “proved and probable”).
- Phrases: Count bigrams/trigrams for key expressions (e.g., “unit of production”, “proved and probable”, “cash-generating unit”).
- Disambiguation: To avoid verb-sense matches (e.g., “proved to be”), require prove(d|n) to co-occur within ± 5 tokens of “reserve(s)”.

B. Specificity Dictionary (captures explicit linkage of reserves to the financials)

Count occurrences of the following and scale by total policy-note words.

1. Reserve/resource taxonomy & assurance
 - proved/proven reserves; proved developed/undeveloped (PDP, PDNP, PUD)
 - reserves reconciliation; reserve replacement; reserve life index (RRR, RLI)
 - contingent resources; prospective resources
 - PRMS; COGE Handbook; NI 51-101; 51-101F1/F2/F3/F4; AIF; SEDAR/SEDAR+
 - independent qualified reserves evaluator/auditor; report of management and directors
2. Accounting linkages
 - unit of production (UOP); depletion; DD&A; depletion base
 - successful efforts (SE); full cost (FC); area of interest
 - impairment; impairment test; recoverable amount; cash-generating unit (CGU); value in use; fair value less costs of disposal; IAS 36; IFRS 6; IAS 16
 - future development costs (FDC); asset retirement obligation (ARO)/decommissioning
3. Asset/unit granularity & reconciliation items
 - field; property; project; well; pad; basin; play; country; concession; licence/lease
 - extensions; improved recovery; technical revisions; discoveries; acquisitions; dispositions; economic factors; production
4. Price/cost assumptions, units, product mix
 - forecast prices; price deck; discount rate; PV10; net present value (before/after tax)
 - boe/Mboe/MMboe; bbl/Mbbl/MMbbl; Mcf/MMcf/Bcf/Tcf; NGL; condensate; bitumen; SAGD; in-situ; upgrader; diluent

Specificity score = (count of Specificity terms) / (total words in policy note).

C. Consistency Dictionary (signals use of multiple, more discretionary categories)

- probable reserves; possible reserves; proved and probable; proved plus probable
- 2P; 3P; P+P
- contingent resources; prospective resources
- phrases indicating broadened inputs (examples): “based on proved and probable”, “including probable reserves”, “on a 2P basis”, “on a 3P basis”.

Consistency score = – (count of Consistency terms / total words).

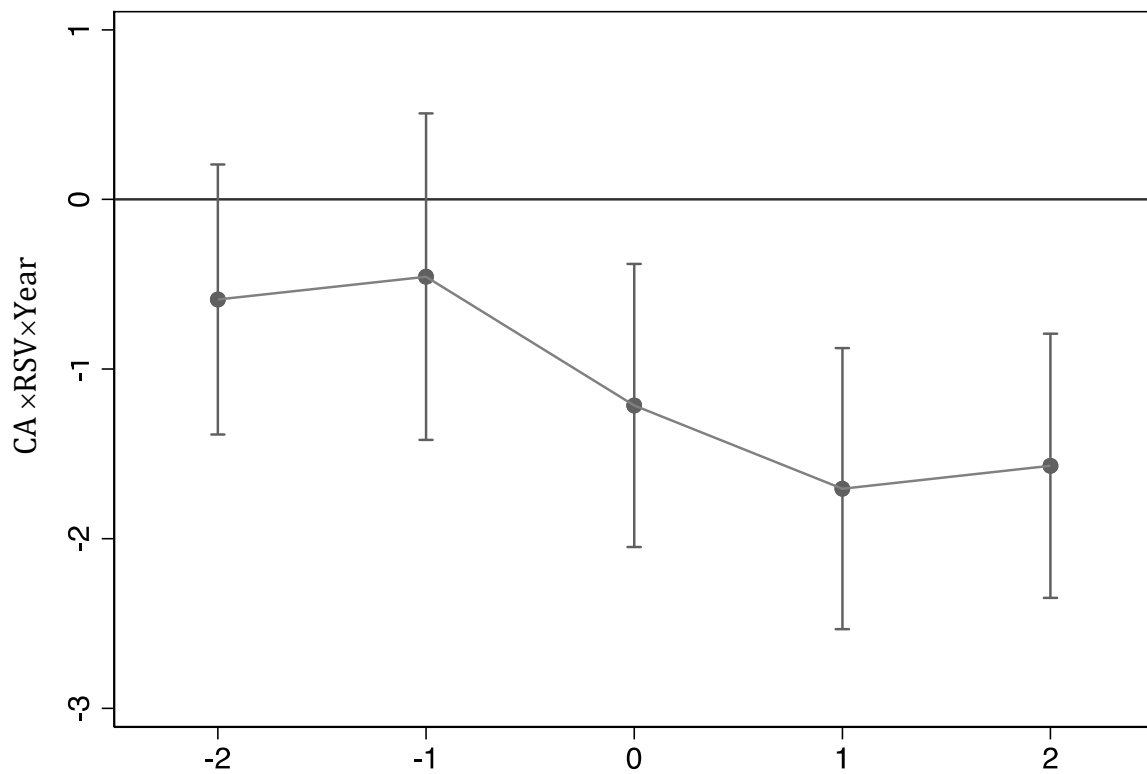


Fig. 1: The effect of IFRS adoption by Canadian firms on the value relevance of their reserves: parallel trend analysis

Notes: This figure plots the coefficients of a dynamic lead-lag difference-in-differences regression that estimates the effect of IFRS adoption by Canadian firms on the value relevance of the firm's disclosed level of reserves (RSV). In particular, share price is regressed on an indicator set to 1 for Canadian firms (CA) interacted with the firm's disclosed level of reserves (RSV) and with fiscal year indicators, controls, and firm fixed effects. The figure displays the slope coefficients and 90% confidence intervals for the interaction term. The sample period spans 2009–2013. Year 0 is the year of IFRS adoption. All variables are defined in Appendix C.

TABLE 1: Sample selection

	<i><u>Firm</u></i>	<i><u>Fiscal year</u></i>
<i><u>Number of companies in the sample</u></i>		
Compustat North America, Oil and Gas Sector, 2009 – 2013	1,007	3,778
- Less missing main variables (BE, EPS, and P)	-132	-661
- Less cross-listed firms identified by Worldscope	-61	-289
- Less holding, service, consulting, and integrated energies	-18	-61
- Less unbalanced panel data	-457	-1,072
- Less observations with zero sales and depreciation for all 5 years	-48	-240
- Less missing reserve data from CanOil, Capital IQ, Compustat or Annual reports	-77	-385
Final sample	214	1,070
- Canadian O&G firms	119	595
- US O&G firms	95	475

Notes: This table reports the sample selection process for the data used in the primary analysis. The sample spans 2009–2013 and includes U.S. and Canadian O&G firms.

TABLE 2: Summary statistics

	Canada (595 Obs)		U.S. (475 Obs)	
	Mean	SD	Mean	SD
Before entropy balancing				
<i>RSV</i>	0.66	2.59	1.81	5.50
<i>BVE</i>	3.75	4.89	14.68	14.76
<i>EPS</i>	0.07	0.73	0.40	2.88
<i>Lag_mv</i>	6.59	10.68	7.89	26.33
<i>Lag_ret_vol</i>	0.03	0.00	0.03	0.00
<i>Lag_turnover</i>	0.23	0.36	0.18	0.24
After entropy balancing				
<i>RSV</i>	0.66	2.46	0.66	2.59
<i>BVE</i>	3.75	5.70	3.75	4.89
<i>EPS</i>	0.06	1.61	0.07	0.73
<i>Lag_mv</i>	6.59	10.68	6.59	17.56
<i>Lag_ret_vol</i>	0.03	0.00	0.03	0.00
<i>Lag_turnover</i>	0.23	0.36	0.23	0.47
Other firm characteristics				
<i>Size</i>	5.14	2.29	5.05	2.13
<i>Growth</i>	0.66	1.97	0.40	1.70
<i>Lever</i>	0.73	1.30	1.06	2.02
<i>BM</i>	0.32	1.02	0.96	0.83
<i>Loss</i>	0.17	0.37	0.15	0.35
<i>Accrual</i>	-0.23	0.71	-0.19	0.77
<i>Dissue</i>	0.47	1.34	0.49	2.11
<i>Big</i>	0.48	0.50	0.86	0.35
<i>Close</i>	24.40	25.80	9.12	16.21

Notes: This table provides descriptive statistics of O&G firm characteristics around the IFRS adoption (2009–2013). See Appendix C for variable definitions. Figures in bold indicate that the difference of means between the Canadian and the US firms is significant at 5 percent levels or lower.

TABLE 3: Stock prices and proved reserves

Dep variable:	(1)	(2)	(3)	(4)	(5)	(6)
<i>Price</i>	<i>Pre</i>	<i>Post</i>	<i>Pooled</i>	<i>Pooled</i>	<i>Pooled</i>	<i>Pooled</i>
<i>RSV</i>	2.56*** (0.66)	-0.01 (0.12)	1.69*** (0.50)	1.13*** (0.43)	0.88*** (0.25)	0.84*** (0.26)
<i>EPS</i>	3.15*** (0.62)	1.71*** (0.48)	0.93*** (0.36)	2.91*** (0.59)	0.56** (0.25)	1.47*** (0.42)
<i>BVE</i>	1.49*** (0.08)	1.70*** (0.08)	1.62*** (0.13)	1.99*** (0.14)	0.74*** (0.16)	0.88*** (0.23)
<i>Post</i> × <i>RSV</i>			-1.71*** (0.50)	-1.40*** (0.32)	-1.06 (1.87)	-0.34 (0.28)
<i>CA</i> × <i>RSV</i>					1.37 (1.61)	-0.91 (1.70)
<i>Post</i> × <i>CA</i>					1.16 (1.77)	-0.83 (2.17)
<i>Post</i> × <i>CA</i> × <i>RSV</i>					-1.56** (0.66)	-1.83*** (0.45)
<i>Post</i> × <i>Control</i>	No	No	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R2_Adj	0.86	0.64	0.90	0.91	0.89	0.90
Sample	CA	CA	CA	CA	CA&US	CA&US
N	238	357	595	595	1,070	1,070

Notes: This table reports the results of regressing stock price three months after the fiscal year-end on “proven” reserve estimates (*RSV*), earnings per share (*EPS*), and book value of equity (*BVE*). *Post* is an indicator that equals 1 for the post-IFRS period. *CA* is an indicator that equals 1 for Canadian O&G firms, and 0 for U.S. O&G firms. *Post* × *Control* presents the interactions between the indicators and EPS and BVE. For the Canada-U.S. specifications (Columns (5) and (6)), regressions are estimated using entropy-balancing weights constructed to balance the distributions of the main covariates between Canadian and U.S. firms. Standard errors are reported under the coefficients and are calculated using robust standard errors clustered by firm. *, **, *** present significance at the ten, five, and one percent (two-tailed) levels, respectively.

TABLE 4: Stock price reaction to reserve estimates news

Dep variable:	(1)	(2)	(3)	(4)	(5)	(6)
<i>Abn Ret</i>	<i>Pre</i>	<i>Post</i>	<i>Pooled</i>	<i>Pooled</i>	<i>Pooled</i>	<i>Pooled</i>
<i>ΔRSV</i>	0.03*** (0.00)	0.01*** (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.02** (0.01)	0.01* (0.01)
<i>BM</i>	0.07** (0.03)	-0.06*** (0.01)	-0.04*** (0.01)	0.06** (0.03)	0.03*** (0.01)	0.03*** (0.01)
<i>Size</i>	-0.01 (0.03)	-0.07*** (0.02)	-0.07*** (0.02)	-0.04** (0.02)	-0.04*** (0.01)	-0.04** (0.02)
<i>Oil_return</i>	0.14*** (0.05)	0.03 (0.02)	0.04 (0.02)	0.01 (0.01)	-0.12 (0.15)	-0.04 (0.14)
<i>Gas_return</i>	-0.02 (0.03)	-0.03 (0.09)	-0.01 (0.01)	-0.08 (0.10)	-0.50 (0.74)	-0.24 (0.16)
<i>Post</i> × <i>ΔRSV</i>			-0.01** (0.00)	-0.01*** (0.00)	-0.01 (0.01)	-0.01 (0.01)
<i>CA</i> × <i>ΔRSV</i>					0.03*** (0.01)	0.02 (0.06)
<i>Post</i> × <i>CA</i>					-0.07*** (0.02)	-0.20** (0.08)
<i>Post</i> × <i>CA</i> × <i>ΔRSV</i>					-0.01*** (0.01)	-0.02** (0.01)
<i>Post</i> × <i>Control</i>	No	No	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R2_Adj	0.24	0.07	0.12	0.16	0.11	0.10
Sample	CA	CA	CA	CA	CA&US	CA&US
N	238	357	595	595	856	856

Notes: This table reports the results of regressing stock price reaction to the releases of O&G reserve news (*ΔRSV*). *Post* is an indicator that equals 1 for the post-IFRS period. *CA* is an indicator that equals 1 for Canadian O&G firms, and 0 for U.S. O&G firms. *Post* × *Control* presents the interactions between *Post* and *BM*, *Size*, *Oil_return* and *Gas_return*. For the Canada-U.S. specifications (Columns (5) and (6)), regressions are estimated using entropy-balancing weights. Standard errors are reported under the coefficients and are calculated using robust standard errors clustered by firm, correcting for heteroscedasticity. *, **, *** present significance at the ten, five, and one percent (two-tailed) levels, respectively.

TABLE 5: Specificity and consistency of reserve-related accounting policy disclosure

Panel A: Reserve information in accounting-policy text			
	<i>Pre</i>	<i>Post</i>	<i>Diff</i>
- Capitalization - Oil and Gas properties			
- Any reserves	52.2%	48.3%	-3.9%
- Proved/proven reserves	39.4%	10.5%	-28.9%***
- Probable reserves	22.4%	31.7%	9.3%**
- Possible reserves	0.0%	0.0%	-
- DD&A			
- Any reserves	80.6%	27.9%	-52.7%***
- Proved/proven reserves	71.1%	5.4%	-65.7%***
- Probable reserves	4.1%	16.7%	12.6%***
- Possible reserves	0.0%	1.1%	1.1%
- Impairment			
- Any reserves	85.6%	45.9%	-39.7%***
- Proved/proven reserves	75.6%	10.9%	-64.7%***
- Probable reserves	17.7%	35.0%	17.3%***
- Possible reserves	0.0%	3.3%	3.3%**
Panel B: Specificity and consistency of reserve-related accounting policy disclosure			
<i>Dependent variables:</i>	(1) <i>Specificity</i>	(2) <i>Consistency</i>	
<i>Post</i>	-2.00*** (0.37)	-0.18** (0.09)	
<i>Length</i>	-0.03*** (0.00)	-0.02*** (0.00)	
<i>RSV_rank</i>	-0.20 (0.29)	-0.02 (0.01)	
<i>RSV</i>	0.67 (0.53)	0.01 (0.05)	
<i>Size</i>	0.42** (0.19)	0.03 (0.09)	
<i>Growth</i>	0.40 (0.81)	-0.29 (0.34)	
<i>Lever</i>	-1.67 (5.49)	-0.98 (1.00)	
<i>RoA</i>	0.79** (0.31)	-0.01 (0.02)	
<i>Accrual</i>	0.18** (0.08)	0.02 (0.01)	
<i>BM</i>	0.71* (0.39)	-0.01 (0.01)	
<i>Big</i>	0.18 (1.52)	0.15** (0.06)	
<i>Close</i>	0.01 (0.03)	-0.00 (0.02)	
<i>Loss</i>	-1.67**	-0.09**	

	(0.75)	(0.03)
<i>SD_return</i>	-2.69**	-0.18**
	(1.05)	(0.08)
<i>SD_earn</i>	0.13	-0.06
	(0.10)	(0.11)
<i>Analyst Acc</i>	-0.04	-0.01
	(0.07)	(0.03)
<i>Analyst missing</i>	1.10	0.02
	(0.98)	(0.42)
Firm FE	Yes	Yes
R2_Adj	0.58	0.49
Sample	CA	CA
N	595	595

Panel C: Cross sectional tests based on changes in specificity and consistency

Dep variable:	$\Delta Specificity$		$\Delta Consistency$	
<i>Price</i>	Low	High	Low	High
	(1)	(2)	(3)	(4)
<i>RSV</i>	2.40**	2.91**	2.46***	3.10***
	(1.08)	(1.26)	(0.95)	(0.71)
<i>Post</i>	1.28	1.11	0.22	1.06*
	(1.84)	(2.40)	(0.23)	(0.63)
<i>Post</i> × <i>RSV</i>	0.36	-2.91**	-1.75	-3.12***
	(1.76)	(1.26)	(2.19)	(0.72)
<i>EPS</i>	0.79	1.30***	3.14***	2.40***
	(0.87)	(0.40)	(1.02)	(0.43)
<i>BVE</i>	1.66***	1.29***	1.73***	1.55***
	(0.14)	(0.15)	(0.19)	(0.07)
Firm FE	Yes	Yes	Yes	Yes
R2_adj	0.90	0.91	0.92	0.91
Sample	CA	CA	CA	CA
N	295	300	295	300

Notes: The table reports the results related to specificity and consistency of reserve-related accounting policy disclosure. Panel A reports descriptive evidence on reserve-related terms used in firms' accounting policy disclosures before and after IFRS adoption. For each accounting-policy area, the table presents the percentage of firm-year observations that refer to reserve information and distinguishes between references to any reserves, proved/proven reserves, probable reserves (including references to proved and probable reserves), and possible reserves (including references to proved, probable, and possible reserves). The reported change is the difference between the post-IFRS and pre-IFRS percentages. Panel B reports coefficient estimates from regressing *Specificity* and *Consistency* on determinants. Panel C reports the results of estimating the value relevance of O&G reserves in subsamples based on the change in disclosure practices. High (Low) refers to observations with above (below) median decline in *Specificity* and *Consistency* from the pre-IFRS to the post-IFRS period. All variables are defined in Appendix C. Standard errors clustered by firm are reported in parentheses under the coefficients. *, **, *** present significance at the ten, five, and one percent (two-tailed) levels, respectively.

TABLE 6: Reserve estimate revisions and dispersion pre- and post-IFRS

Panel A: Probability of negative reserve revisions					
Dependent variable:	<i>RSV Revision_{t+1}</i>				
	<i>Baseline</i>	<i>ΔSpecificity</i>	<i>ΔConsistency</i>	<i>Tech Revision</i>	<i>DiD</i>
	(1)	(2)	(3)	(4)	(5)
<i>Post</i>	0.03*** (0.01)	0.02** (0.01)	0.07** (0.03)	0.06*** (0.01)	
<i>Post × High Specificity Decline</i>		0.08*** (0.03)			
<i>Post × High Consistency Decline</i>			-0.04 (0.03)		
<i>Post × CA</i>					0.02** (0.01)
<i>Controls</i>	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes
R2_Adj	0.77	0.76	0.77	0.77	0.77
Sample	CA	CA	CA	CA	CA&US
N	595	595	595	595	856
Panel B: Reserve estimate dispersion					
Dependent variable:	<i>RSV Dispersion</i>				
	<i>Baseline</i>	<i>ΔSpecificity</i>	<i>ΔConsistency</i>		
	(1)	(2)	(3)		
<i>Post</i>	0.06*** (0.02)	0.06** (0.03)	0.02*** (0.01)		
<i>Post × High Specificity Decline</i>		0.04 (0.05)			
<i>Post × High Consistency Decline</i>				0.06* (0.03)	
<i>Controls</i>	Yes	Yes	Yes		
Firm FE	Yes	Yes	Yes		
R2_Adj	0.66	0.65	0.65		
Sample	CA	CA	CA		
N	595	595	595		

Notes: This table represents the results of testing the change in reserve estimate revision and dispersion before and after IFRS adoption. *RSV_Revision* is an indicator variable that equals one if there is a negative revision in year $t + 1$. *RSV_Dispersion* is the difference between “proved” and “probable” O&G reserves, scaled by the “probable” reserves. *High Specificity Decline* is an indicator variable that equals one for firms with an above-median decline in the specificity of reserve-related accounting policy disclosures from the pre-IFRS to the post-IFRS period. *High Consistency Decline* is an indicator variable that equals one for firms with an above-median decline in the consistency of reserve-related accounting policy disclosures from the pre-IFRS to the post-IFRS period. All variables are defined in Appendix C. Standard errors clustered by firm are reported in parentheses under the coefficients. *, **, *** present significance at the ten, five, and one percent (two-tailed) levels, respectively.

TABLE 7: Reserve-related questions in earnings conference calls

Dependent variable: <i>CCQA_reserve</i>	<i>Full sample</i>		<i>Quarter comparison</i>			<i>Country comparison</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post</i>	-0.68*** (0.20)	-0.68*** (0.20)	-1.15*** (0.30)	-0.19 (0.21)		
<i>Post</i> × <i>Q4</i>					-1.57*** (0.39)	
<i>Post</i> × <i>CA</i>						-1.75*** (0.54)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes
R2_Adj	0.14	0.17	0.18	0.17	0.15	0.17
Sample	CA	CA	CA-Q4	CA-Q1-3	CA	CA&US
N	866	866	341	525	866	2,377

Notes: This table represents the results of testing the change in reserve-related questions in the conference call Q&A section. *CCQA_reserve* is the frequency of reserve-related questions in the conference call Q&A sessions scaled by the total number of questions. The control variables are variables related to the other characteristics of managers' presentations and Q&A in the conference call and firms' fundamentals (*Tone*, *Uncertainty*, *RSV_Pres*, *Q&A_Length*), as defined in Appendix C, and not tabulated due to space constraints. Standard errors clustered by firm are reported in parentheses under the coefficients. *, **, *** present significance at the ten, five, and one percent (two-tailed) levels, respectively.