

Exploration and evaluation expenditures and the cost of debt

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Abstract

This study responds to calls for research on whether capitalized intangible assets and their related accounting policies influence the price of debt. Specifically, using a large sample of 2,381 firm-year observations of hand-collected data, we first examine whether the annual capitalized exploration and evaluation (E&E) expenditures of Mining and Oil & Gas firms are associated with the cost of debt. Second, we investigate whether the variation in accounting policy applied for the E&E capitalization on the balance sheet (i.e., degree of the aggressiveness) affects the cost of debt. Consistent with our predictions, we find that Mining firms with larger amounts of capitalized E&E expenditures exhibit lower cost of debt. Further, consistent with feedback to the International Accounting Standards Board (IASB) that the diverse accounting policies are not a primary concern to investors and other financial statement users, we document that effect of the E&E expenditure on cost of debt is not contingent upon the accounting policy that firms apply. Collectively, our findings suggest that capitalized E&E expenditures signal a reduced risk with regards to the future associated economic benefits, thereby mitigating debtholder downside risk irrespective of the accounting policy applied. In additional tests, we find evidence consistent with reduced risk of future benefits and increased future profitability associated with E&E assets. Overall, this paper contributes to the financial accounting literature by illustrating the implications of accounting for E&E expenditures on the cost of debt and to practice, standard setters and policy makers.

JEL classifications: G30, M40, M41.

Keywords: Exploration and evaluation expenditures, IFRS 6, cost of debt, IFRS.

1. Introduction

Drawing on a large sample of hand collected data, we examine whether the annual amounts of capitalized exploration and evaluation (E&E) expenditures in Mining and Oil & Gas firms are associated with cost of debt. Additionally, we investigate whether this association is influenced by the degree of variation of the accounting policy governing the capitalization of E&E assets on the balance sheet (i.e., degree of the aggressiveness).

Firms involved with extractive activities play an important role in the economy worldwide, representing a significant proportion of the market capitalization (Gray et al., 2019; Nobes & Stadler, 2021). For example, the world's top 40 Mining firms' market capitalization was more than US\$1.2 trillion in 2022 (PWC, 2023), while the revenues made by Oil & Gas firms exceeded the US\$4 trillion in 2022 (Reuters, 2023). However, Mining and Oil & Gas firms face significant uncertainty and risk in their core operations, particularly during the E&E phases, which encompass a wide range of activities -from acquiring exploration rights to conducting topographical, geological, geochemical and geophysical studies; exploratory drilling; trenching; sampling; technical feasibility and commercial viability evaluations), entailing substantial E&E expenditure (in absolute terms and relative to total assets or revenue) (Constantatos et al., 2021; Nobes & Stadler, 2021). Despite their large scale, such investments are highly uncertain and could end up a "dry hole" (Katz, 1985; Wise & Spear, 2002): "companies may spend millions of dollars on an exploration effort only to find that variables such as development and production risk, changing technology, time horizons, market risk, and the legal and political environment render the project uneconomical" (Cortese, 2009, p.28).

Beyond the underlying uncertainty associated with the E&E expenditure, the accounting treatment of E&E expenditure remains highly unregulated and certainly not standardised

(Constantatos et al., 2021; Power et al., 2017; Stadler & Nobes, 2025).⁵ Under International Financial Reporting Standards (IFRS), IFRS 6 *Exploration for and Evaluation of Mineral Resources* governs the accounting treatment of expenditure on extractive activities, but provides limited guidance and scope. Issued in June 2004 as an interim standard with a restricted scope (IASB, 2004), it lacks definitions of specific accounting policies and mandates only minimum disclosures, unlike the majority of other IFRS (Constantatos et al., 2021; Nobes & Stadler, 2021). It allows firms to use any accounting policy they deem that it reflects the firm economics, thus permitting multiple and diverse accounting approaches that vary considerably across the world. The policies that firms can apply vary with respect to, first, the degree of aggressiveness in the capitalization of E&E expenditure and, second, the pool of impairment and testing appraisal of these assets thereafter. Thus, IFRS 6 allows a significant degree of management discretion (Constantatos et al., 2021; Stadler & Nobes, 2025; Wu et al., 2010), which differs substantially from the degree of managerial discretion associated with the capitalization of development costs governed by International Accounting Standard (IAS) 38 *Intangible Assets*.⁶

The underlying uncertainties arising from the inherent nature surrounding the extractive industry environment, compounded by the diversity of permitted accounting treatments, increase the related information asymmetry and estimation risks (Bui et al., 2021; Ferguson et al., 2011; Ferguson et al., 2021; Gray et al., 2019). Under these conditions, the amount of E&E expenditures capitalized (i.e., managerial signal of related future economic benefits) and the accounting policy adopted for such expenditure, should be particularly relevant for capital market participants. In line with this argument, a handful of prior studies explore whether E&E

⁵ Historically, regulating accounting practices in the extractive industry has been a complex matter mainly due to the divergent and national vested interests and lobbying forces (e.g., Smith & Brock, 1959; Luther, 1996; Cortese et al., 2010; Gray et al., 2019).

⁶ IAS 38 requires research costs to be expensed and development costs to be capitalized when the Paragraph 57 capitalization criteria are met.

expenditures and their accounting treatment are useful for equity market participants (e.g., Chen et al., 2018; Ferguson et al., 2021; Harris & Ohlson, 1987; Power et al., 2017; Zhou et al., 2015). To the best of our knowledge, the limited prior literature has exclusively focused on equity markets, while uncertainties and risks associated with E&E projects can affect both equity investors and debtholders. Hence, existing evidence on the capital market implications of E&E expenditure provides only a partial view of such implications. Whether capitalised E&E expenditure provide relevant information for debt market participants is therefore an open empirical question and this study fills this void.

Beyond the apparent lack of related, evidence within a debt financing context becomes even more pertinent after considering the following. First, debtholders, compared to equity investors, bear the risk of an asymmetric payoff structure (Dewatripont & Tirole, 1994). That is, while both market participant groups are exposed to downside risk, the upside prospect of the debt holders is confined to a fixed contractual payment (i.e., interest and principal payments), whereas equity investors also benefit from unlimited upside potential (Defond & Zhang, 2014; Easton et al., 2009; Elliott et al., 2010; Lok & Richardson, 2011). Inevitably, these differences in the payoff structure lead also to differences in the information needs between the two groups. Debtholders are more sensitive to negative news, information risks and uncertainties, since these could increase their downside risk (Armstrong et al., 2010; Ball et al., 2008; Florou & Kosi, 2015; Holthausen & Watts, 2001; Kreß et al., 2019). In fact, drawing on economic theory and particularly debt covenants monitoring and political costs, prior literature highlights that the accounting and reporting of E&E expenditure should be particularly relevant for debt contracting (Dhaliwal (1980); Collins et al. (1981); Leftwich (1981) and Malmquist (1990).

Second, creditors constitute one of the most important group of recipients and users of the financial statements (Shi, 2003; Florou & Kosi, 2015). Third, firms raise capital much more

frequently from debt than equity markets and for many entities debt is the most significant source of capital (Amstrong et al., 2010; Dhaliwal et al., 2011; Florou & Kosi, 2015).⁷ Fourth, the equity-focused findings (and their interpretation) do not necessarily allow for clear inferences to be drawn within a debt financing setting. For example, Shi (2003) in relation to R&D expenditure, which similar to E&E expenditure (Bui et al., 2021) is associated with significant underlying uncertainty, questions prior literature interpreting a positive association between R&D and stock prices/returns (e.g., Bublitz & Ettredge, 1989; Cockburn & Griliches, 1988; Lev & Sougiannis, 1996) as evidence that investment in R&D generates future benefits. They argue that the benefits and the riskiness of R&D investment for levered firms impact equity valuation positively. Thus, “an increase in the uncertainty of future cash flows that is attributed to R&D investments will increase the stock price, even if the expected future cash flows remain unchanged” (Shi, 2003, p. 228).

Our first hypothesis predicts a negative association between the amount of E&E expenditures capitalised in a given year and the cost of debt. This prediction is motivated by creditors’ asymmetric payoff structure and firms’ discretionary reporting decisions to signal future successful E&E projects, effectively sending a positive signal in relation to the firm’s future risk and cash flows. Further, the research undertaken by the IASB with investors and other financial statement users acknowledges “that information about exploration and evaluation expenditure is important” (IFRS, 2023, p. 7). Hence, we conjecture that creditors’ downside risk associated with their asymmetric payoff structure would be mitigated relative to the amount of E&E expenditures capitalized. Therefore, we expect higher levels of annual capitalized E&E expenditures to reduce firms’ cost of debt.

⁷ For instance, the total amount of global outstanding corporate debt equalled \$108 trillion in 2018, whereas the global equity market capitalization for the same year was \$74 trillion (LSEG, 2020; SIFMA, 2019).

In our second hypothesis, we investigate whether the association between cost of debt and capitalized E&E expenditure is affected by the accounting policy that firms apply. Motivated by positive accounting theory (c.f., Khurana & Wang, 2015; Zhang, 2008) and by prior debt contracting literature suggesting that creditors require higher interest rates for borrowers following more aggressive financial reporting (e.g., Ahmed et al., 2002; Beatty et al., 2008; Beatty et al., 2012; Li, 2015; Zhang, 2008), one would expect more aggressive accounting policies to disrupt the positive signal the capitalized amounts project. Thus, E&E accounting policy should moderate the effect of E&E expenditure on firm's cost of debt. On the other hand, the IASB acknowledges the diverse accounting policies for E&E expenditure applied in practise and concludes that these are “not a significant concern” (IFRS, 2023, p3). In fact, their findings suggest that the “accounting policy applied to exploration and evaluation expenditure is often not material to users of financial statements” (IFRS, 2023, p.8). Additionally, firms engaging in E&E activities are relatively young and not well-established firms. As such, E&E firms are more likely to be financed by private debt than public debt, which is the focus of this study. Given that IASB's research findings contradict debt contracting and positive accounting theory informing the accounting literature around cost of debt and conservative accounting, we develop our second hypothesis in its null form.

To test our hypotheses, we focus on a sample of firms from five countries with significant presence in the extractive industry (i.e., Australia, Canada, Norway, South Africa and the UK).⁸ Our final sample consists of 2,381 firm-year observations (1,748 Mining and 633 Oil & Gas). For each firm, we hand collect the E&E amounts capitalized, expensed and impaired during the year and manually categorise the accounting policy applied, based on its degree of aggressiveness. Our findings indicate that firms indeed use a variety of accounting policies in

⁸ Australia, Canada, Norway and South Africa were involved in the 2004 International Accounting Standards Board's (IASB) project to explore potential changes in IFRS 6, which subsequently resulted in the related Discussion Paper (DP) published in 2010.

relation to E&E expenditure, consistent with prior academic and practice research (e.g., Constantatos et al., 2021; Power et al., 2017; Stadler & Nobes, 2025) and the research undertaken by the IASB (IFRS, 2023). In fact, Mining firms tend to use more diversified and more conservative accounting policies than Oil & Gas firms, consistent with the evidence in Power et al. (2017) for the UK and Stadler and Nobes (2025) who employ an international (albeit relatively small) sample. With respect to our first hypothesis, we find that firms with larger amounts of capitalized E&E expenditures in a year exhibit significantly lower cost of debt financing, albeit this finding holds only for Mining firms. This finding is also economically significant. Increasing capitalized E&E expenditure by one standard deviation each year decreases cost of debt financing by 0.50%. This represents a decrease of 5%. This finding suggests that the capitalization intensity of E&E provides relevant information that is priced positively by the debt market. In other words, capitalized E&E expenditure signals a reduced risk with regards to the future economic benefits and decreases debtholder downside risk. We further show that this effect is not contingent upon the accounting policy that firms apply, despite observing a significant variation in the policies followed. Our results are robust in a series of sensitivity tests and potential sample selection bias.

In additional tests, first, we corroborate the arguments underpinning our first hypothesis that the capitalized E&E expenditures are associated with lower uncertainty of future benefits and higher future economic benefits. Second, we explore whether the documented effects differ between exploration- and production-oriented firms (c.f., Chen et al., 2018; Constantatos et al., 2021; IFRS, 2023). Arguably, future earnings are more predictable during the production stages, but exploration is more uncertain. Thus, information asymmetry is expected to be less prominent for production-oriented compared to their exploration-oriented counterparts. Consistent with this, we document that the effect of capitalized E&E expenditure on cost of debt financing is driven by exploration-oriented firms.

To the best of our knowledge, this is the first study to provide evidence about: (i) the association of capitalized E&E expenditures with firm's cost of debt; and (ii) the potential moderating effect that more aggressive reporting decisions may have on the impact of capitalized E&E expenditures and firm's cost of debt financing. Thus, this study makes three important contributions to the accounting literature. First, it adds to the body of literature that examines whether E&E expenditures contribute to the decision usefulness of capital market participants. Prior research has solely concentrated on equity market implications such as firm value and returns (e.g., Zhou et al., 2015; Power et al., 2017; Ferguson et al., 2021) and analyst forecast accuracy (e.g., Chen et al., 2018) with Mining firms being “relatively under-researched” (Power et al., 2017, p. 550). Our findings add to the cost of debt financing literature (e.g., Francis et al., 2005; Gray et al., 2009; Jung et al., 2018; Li, 2015; Mählmann, 2009; Orens et al., 2010; Pittman & Fortin, 2004), for which evidence in the context of E&E capitalization is scarce. Second, we provide evidence that responds directly to the Givoly et al. (2017, p.69) call, urging future researchers to examine “whether capitalisation [of intangible assets] is beneficial to creditors”. Specifically, our findings in relation to the first hypothesis point out a potential signalling mechanism, employed by firms that capitalize E&E expenditures. This supports the reduction of associated inherent risks and uncertainties associated with such environments and effectively accommodates lower cost of debt.

With the findings in relation to our second hypothesis, third, we directly address Christensen et al.'s (2016; p.427) call for future studies to investigate how “the choice among different accounting methods” could facilitate firm's debt financing. We provide related evidence while using the unique setting of E&E capitalization under IFRS, which allows the recognition of intangible assets using a range of accounting policies, unlike other intangible assets governed by IAS 38 such as R&D or software development costs. Hence, the findings on the second hypothesis provide the, lacking so far, empirical evidence for the conjectures put

forward on the role of accounting policies of E&E firms and debt contracting (Collins et al., 1981; Malmquist, 1990). Although the insights from debt contracting and positive accounting theory inform evidence in the accounting literature around cost of debt and conservative accounting more broadly, the accounting policy for capitalization and impairment of E&E expenditure for firms in the extractives industry in particular does not seem to affect cost of debt. This, however, is consistent with the IASB's own research that the accounting policy is not material to users.

Beyond the academic contributions, our findings provide valuable insights for preparers, standard setters and regulators. Specifically, the findings indicate direct firm capital structure and accounting-choice decision implications. Given the importance of raising external capital, firms might need to (re)consider the trade-offs related to capitalization of E&E expenditure. Further, our findings contribute to the long-standing debate about the relevance of the current regulatory environment around accounting for the extractive industry. Overall, our findings are in line with the IASB's stakeholder feedback that "information about exploration and evaluation expenditure is *important* but most suggested that diversity in accounting for exploration and evaluation expenditure is *manageable*" (emphasis added) (IFRS, 2023, p.7). As such, our study should inform future roundtables and discussions that would assist in the potential development of IFRS 6 and more generally other intangibles assets that fall outside the IAS 38 scope.

The remainder of this paper is structured as follows. Section 2 discusses the accounting background, the relevant literature and outlines the hypotheses tested. Section 3 describes the research design, including the sample selection process and empirical specifications. Sections 4 and 5 report the findings of the main and additional analyses. Section 6 presents the findings of the sensitivity analysis. Finally, Section 7 provides a summary and conclusion.

2. Accounting context, related literature and hypothesis development

2.1 Background to IFRS 6

Firms that engage in extractive activities involve “finding and removing wasting natural resources located in or near the earth’s crust” (IASB, 2000; p.14). These firms engage in a multi-phase process including the discovery, exploration and evaluation, development, extraction and production of the minerals, oil and natural gas deposits.

IFRS 6 focusses exclusively on the accounting treatment of the expenditures related to the exploration and evaluation phase.⁹ Any expenditures occurred before or after this phase are outside of the scope of IFRS 6, and hence are treated by other standards. IFRS 6 was introduced as part of the wider IFRS adoption in 2005, and it was only intended to be an interim standard with limited scope (IASB, 2004). The standard does not include any prescribed accounting policies or even definitions of potential accounting policies to the accounting treatment of E&E expenditures. Rather, IFRS 6 requires firms only to determine their accounting policy by specifying what expenditures would be recognised as E&E assets (if any) and apply their selected policy consistently (IFRS 6, para. 9). On transition from local accounting standards to IFRS, the standard allows firms to continue using the accounting policies that they were in place under national accounting standards prior to the adoption of the IFRS. In practice, this is led to the application of a range of accounting policies worldwide and the continuation of national accounting practices under an IFRS regime (IASB, 2020b; Stadler & Nobes, 2025; Hellman et al., 2023).

Considering this background, in 2004, the IASB launched a research project conducted by staff from national standard-setters in four countries with significant national interest and presence in the extractive industry, namely Australia, Canada, Norway and South Africa. In

⁹ Exploration activities include a range of activities such as, conducting topographical, geological, geochemical and geophysical studies; and carrying out exploratory drilling, trenching and sampling activities. Evaluation activities involve determining the technical feasibility and commercial viability of mineral deposits that have been found through exploration (IASB, 2010).

2010, the IASB published the findings and proposals of this research project as a Discussion Paper (DP). The DP proposed the introduction of one consistent accounting policy, which was mainly based on the ‘area-of-interest’ approach that the respective Australian standard required at the time. This proposed policy suggested that the model for asset recognition should be based on the acquisition of legal rights (e.g., exploration and extraction rights). In that sense, any costs associated with E&E activities should be treated as “enhancements” of those legal rights – since they would not constitute separate assets, but they would be necessary to obtain future economic benefits - and therefore should be capitalized (IASB, 2010).

Following the release of the DP, the IASB received several responses from various stakeholders. The main common theme in these responses was that the IASB should either consider the development of a new standard that would focus exclusively on the reporting of E&E expenditures or to incorporate the accounting for E&E expenditures in a broader project for intangible assets such as R&D. Despite the concerns raised and the suggestions made, the IASB decided not to continue with the proposed changes to IFRS 6 as they were not deemed urgent enough and assigned a “low priority” to the topic (IASB, 2016).

Given the importance of firms involved with extractive activities as well as the diverse accounting policies applied in practice and the associated financial reporting implications, the topic of extractive activities held a prominent place in the IASB’s 2015 Agenda Consultation. Following the feedback and discussions of the 2015 Agenda Consultation, the IASB lifted the “low priority” status of the topic and classified extractive activities as a “Research Pipeline” project (IASB, 2016).

The research project commenced in 2018 with national standard setters, financial statement users and other stakeholders from different jurisdictions participating in the discussion on whether to amend or replace IFRS 6. While consensus was not reached among the participants, the three main suggestions that prevailed were: (i) improving the existing

recognition, measurement and disclosure requirements of the standard; (ii) withdrawing IFRS 6 and incorporate it in a broader project for intangible assets; (iii) applying no changes and maintaining the standard at its current state. In light of this inconclusive feedback, in 2023, the IASB decided to adopt the third alternative i.e., postponing any changes to the recognition of E&E expenditure and removing the standard's temporary status (IFRS, 2023), while acknowledging the continued use of diverse accounting policies in practice.

2.2. Related literature and hypotheses development

2.2.1 Capitalized amounts and cost of debt

Debtholders are exposed to downside risk but their upside potential is limited to the fixed interest and principal payments (Zhang, 2008). For firms involved in extractive activities, this inherently disproportional difference between debtholders' downside risk and upside potential is further exacerbated not only due to the increased uncertainties surrounding the technical and commercial viability of the exploration projects, but also because of their generally low success rate (Cortese, 2009; Ferguson et al., 2011). For example, Bartrop and Guj (2009) report c23 discoveries in 2,669 trials of discovering an economic orebody in a greenfield exploration program, irrespective of size.¹⁰

Moreover, the increased uncertainties and information asymmetry around the success of an exploration activity is exacerbated by its long-life cycle. While likening mining exploration firms to biotechnology firms, Ferguson and Lam (2023, p. 662) cite the World Bank policy working paper by Khan et al. (2016) who suggest that “the average time from an initial gold discovery to production is 10 years, and 15 years for base metals projects (zinc, lead, copper, and nickel). Industry estimates place the period from early exploration to production for copper mines at almost 25 years.” Moreover, they explain that resource sampling is a tiny fraction of

¹⁰ Ferguson and Lam (2023) point to evidence in Robinson and Stuart (2007) and highlight that these small probabilities of success are like drug development.

the overall size of the deposit, highlighting the potential for fraud in relation to the resource estimates announced, while again this mirrors examples in the biotech industry. Thus, any information that could mitigate or alleviate information asymmetry and debtholder's downside risk is expected to be highly valuable. Arguably, the annual amounts of E&E expenditures recognised as assets on the balance sheet should be perceived positively by capital providers for several reasons.

First, in the Conceptual Framework for Financial Reporting (2018) an asset "is a present economic resource controlled by the entity as a result of past events" (para. 4.3), with economic resource being defined as "a right that has the potential to produce economic benefits" (para. 4.4). As explained by Ferguson et al. (2021 p. 805), "IFRS 6 allows firms to capitalize E&E as an intangible asset, despite the speculative nature of such activities, provided that (a) the firm has a genuine ongoing claim to the project (if such a claim is lost, any capitalized E&E expenditure is to be written-off as an expense), (b) the project has not been abandoned (if so, any capitalized E&E is to be written-off as an expense), and (c) the project has not yet reached the development stage (if so, any capitalized E&E expenditure is to be reclassified as capitalized mine development costs and amortized against production revenue)." Thus, recognising E&E expenditure as an intangible asset would convey management's expectations about its success and act as a communication channel that signals the future economic benefits.

Second, capitalization communicates management's beliefs with regards to the expected value of E&E expenditure. It may be a costly signal because it may reveal opportunity costs and proprietary information to competitors with respect to the success of E&E (Bellora & Guenther, 2013). Further, as Bui et al. (2021, p.900) explain, managers "need to provide the auditor with sufficient evidence regarding movements affecting the carrying amount of the E&E asset account balance to ensure that it is not overstated". Beyond the preparation costs stemming from this, management is also exposed to a loss of credibility if the signalled

expected benefits do not materialise in the long-term or, even worse, if the firm impairs them soon after they are capitalized. Thus, the reputational risks that managers are exposed to when capitalizing E&E expenditures are even higher than in the case of development costs. Consistent with these arguments, Chen et al. (2018) suggest that capitalization of E&E expenditures serve as a signalling mechanism to communicate “genuine” future economic benefits resulting from successful E&E projects and production activities. Effectively, managers can use their discretion to convey relevant information that reduces information asymmetry (Godfrey & Koh, 2001). Consequently, capitalization could affect capital providers’ expectations about the associated future payoffs.¹¹

Empirically, prior literature confirms that equity investors find capitalized E&E relevant and shows that it impacts firm value and returns (e.g., Power et al., 2017; Wu et al., 2010; Zhou et al., 2015; Ferguson et al., 2021) and analyst forecast accuracy (e.g., Chen et al. 2018).¹² Justifying the resemblance of E&E activities of those in R&D intensive industries (see Bui et al., 2021; Ferguson et al., 2021; Ferguson & Lam, 2023), this empirical evidence is very similar to that reported around capitalized development costs from R&D activities under IFRS (see discussions in Andronoudis et al., 2025; Dargenidou et al., 2021; Dinh et al., 2016; Mazzi., 2019). In relation to debtholders specifically, Kreß et al. (2019; p.639) predict and find a negative association between capitalized development costs and cost of debt for an international sample of R&D active firms reporting under IFRS, and state that “capitalised

¹¹ Firms may provide voluntary disclosures to reduce information asymmetries instead of opting to capitalize E&E expenditure. However, as Dargenidou et al. (2021) note in the context of development costs capitalization, voluntary disclosures may not reduce information asymmetries, because: 1) voluntary disclosures are not audited; 2) it is more costly for market participants to extract information from voluntary disclosures compared to mandatory disclosures (Palmon & Yezegel, 2012); 3) managers may be reluctant to provide voluntary disclosures that may reveal proprietary information (e.g., Bellora & Guenther, 2013; Palmon & Yezegel, 2012).

¹² There is similar evidence in prior literature for the US market i.e., not within an IFRS setting. Berry and Wright (2001) find that capitalized E&E expenditure is positively associated with firm market value and Bryant (2003) finds that a higher intensity of capitalization of E&E expenditures explains better the firm value and changes in the firm value of extractive firms.

development costs are closer to being marketed or sold, and hence ... reflect proprietary firm information about R&D projects that are highly likely to succeed”.

Against this backdrop, we conjecture that capitalized E&E expenditures convey a signal about the success of E&E projects and information about the future payoffs and economic benefits. This, in turn, should mitigate debtholders’ information asymmetry and estimation uncertainties, thus lowering their downside risk (c.f. Kreß et al., 2019). Therefore, we expect firms with higher amounts of capitalized E&E expenditures in a given year to exhibit lower debt costs.

H1: The cost of debt is decreasing in the proportion of E&E expenditures capitalized.

As in Power et al. (2017), we test our hypothesis separately for Mining and Oil & Gas firms. Prior literature documents significant differences across the two groups. For example, Stadler and Nobes (2025 p. 612) note that the “physical and economic features of mining differ from those of oil & gas extraction; such as that it may be easier to identify a mining asset compared to an oil & gas asset”. Additionally, prior literature shows that Mining firms tend to use more diversified accounting policies than Oil & Gas firms (e.g., Constantatos et al., 2021; Power et al., 2017; Stadler & Nobes, 2025) and more conservative policies than Oil & Gas counterparts (Power et al., 2017; Stadler & Nobes, 2025). Moreover, prior literature documents that Oil & Gas firms, compared to Mining firms, tend to have a larger asset base and tend to be at a more advanced life cycle stage (e.g. Constantatos et al., 2021). Furthermore, the more dated literature on the accounting policies of firms in the extractive industries has focused only or primarily on Oil & Gas firms given the related accounting changes in the US in the late 1970s (e.g., Dhaliwal 1980; Collins et al., 1981; Leftwich, 1981; Malmquist, 1990), hence recent evidence across the two industries is absent.

2.2.2 Aggressive reporting in relation to E&E expenditure capitalized

Prior literature that focuses on extractive firms under IFRS broadly defines and categorised accounting policies found in practice by their degree of aggressiveness (or conservatism) with respect to two aspects: (i) the circumstances under which such costs are capitalized, and (ii) their impairment testing appraisal (Abdo, 2016; Cortese et al., 2022; Power et al., 2017; Constantatos et al., 2021; Stadler & Nobes, 2025). Although these accounting policies are frequently grouped in four broad categories in terms of conservatism i.e., ‘full cost’, ‘area-of-interest’, ‘successful efforts’ and ‘expense all’ (Power et al., 2017; Constantatos et al., 2021), Stadler and Nobes (2025, p.615) provide a more granular disaggregation of ten (10) E&E policies “by degrees of conservatism”.¹³ These are described in column (1) of Table 1 and presented in decreasing order of conservatism (or increasing of aggressiveness).

However, distinguishing between these more granular policies can be difficult based on the information firms disclose. In their robustness tests, Stadler and Nobes (2025, p.638) explain that some of the “Policy 1” firms might use “Policy 2”, and “Policy 3” and this is sometimes difficult to determine. Further, some firms frequently have unspecified impairment pools and hence can be misclassified into either “Policy 7” or “Policy 8”. Moreover, they acknowledge that combining policies “reduces the number of categories with a small number of observations” (ibid., p.638). Hence, they provide an alternative aggregation of six policies, which are based on the 10 identified policies (see column (2) of Table 1). They further acknowledge that the ‘area of interest’ definition in the Australian standards that is used to define “Policy 5” and “Policy 7” is very broad. Therefore, firms that are classified as using either of the two policies because they refer to impairment by geological area could in fact employ a narrower pool as would be expected in “Policy 4” and “Policy 6” instead. Following

¹³ Stadler and Nobes (2025) identify 11 potential policies. However, only ten are allowed under IFRS. Indeed, they report that none of the companies in their sample, which consists of 307 IFRS reporting firms from 11 countries for the accounting period ending on 31 December 2017 or nearest after that point in time apply the policy not permitted under IFRS (i.e. capitalizing all E&E costs including those before obtaining rights).

this reasoning, they provide a second alternative aggregation of four policies (see column (3) of Table 1). Arguably, this aggregation better allows for the subjectivity involved in assigning accounting policies to companies due to the vague and unclear disclosures.

TABLE 1 ABOUT HERE

2.2.3 Capitalized E&E expenditure, aggressive reporting and cost of debt

While the first hypothesis concentrates on the effect of capitalized E&E expenditure on firm cost of debt financing, it does not capture the quality underpinning the signalling mechanism. It can be argued that the quality of the signal i.e., the reliability and faithful representation of the amounts of E&E capitalized rely on the accounting policy a firm adopts. The discretion in the standard and the evidence about significant variation in the accounting policies firms adopt (e.g., Abdo, 2016; BDO, 2013; Constantatos et al., 2021; Power et al., 2017; IASB, 2020; Stadler & Nobes, 2025) provide a unique setting to examine whether the choice of the accounting policy has a differential impact on the association of the capitalized amount of E&E expenditures and the firm's cost of debt.¹⁴

Dhaliwal (1980, p.79) explains that “most publicly traded and privately placed debt issues contain restrictive covenants designed to prevent the debtor from unilaterally altering creditor's risk” and shows that US firms in the Oil & Gas industry select accounting policies that are less likely to make them enter into technical default on its loan agreements. In line with this and focusing on US Oil & Gas firms, Collins et al. (1981) find evidence consistent with the contracting cost theory which predicts that accounting policies are chosen as part of a wealth-

¹⁴ For example, Power et al. (2017) who, inter alia, explore whether E&E expenditures are associated with the decision usefulness of equity capital providers in the UK, show that for firms listed in the LSE's Main Market (AIM) only the 'successful efforts' ('full cost') policy facilitates value relevant and meaningful information. The US oil and Gas literature is concentrated on the capital equity market effects of the so called “success efforts” (SE) or “full cost” (FC) policies because these are available under US Generally Accepted Accounting Principles (GAAP). This literature acknowledges that “several variations of each method [policy] are found in practice” (Lev, 1979, p. 485) and is unanimous in that the “FC is a less conservative method [policy] than SE” (Harris & Ohlson, 1989, p. 657) (and see discussion in Malmquist (1990) for details).

maximizing process. Building on these two studies and focusing on the accounting policies of US firms in the Oil & Gas industry, Malmquist (1990) argues that “rational value-maximizing managers will choose accounting methods [policies] that facilitate efficient contracting”.

Further, a fundamental prediction of positive accounting theory is that conservatism reduces the moral hazard and adverse selection components of the cost of debt (Watts & Zimmerman, 1986, chapter 8; Khurana & Wang, 2015; Zhang, 2008). Indeed, evidence suggests that creditors favor a conservative financial reporting system that recognizes bad news in a timelier manner than good news (Li, 2015). Further, lenders tend to charge higher interest rates to borrowers that apply more aggressive (less conservative) reporting strategies (e.g., Ahmed et al., 2002; Beatty et al., 2008; Beatty et al., 2012; Zhang, 2008). Ahmed et al. (2002) show that less aggressive (i.e., more conservative) reporting firms are more likely to have debtholder – shareholder conflicts due to conflicts of interests over dividends and that more conservative accounting practices lead to lower cost of debt. Beatty et al., (2008) report a positive relationship between financial reporting conservatism and debt contract modifications due to conservatism demand by lenders. Zhang (2008) finds that lenders offer lower initial interest rates to borrowers following more conservative (less aggressive) reporting, to compensate for the timelier signal of default risk associated with more conservative reporting.

In our setting, conservatism refers to the tendency for extractive firms to recognize losses from exploration activities sooner than profits (c.f., Ferguson et al., 2021). This is primarily influenced by the accounting policy the firm applies in relation to capitalization and impairment pool of E&E expenditure each year (Stadler & Nobes, 2025), considering that a more aggressive, relative to a more conservative, policy produces markedly different results. For example, policies like “Policy 10” in Table 1 will always yield higher book asset values and net income when drilling and exploration costs are sufficiently large, compared to when the

company applies policies like “Policy 1”.¹⁵ Given this background, it could be argued that applying a more aggressive (less conservative) accounting policy to record E&E expenditures will dilute the relevance and reliability of the amounts of E&E capitalized, disrupting the positive signalling role that capitalized E&E expenditure play for creditors, by ultimately increasing debtholders’ downside risk. Consequently, a more aggressive accounting policy would impair the favourable effect of E&E capitalization on a firm’s cost of debt financing hypothesized in H1.

Nonetheless, in contrast to theory, the IASB’s research with investors and other financial statement users aiming to inform the direction of their project (IFRS, 2023) indicates that while the information about E&E expenditure is important and relevant, the diverse accounting policies applied in practise “were not a significant concern” (IFRS, 2023, p3). On reflection of this, the IASB concluded that they “did not find compelling evidence that standard-setting would be necessary” (IFRS, 2023, p. 3). Their findings in relation to the diverse accounting policies followed contrast the insights from debt contracting and positive accounting theory. As such, we develop the following hypothesis in the null form, for Mining and Oil & Gas firms:

H2: The association between the proportion of E&E expenditures capitalized and the cost of debt is not affected by the accounting policy a firm applies.

3. Research design

3.1 Sample selection process

We focus on countries with significant national interest in the extractives industry, due to the significant presence of firms involved in such activities as well as their important contribution to regulatory discussions around extractive activities and IFRS 6 that resulted in the 2010 DP:

¹⁵ In line with this, prior US literature argues that the full cost relative to successful efforts method [policy] can yield markedly different earnings and book value of equity (cf., cf. Collins et al., 1981; Dhaliwal, 1980; Lev 1979; Malmquist, 1990).

Australia, Canada, Norway, South Africa and the UK. We obtain data from Worldscope/Datastream and firms' annual reports.¹⁶

To identify firms engaging in extractive activities, we concentrate on the subsectors of the Industry Classification Benchmark (ICB) and consider these subsectors that are more likely to contain firms that are involved with Mining or Oil & Gas extractive activities. Firms operating in the following ICB subsectors are more likely to be involved with mining: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper. Further, firms operating in the following ICB subsectors are more likely to be involved with oil & Gas extractive activities: alternative fuels; oil: crude producers; integrated oil & gas; and offshore drilling and services.

Due to the unavailability of the accounting policies and E&E related amounts from extant databases for an international sample of firms (see also Abdo, 2016; Constantatos et al., 2021; Stadler & Nobes, 2025), we collect these data manually from firms' annual reports. Given that the analysis relies heavily on time consuming manual collection of the accounting practices and related amounts from firms' annual reports, we concentrate our sample over three-period intervals: 2011 and 2012; 2014 and 2015 and 2017 and 2018. These period intervals are purposefully selected as they follow or coincide with the three key years associated with the IASB's effort for attention in the extractives industry and potential improvements to IFRS 6 (see background discussed in Section 2.1). Arguably, these periods allow us to capture any changes on the accounting policies applied by firms across the extractives industry and potentially drew the attention of other stakeholders because of the standard setting debates around these periods. They also allow us to measure a firm's future earnings over the subsequent three accounting periods and hence explore whether capitalized E&E expenditures

¹⁶ We source annual reports from Perfect Information (PI). If the annual report is not available in PI, we search in Workspace/Eikon and from the corresponding company's website.

are associated firstly, with uncertainty in future economic benefits and secondly, with future economic benefits themselves (see tests in Section 5.1, which involve data up until 2021). These conditions result in an initial potential sample of 15,250 firm-year observations that may engage in extractive activities during the periods tested.

Subsequently, we eliminate 936 firm-year observations that do not report under IFRS.¹⁷ Then, we remove firms if their financial year end has changed during the sample period (Dargenidou et al., 2021; García Lara et al., 2005), resulting in a drop of further 1,086 firm-year observations. Subsequently, we exclude 5,795 firm-year observations with missing data in Datastream and 2,347 firm-year observations of firms not appearing across all three-period intervals.¹⁸ In addition, we remove 425 observations related to firms that either do not report any financial statements or their annual reports are not available in English. Moreover, we exclude 494 firm-year observations that are not involved in any extractive activities (for instance, being service providers e.g. offshore drilling or producers, of metal pipes and similar products, within iron and steel).¹⁹ Following these restrictions, we read in the annual reports of 4,167 firm-year observations to collect E&E amounts and the related accounting policy. From these, we find that 1,786 firm-year observations do not disclose E&E amounts separately and exclude those, even though some of them discuss the accounting policy. This process leads to

¹⁷ We identify IFRS reporters by using the Worldscope item “Accounting Standards Followed” (WC07536) and eliminate those firm-year observations for which the item is missing or returns a non-IFRS related code (Constantatos et al., 2021; Daske et al., 2013; Dionysiou et al. 2021; Mazzi et al, 2019; Tsalavoutas & Tsoligkas, 2021).

¹⁸ This latter restriction allows the extensive manual data collection of the annual reports and subsequently the E&E amounts and accounting policies as reported in the financial statements to become a more manageable task. It also allows for a clearer identification as to the changes in firms’ accounting policies over time. However, this restriction may introduce survivorship bias, as we exclude smaller firms with a shorter life span. Nevertheless, this may not be significant for this paper. The 2,347 firm-year observations correspond to 1,137 firms, of which 424 have data for one year only, 379 firms have data for two years, 193 firms have data for three years and 114 firms have data for four years. The remaining 26 firms have data for five years. When we delve further in this dataset, we observe that 1,137 these firms tend to be significantly smaller (both in terms of total assets and market capitalization), younger and report lower revenues (results available upon request) compared to the rest of the sample. Therefore, these 1,137 firms may have also been eliminated in subsequent stages given that we exclude 1,786 firm-year observations because E&E amounts are not disclosed separately, which have similar characteristics with those not appearing across the 3-year period i.e., they are significantly smaller, younger and with lower revenues compared to the remaining firms of the sector.

¹⁹ We derive this because they do not disclose any E&E-related accounting policy or figures in their annual reports.

our final sample of 2,381 firm-year observations, related to 667 firms. Of these, 1,748 firm-year observations (506 firms) are classified as Mining and the remaining 633 observations (161 firms) are classified as Oil & Gas. Despite the extensive manual data collection involved, this sample is significantly larger than that in relevant literature that uses either international (Abdo, 2016; Constantatos et al., 2021; Stadler & Nobes, 2025) or single-country samples (Power et al., 2017) with hand-collected data from annual reports.²⁰ Table 2 summarises the sample selection process and Appendix 1 presents the distribution of the sample by ICB subsectors and accounting policy.

TABLE 2 ABOUT HERE

3.2 Empirical specifications

To examine our first hypothesis (H1), we employ the following econometric model:

$$CoD_{t+1} = \alpha_0 + \beta_1 CAP_EE_{i,t} + \sum \beta_2 Controls + FE + \varepsilon_{i,t} \quad (1)$$

where CoD_{t+1} represents the realised cost of debt financing, and i and t are firm and year identifiers, respectively. Following prior literature (e.g., Callahan, Vondryk, & Butler, 2012; Francis et al., 2005; Gray et al., 2009; Jung et al., 2018; Li, 2015; Orens et al., 2010; Mählmann, 2009; Pittman & Fortin, 2004; Tanin et al., 2024), we use the ratio of interest expense at time $t+1$ to the sum of short- and long-term interest bearing debt as separately provided by

²⁰ Abdo (2016) employs a sample of 118 firm-year observations and focuses only on Oil & Gas firms, Constantatos et al. (2021) employ 831 (265) firm-year observations classified as Mining (Oil & Gas), while Stadler and Nobes (2025) use 155 (152) firm-year observations classified as Mining (Oil & Gas). Power et al. (2017) use a sample of 473 (395) firm-year observations from the UK, classified as Mining (Oil & Gas). Chen et al. (2018) focus on Australia and use a sample of 615 firm-year observations, and draw the data from Morningstar which appears to have related available data only for Australian and New Zealand firms. Moreover, in tangentially related study, Bui et al. (2021) capture the amount of E&E asset additions and impairment during a given year and cross-check these via Morningstar, and employ a sample of 3,894 firm-year observations of mining exploration entities in Australia. Neither Chen et al. (2018) nor Bui et al. (2021) capture the accounting policy companies follow.

Datastream, averaged over years $t+1$ and t .²¹ Following this stream of literature, in the sensitivity tests reported in Section 6, we calculate the ratio of interest expense at time $t+1$ to the sum of short-term debt, long-term interest-bearing debt and convertible debt, as separately provided by Datastream, averaged over years $t+1$ and t .²²

In the spirit of pertinent literature that examines market valuation of R&D expenditures (e.g., Dargenidou et al., 2021; Kreß et al., 2019), but adapted to our setting, our key variable of interest is the *CAP_EE*. This is calculated as the amount of capitalized E&E costs during the year, scaled by the firm's total assets at the beginning of year t , i.e., in $t - 1$. Consistent with our first hypothesis, we expect the coefficient of *CAP_EE*, β_1 , to be negative and significant indicating higher levels of capitalized E&E expenditures in a given year is associated with lower cost of debt financing.

To test our second hypothesis (H2), we extend Eq. (1) by including a categorical variable *ACC_POL* that captures the accounting policy that firms follow, both as a main effect and as an interaction with *CAP_EE*. To operationalise this variable, we read the accounting note policy from the annual reports to identify the accounting policy that a firm in fact applies. Our inferences from reading the notes to the financial statements echo Stadler and Nobes (2025) who argue that relying solely on the labels assigned by firms can be misleading, motivating the need to read the policy note in its entirety. As discussed in Section 2.2.2, distinguishing between the potential 10 policies can be difficult based on the information firms disclose. Against this backdrop and to minimize the number of accounting policies with small number of

²¹ As an alternative, we could have used public bonds' spread (c.f., Almaghrabi et al., 2021; Ge & Liu, 2015; Kreß et al., 2019; Qin & Xiao, 2024). We have attempted to pursue related data collection and analysis. However, data on bond issues available in Thomson Reuters Eikon Deal Screener (TR Eikon) would result in a loss of over 80% of our sample. The lack of available data is justified by the fact that public debt markets are mainly accessed by larger, older and more established firms (Francis et al., 2017). Instead, our sample mainly consists of relatively younger and thus less established firms. As a further alternative, we explored the possibility of using syndicate loan issues as provided in TR Eikon (c.f., Almaghrabi et al., 2021; Kreß et al., 2019). However, the available data would result in a loss of over 90% of the sample. For these reasons, we did not pursue either of these alternatives.

²² In unreported tests, we also use the ratio of total interest expense at time $t+1$ to the sum of total interest-bearing debt as provided by Datastream, averaged over years $t+1$ and t . Our conclusions remain unchanged.

observations, we follow Stadler and Nobes (2025) and aggregate the 10 policies to six policies (see column (2) of Table 1).²³ Using these six aggregated policies, we define *ACC_POL* to range from zero to one, with higher values reflecting a more aggressive accounting policy.²⁴ Thus, we extend Eq. (1) as follows:

$$CoD_{t+1} = \alpha_0 + \beta_1 CAP_EE_{i,t} + \beta_2 CAP_EE_{i,t} * ACC_POL_{i,t} + \beta_3 ACC_POL_{i,t} + \sum \beta_4 Controls + FE + \varepsilon_{i,t} \quad (2)$$

The interaction term between capitalized E&E expenditures, *CAP_EE_{i,t}*, and the accounting policy, *ACC_POL_{i,t}*, captures the incremental effect of the accounting policy on the association between the amount of capitalized E&E expenditures and the cost of debt financing. Consistent with our second hypothesis (H2), that the accounting policy has no effect on the association between capitalized E&E expenditure and cost of debt, we expect the coefficient β_2 to be insignificant. Further, we expect the coefficient of *CAP_EE*, β_1 , to remain negative and significant, in line with H1.

For completeness and to avoid omitted variable biases, we reflect on the recent literature on E&E expenditure by IFRS reporters (e.g., Constantatos et al., 2021; Stadler & Nobes, 2025) and include as control variables the (hand collected) amounts of E&E expensed (*EE_EXP*) and E&E impairment recognised (*EE_IMPR*) in the income statement. In line with the literature that examines determinants of debt financing (e.g., Francis et al., 2005; Pittman & Fortin, 2004; Jung et al., 2018; Ye & Zhang, 2011), we also include a battery of firm level control variables: an indicator variable that equals to one if a firm employing a big 4 auditor and zero otherwise (*Big4AR*) as a mechanism that would ensure more faithful and reliable recognition of E&E

²³ To ensure the validity of the accounting policies coding, two authors and a research assistant independently coded 10 companies. Subsequently, the research team met to discuss any discrepancies. After repeating the process with another set of 10 companies, no further discrepancies arose. Any ambiguities that arose subsequently were discussed and resolved among team members.

²⁴ In Section 6 (sensitivity analysis), we again follow Stadler and Nobes (2025) and aggregate the 10 identified policies to four (see column (3) of Table 1) and our results remain unchanged. Despite the low frequency of some of the 10 policies, we also report our results when we abstain from aggregating the 10 accounting policies. Again, our conclusions remain unchanged.

expenditure; the natural logarithm of total assets (*LnSIZE*) as a proxy for firm size; return on assets (*ROA*) as a measure of firm's profitability; the ratio of total debt to book value of equity (*LEV*) and the ratio of short-term debt to total debt (*PCTSHORTDEBT*) as proxies for firm's financial health; the ratio of cash generated from operations to total assets (*CF*) and the ratio of current assets to current liabilities (*LIQ*) as proxies for cashflow and liquidity risk, respectively; the book to market ratio (*BM*) as a measure of risk and growth. Finally, we include an indicator variable that equals to one for "explorers" and two for "developers and producers" as a proxy for the stage of E&E activities based on revenue (see also Section 5.2) firm (*REVD*). A summary of all variable definitions and measurements used can be found in Appendix 2.

We also add year and country fixed effects to control for potential differences across years and countries, respectively, and cluster standards errors at the firm level to account for the panel structure of the dataset.²⁵ We winsorise all continuous variables at the 1% and 99% percentiles to reduce the effect of outliers. Furthermore, to check for any multicollinearity among the variables in all models, we produce Pearson and Spearman correlations coefficients and compute the Variable Inflation Factors (VIF) values for each variable.²⁶ Finally, as explained earlier, we estimate Eq. (1) and Eq. (2) separately for Mining and Oil & Gas firms.

4. Empirical results

4.1 Descriptive statistics

Table 3 presents the accounting policies applied by the sample firm-year observations using the 10 policies outlined in Stadler and Nobes (2025). Panel A shows the distribution of Mining firms by country of domicile, while Panel B presents the distribution of Oil & Gas firms by country of domicile. Table 4, similar to Table 3, shows the distribution of the six aggregated

²⁵ Following Ge et al. (2022), to better capture time varying country effects, we repeat our analysis by adding an interaction term between country and year dummies as an additional fixed effect. Our conclusions remain the same under this specification. The results are available upon request.

²⁶ We can confirm that we observe no coefficient or VIF to be above 8.

accounting policies (see also column (2) of Table 1), which we use to construct *ACC_POL*. Canadian and Australian firms account for approximately 85% of the Mining firms in the sample (827 and 657 observations, respectively) and 70% of the Oil & Gas firms in the sample (306 and 135 observations, respectively). The remaining sample is represented by firms from the UK (208 and 146 observations, respectively), South-Africa (47 and 3 observations, respectively) and Norway (9 and 43 observations, respectively).

The most prevalent accounting policy among Mining firms is “Policy 7” (43.88%), predominantly adopted by Australian and Canadian firms (488 and 218 firm-year observations, respectively). Given its alignment with the “area of interest” approach mandated under AASB 6 *Exploration for and Evaluation of Mineral Resources* (e.g., Constantatos et al., 2021; IASB, 2020), its widespread use among Australian firms is unsurprising. The second most commonly/frequently applied policy is “Policy 6” (15.05%), which is similar to Policy 7 but employs a narrower impairment pool at the project level. Additionally, 11.67% of firms adopt “Policy 8”, which applies a broader impairment pool than “Policy 7”. Collectively, these three policies account for approximately 70% of the sample. The third most applied approach is “Policy 1” (12.19%). More broadly, around 27% of firms adopt Policies 1 to 3 -the most conservative treatments- with most of these firms being Canadian. The remaining policies are used less frequently. Overall, the distribution of accounting practices is concentrated across five policies (Policies 1, 3, 6, 7, and 8).

Among Oil and gas firms, “Policy 7” is the most widely applied, adopted by 26.07% of sample firms, and is particularly prevalent among Australian firms (101 firm-year observations). Consistent with the findings for Mining firms in Panel A, this result is unsurprising given the policy’s close alignment with the “area of interest” approach prescribed under AASB 6 (see also Stadler & Nobes, 2025). The second most common policy is “Policy 4” (23.22%), which involves the capitalization of drilling and evaluation expenditure with

impairment assessed at the project level; this approach is most frequently observed among UK firms. The third and fourth most applied policies are “Policy 6” (22.91%) and “Policy 8” (11.69%), respectively. Notably, only 3% of Oil and Gas firms adopt the most conservative approaches (Policies 1 to 3), in sharp contrast to the 27% observed among Mining firms. These findings indicate that accounting practices in the oil and gas sector are concentrated in a narrower set of policies- primarily Policies 4, 6, and 7- compared to the broader distribution observed among Mining firms.

Overall, these results indicate that Mining firms tend to use more diversified accounting policies than Oil & Gas firms, similar to the results reported in Power et al. (2017) for the UK and is largely consistent with prior academic and practice research with international samples, which examines the diversity in the accounting treatment of E&E expenditure (e.g., Constantatos et al., 2021; Stadler & Nobes, 2025). Further, our results indicate that Mining firms adopt more conservative policies than Oil & Gas firms which is consistent with the evidence in Power et al. (2017) for the UK and Stadler and Nobes (2025) who employ an international sample.²⁷

TABLE 3 ABOUT HERE

TABLE 4 ABOUT HERE

Table 5 reports the descriptive statistics of the variables used in the multivariate analyses separately between Mining and Oil & Gas firms. The mean value of cost of debt financing variable (*CoD*) is 9.2% for Mining firms and 8.2% for Oil & Gas firms. These figures are consistent and comparable to those reported by prior relevant studies that employ accounting-

²⁷ Considering that we select the period intervals to coincide with the IASB’s effort for attention in the extractives industry and potential improvements to IFRS 6 (i.e., 2010, 2015 and 2018, we have examined whether there is a change in the accounting policies firms follow over time. Appendix 3 presents the aggregated accounting policies (Column 2, Table 1), across the three periods. We find that the standard setting debates around these periods do not influence firm’s choices of reporting policies.

based measures to capture cost of debt (e.g., Gray et al., 2009; Jung et al., 2018; Gong et al., 2021; Pitman & Fortin, 2004; Owusu et al., 2023).²⁸

The mean amount of capitalized E&E expenditures (*CAP_EE*) for Mining firms accounts for 17% of their total assets (at the beginning of the year) and for 14.2% Oil & Gas firms is. Further, Mining firms are significantly smaller than Oil & Gas firms. The mean total assets (*TA*) of Mining firms is €2.738 billion, while that for Oil & Gas is €4.065. When delving further in the data, we also note that 74% of the Mining firms and 89% of the Oil & Gas firms capitalize E&E expenditure.²⁹ Therefore, the size of capitalized E&E expenditures, especially for Mining firms, is significant in both absolute and relative terms.

With respect to the remaining firm-specific characteristics, the mean amount of E&E expensed costs (*EE_EXPENSE*) and EE related impairments (*EE_Impair*) of Mining firms account for 6.5% and 5.6% of firms' total assets (at the beginning of the year), respectively. These are statistically significantly higher than those reported by Oil & Gas firms. Specifically, the mean amount of E&E expensed costs (*EE_EXPENSE*) and EE related impairments (*EE_Impair*) of Mining firms account for 1.7% and 4.7% of firms' lag total assets, respectively. Further, Mining firms are less likely to be audited by a big four auditor, are less profitable and generate less cash flows (differences in *Big4AR*, *ROA* and *CF*, respectively significant at the 1% level). Compared to Oil & Gas firms, they also hold a higher proportion of short-term to total debt (differences in *PCTSHORTDEBT* significant at the 1% level). Finally, Mining firms are more (less) likely to be classified as developers and producers (explorers) than Oil & Gas firms (differences in *REVD* significant at the 1% level). Overall, Mining firms are indeed

²⁸ Like Pitman and Fortin (2004), our sample includes firms with no outstanding debt during the year and, thus, have zero percent interest rate as indicated by the minimum value. In sensitivity tests, Section 6, following Pitman and Fortin (2004) we perform tobit regressions to address potential censorship bias.

²⁹ As expected, 60% of the observations with zero amounts of capitalized E&E during the year apply one of the three most conservative policies (i.e., policies 1-3).

different from Oil & Gas in terms of their characteristics, justifying our choice to examine our hypotheses separately for the two groups.

TABLE 5 ABOUT HERE

4.2 Results of the multivariate analysis

Table 6 reports the results of the multivariate analysis. Models (1) and (3) investigate our first hypothesis (H1) for Mining and Oil & Gas firms, respectively. The coefficient estimates of our key variable of interest, *CAP_EE*, is negative and statistically significant, nevertheless only for the Mining firms (coefficient: -0.010; p-value<0.05). In terms of economic significance, increasing capitalized E&E expenditure by one standard deviation decreases cost of debt financing by 0.50%. Given that the mean cost of debt financing is 9.2% for Mining firms, this effect represents a decrease of 5%.³⁰ This evidence is consistent with our prediction and the signalling role of capitalized E&E expenditure. In fact, capitalized E&E expenditure provides relevant information that is incorporated into lending decisions through the cost of debt financing. Nevertheless, this is only the case for Mining firms and not Oil & Gas firms.

Models (2) and (4) investigate our second hypothesis H2, for Mining and Oil & Gas firms, respectively. The coefficients of the interaction between capitalized E&E expenditure and the categorical variable that captures the accounting policy that firms follow, *CAP_EE*ACC_POL*, are statistically insignificant both for Mining and Oil & Gas firms. Further, *CAP_EE* (capitalized E&E expenditures) maintains its negative and statistically significant coefficient for Mining firms (coefficient: -0.011; p-values<0.05), consistent with (1) and (3) for H1. Collectively, this evidence suggests that the accounting policy a firm follows is unrelated to the signalling role that capitalized E&E expenditure has on lending decisions. This finding is

³⁰ Following Biddle et al. (2009), first, we multiply the standard deviation of capitalized E&E expenditure (0.500) with the coefficient of *CAP_EE* (-0.010) and divide this product with the mean value of the cost of debt (0.092).

consistent with the IASB's (2023, p.3) own research that the diverse accounting policies applied in practice "were not a significant concern".

With respect to the control variables, we find that the coefficients of the percentage of short term to total debt (*PCTSHORTDEBT*) are positive and significant, indicating that the cost of debt financing increases with the proportion of short-term debt. Additionally, larger firms and firms with higher liquidity exhibit lower cost of debt financing, as expected (negative and statistically significant coefficients of *LnSIZE* and *LIQ*).

TABLE 6 ABOUT HERE

5. Additional analysis

5.1 Capitalized E&E expenditures and future economic benefits

Our first hypothesis relies on the assumption that capitalized E&E expenditure represents an economic resource that conveys managements' expectations about its success and signals future economic benefits. In turn, such information could mitigate or alleviate debtholder's downside risk and decrease uncertainties surrounding the technical and commercial viability of the exploration projects. In this section, we directly test this proposition by performing two tests. First, we examine the association between capitalized E&E expenditures and the uncertainty of future benefits arising from such assets. Second, we examine the impact of capitalized E&E expenditures on future economic benefits. Drawing upon prior literature within a similar setting, namely R&D expenditures, we employ the standard deviation of future earnings as a measure of future benefits uncertainty (e.g., Andronoudis et al., 2025; Curtis et al., 2020; Kothari et al., 2002) and the sum of future earnings as a measure of future economic benefits (e.g., Curtis et al., 2020; Kreß et al., 2019; Lev & Sougiannis, 1996; Mazzi et al., 2019). In other words, we first replace the dependent variable in Eq. 2 with the standard deviation of future earnings and subsequently with the sum of future earnings time $t+1$ to $t+3$,

scaled by market value at time t .³¹ The results of this analysis are presented in Table 7.³² Columns (1) and (2) show the results when the dependent variable is the standard deviation of future earnings, while Columns (3) and (4) show the results when the dependent variable is the future benefits, for Mining and Oil & Gas respectively.

The coefficient of capitalized E&E expenditure, CAP_EE , is negative and significant only in Column (1) (coefficient: -0.104; p-value<0.05), consistent with H1 and our main findings in Table 6. This indicates that capitalized E&E expenditure by Mining firms is indeed associated with decreased uncertainty. Regarding the direct link between the future benefits (not uncertainty), the coefficient of capitalized E&E expenditure, CAP_EE , is positive and statistically significant for Mining firms (Column (3)) (coefficient: 0.254; p-value<0.05). This indicates that capitalized E&E expenditure is indeed associated with future economic benefits. Taken together these findings are consistent with the arguments underpinning H1 that capitalized E&E expenditure provides a signal of future economic benefits and which in turn decreases uncertainties surrounding the technical and commercial viability of the exploration projects.

With regards to H2, the coefficient of interaction between capitalized E&E expenditure and the categorical variable that captures the accounting policy a firm applies (i.e., CAP_EE*ACC_OL), is not statistically significant in all specifications for Mining and Oil & Gas firms. This finding further corroborates the evidence presented in Table 6 that the accounting policy is not informative.

TABLE 7 ABOUT HERE

³¹ In unreported tests, which are available upon request, we use five years of future earnings and our conclusion remain unchanged.

³² For brevity, we only present the results for Eq. 2 that tests both hypotheses.

5.2 Explorers, developers and producers

Our sample includes firm-year observations which are at various stages ranging from early-stage exploration (explorers) or subsequent stages of developing (developers) and more established firms involved in production (producers). In this section, we explore whether the effect of capitalized E&E expenditures and the role of the different accounting policies on the cost of debt financing vary depending upon the stage of the business.

Arguably, when a firm shifts the focus of its operations and expands from E&E activities to primarily commercial production of natural resources, its future earnings become less dependent on imminent E&E activities. Considering that future earnings are more predictable during the production stages and that exploration is more uncertain, information asymmetry is expected to be less prominent for developers and producers compared to exploration firms. Constantatos et al. (2021) indicate that junior explorers tend to be smaller and are more E&E intense, while they record zero revenue and high proportion of capitalized E&E expenditure relative to their total assets. In fact, these values decrease monotonically as revenues increase. Moreover, the value of impairment for junior explorers in Constantatos et al. (2021) is significantly larger than that for the developers which are also mainly Mining firms.

In line with these characteristics of firms in the extractive industry and discussions in Cortese (2011), Gorton (1991) and Luther (1996), Stadler and Nobes (2025) state that impairments of E&E costs for exploring firms would have detrimental effects on profitability and balance sheet values. Instead, a producing firm “is likely to be more relaxed about writing off E&E costs on any particular project” (Stadler & Nobes, 2025, p8). Further, stakeholder feedback to the IASB indicates that E&E expenditure is less relevant to larger entities involved in production and that E&E information is particularly useful to financial statement users of firms engaging “with significant exploration programmes” (IFRS, 2023, pg. 7). Finally, Chen et al. (2018) indicate that analysts undertake more private information acquisition- and

processing activities for those firms with substantial E&E activities not engaging in production. Against this backdrop, we expect the associations we document in our main analysis to be more (less) prevalent for explorers (developers and producers) since their future is largely reliant on the economic outcomes of the exploration projects.

To identify explorers, we follow Constantatos et al. (2021) and initially partition our sample based on the yearly value of operating revenues into terciles, i.e., explorers, developers and producers (i.e., 769, 600, and 1,012 firm-year observations, respectively). These three categories reflect the stage of the business and stakeholder feedback received by IASB in relation to IFRS 6 (IFRS, 2023). Subsequently, we reflect on the prior literature indicating that explorers typically do not report revenue from E&E activities and that the revenue reported in Datastream/Worldscope may include income from sources other than income from E&E activities. We thus manually read and collect the relevant information from the annual reports to confirm whether a firm records revenue from E&E activities or not. None of the 769 firm-year observations that we classify as explorers report revenues from E&E activities. Moreover, only 155 firm-year observations in the middle tercile report revenue from E&E activities. As such, we reclassify the remaining 445 firm-year observations with no revenue from E&E activities from the middle tercile as explorers. The observations in the top tercile are grouped along with those 155 firm-year observations. Following this process, we create two subsamples of “explorers” and “developers and producers” (with 1,214 and 1,167 firm-year observations, respectively).

In unreported tests, we find that, as expected, Mining firms classified as explorers are smaller in size and more E&E intense than developers and producers. Further, the mean value of capitalized E&E expenditure to total assets at the beginning of the year for Mining explorers is 22.69%, while that for Mining developers and producers is 8.13%. This finding indicates that such assets are indeed material for explorers, consistent with evidence in prior literature

(e.g. Bui et al., 2021; Ferguson & Lam, 2023). Moreover, the mean value of impairment to total assets at the beginning of the year for Mining explorers is 8.27% while that for Mining developers and producers is 1,60%. This is consistent with the evidence in prior literature (e.g., Constantatos et al., 2021).³³ Overall, the properties of the two subsamples of “explorers” and “developers and producers” exhibit characteristics similar to those reported in prior literature.

To examine whether our main findings differ between explorers and developers and producers, we estimate Eq. 2 across the two subsamples.³⁴ Table 8 reports the results.

TABLE 8 ABOUT HERE

In line with our conjecture, the coefficients of *CAP_EE* is negative and statistically significant (coefficient: -0.010, respectively; p-values:<0.05) only for the sub-samples of explorers in Mining. Developers & producers in Mining do not seem to benefit from capitalized E&E expenditures in terms of a reduced cost of debt. Given their existing income from E&E activities, capitalizing E&E expenditures does not seem to facilitate further signals as to their future economic benefits.. With respect to H2, we find that the coefficients of the interaction between capitalized E&E expenditure and the categorical variable that ranks the accounting policies a firm follows (i.e., *CAP_EE*ACC_POL*), are insignificant in all. This is in line with our previous findings that the accounting policy does not affect debt holders.

Overall, these findings suggest that the amount of E&E capitalized is relevant to creditors only for Mining firms engaging with exploration activities, consistent with the evidence in the research undertaken by IASB (2023). Furthermore, the accounting policy is irrelevant to creditors consistent with the results reported in our main analysis and in the research undertaken by IASB (2023). Thus, capitalizing E&E expenses provide signals only to Mining

³³ The differences in these sub-group ratios are statistically significant at the 1% level.

³⁴ In unreported tests, our conclusions remain unchanged when we eliminate from the sample of developers and producers the 155 firm-year observations in the middle tercile, which are classified as developers. The results are available upon request.

firms that are yet to achieve income from their activities, for which information asymmetry and uncertainty is higher.

6. Sensitivity analysis

To ensure the robustness of our findings, we conduct a series of sensitivity tests. The results reported in Table 9 are overall consistent with those from our main analysis. First, in our main tests we define the cost of debt as the ratio of interest expense at time $t+1$ to the sum of short- and long-term interest-bearing debt as separately provided by Datastream, averaged over years $t+1$ and t . To ensure the sensitivity of the definition of the cost of debt, in columns (1) and (2) for Mining and Oil & Gas, respectively, we show the results when we calculate the ratio of interest expense at time $t+1$ to the sum of short-term debt, long-term interest-bearing debt and convertible debt, as separately provided by Datastream, averaged over years $t+1$ and t . Second, in our main tests we follow Pittman and Fortin (2004) and include firms with zero debt. However, this may introduce potential censorship bias stemming from treating interest rate (cost of debt measurements) as a continuous variable. To address this, we follow Pittman and Fortin (2004) and trim cost of debt financing variable at the 5 and 95 percentiles of the distribution (columns (3) and (4)). Third, we perform tobit regressions (columns (5) and (6)) and fourth, we exclude firms with zero debt (columns (7) and (8)).

Fifth, we consider that the capitalization of E&E expenditure is an accounting choice. Prior literature in the context of capitalizing R&D expenditure indicates that such a choice may lead to potential endogeneity issues (e.g. Dargenidou et al., 2021; Oswald & Zarowin, 2007). To mitigate endogeneity concerns, we employ Heckman's (1979) and Lee's (1979) two-stage approach and use the Inverse Mills Ratio (IMR) retrieved from estimating a probit model examining the determinants of capitalizing E&E expenditure. Appendix 4 presents the results

of this probit model used to estimate the IMR. Subsequently, we include the IMR as an additional control variable in our main analysis as shown in columns (9) and (10).

Sixth, given that the data come from firms in different countries, we further include a series of country-specific variables, beyond the country fixed effects, namely: (*TRADE%GDP*), which is calculated as the sum of exports and imports of goods and services measured as a share of the gross domestic product; the level of country's corruption (*CCR*) measured as the percentile rank of control of corruption; the country-level skilled labour that is readily available (*LABOUR*); and the annual percentage growth rate of GDP of the country (*GDPG*). We also include the buy and hold annual return of the Global Price Index (GPI) of all commodities to control for changes in the prices of commodities. Beyond these, we also include a number of firm-level control variables, namely: the natural logarithm of firm's age (*LnAGE*) given that the prospects of young firms in the extractives industry are heavily reliant on the success of the E&E efforts; Tobin's Q ratio (*TOBINSQ*) to gauge whether the firm is over- or under-valued; the percentage of shares owned by institutional investors and pension funds as a proxy for the presence of blockholders with monitoring incentives (*STRATOWN*); and, an indicator variable that equals to one if a firm has received cash from the sale of shares as a proxy of equity issue (*EQUITY*). We also add an indicator variable, (*CROSSLIST*), that equals to one if a company is cross-listed in another stock exchange, and zero otherwise. The results are presented in columns (11) and (12) of Panel B.

Seventh, in our main tests, we include 533 firm-year observations that do not capitalize any E&E expenditure (*CAP_EE*) during the year. Arguably, the observed association between capitalized E&E expenditure and the cost of debt may be affected by those firm-year observations as they may add noise. To address this potential concern, we draw on R&D literature (e.g., Chen et al., 2017; Kreß et al., 2019) and repeat the analysis by only including those firm-year observations that capitalize either some or all their E&E expenditures during

the year (i.e., capitalizers only). The results of this analysis are presented in columns (13) and (14).

Eighth, informed by the R&D literature, we consider that the management may capitalize E&E expenditure to meet or beat earnings targets. In this case, the signalling role of capitalized E&E expenditure may be impaired as E&E assets would not reflect investment that is genuine and the expected generate future economic benefits are more in doubt. Thus, management's opportunistic incentives may introduce bias in our results. To address this, we exclude firm-year observations suspect to earnings management incentives following prior R&D literature (e.g., Dargenidou et al., 2021; Dinh et al., 2016; Kreß et al., 2019; Mazzi et al., 2019). We identify earnings management suspect firm-year observations if earnings at t assuming full capitalization (expensing) are lower (greater) than previous year's earnings or earnings at t assuming full capitalization (expensing) are lower (greater) than the zero earnings threshold. The results of this analysis are presented in columns (15) and (16).

Ninth, in our main analysis we follow Stadler and Nobes (2025) and aggregate the 10 accounting policies into six. In columns (17) and (18), we present the results when we aggregate the 10 policies in four (as in Column C in Table 1). Finally, columns (19) and (20) present the results when we abstain from aggregating the 10 accounting policies. Our results are immune to these sensitivity tests.

TABLE 9 ABOUT HERE

7. Conclusion

In this paper, we respond to calls for research on how the accounting policies and the capitalization of intangible asset choices influence the price of debt (Christensen et al., 2016, p.427; Givoly et al., 2017, p.69). Firms involved with extractive activities have a significant proportion of the market capitalization (Gray et al., 2019; Nobes & Stadler, 2021). Nevertheless, they face considerable uncertainty and risk in their core operations, particularly

during the E&E phases, which are highly uncertain (Katz, 1985; Wise & Spear, 2002; Cortese, 2009). In addition, IFRS 6 governs the accounting treatment of expenditure on extractive activities but provides limited guidance and scope. Neither does it provide definitions of accounting policies allowed, nor mandate relevant E&E disclosures. Thus, a wide range of policies are used in practice, escalating the information uncertainty.

Drawing on economic theory and particularly debt covenants monitoring and political costs, the accounting and reporting of E&E expenditure should be particularly relevant for debt contracting (Dhaliwal (1980); Collins et al. (1981); Leftwich (1981) and Malmquist (1990). However, prior literature focuses mainly on the equity market, ignoring that debtholders bear the downside risk, while they are consistent users of the financial statements (Shi, 2003; Florou & Kosi, 2015). Hence, equity-focused findings provide only a partial picture of the implications of capitalizing intangible assets, and specifically E&E expenditures which are subject to increased risk, uncertainty and information asymmetries.

We investigate whether the amounts of capitalized E&E expenditures in extractive industry firms reduces the uncertainty, by reducing the cost of debt financing. We additionally investigate whether the diversion in the accounting policy used for capitalizing E&E expenditures moderates the impact of capitalized E&E on cost of debt.

We document that , .. capitalized E&E expenditures are associated with lower cost of debt financing for Mining firms, and this effect is unconditional upon the accounting policy used. The latter finding is consistent with feedback to the International Accounting Standards Board (IASB) that the diverse accounting policies are not a primary concern to investors and other financial statement users. We also show that the capitalized E&E expenditures are associated with lower uncertainty of future benefits and higher future economic benefits. Finally, our main results are driven by firms involved in exploration activities. Given that information asymmetry is expected to be less prominent for production-oriented compared to their exploration-oriented

counterparts, these findings suggest that creditors are more sensitive to the E&E expenditures incurred by exploration firms. Our findings suggest that capitalized E&E expenditures signal a reduced risk with regards to the future associated economic benefits, thereby mitigating debtholder downside risk irrespective of the accounting policy applied. Our results are robust to a battery of sensitivity tests.

To our knowledge, this study provides novice evidence about: (i) the association of capitalized E&E expenditures with firm's cost of debt; and (ii) the potential moderating effect that more aggressive reporting decisions may have on the impact of capitalized E&E expenditures and firm's cost of debt financing. It contributes to the financial accounting literature by illustrating the implications of accounting for E&E expenditures on the cost of debt and to the practice by informing the IASB about the impact of the accounting policy practices with regards to IFRS 6, which is deemed as of no major concern (IFRS, 2023).

Future research could attempt to expand our work and overcome our limitations. First, our measure of cost of debt financing relies on interest expense scaled by total debt. Although this measure is used by prior literature extensively, it does not allow us to disentangle the effect of capitalized E&E expenditure on the cost of debt arising from public (i.e., bonds) and private (i.e., syndicated loans) debtholders. Second, our conclusions are based on firms from countries with national interest in the extractives industry due to significant presence of firms involved in such activities as well as their important contribution to regulatory discussions around related accounting reforms. Although the sample size employed is considerably larger to those in prior literature, other studies could expand our findings by examining additional countries in different regimes e.g., the US. these issues.

Appendix 1. Sample distribution by subsectors of the Industry Classification Benchmark (ICB)

Panel A. Mining											
ICB subsector	Accounting policy										Total
	1	2	3	4	5	6	7	8	9	10	
Aluminum	0	6	0	0	0	0	0	0	0	0	6
Coal	6	4	8	0	0	2	63	9	0	0	92
Copper	6	10	3	0	0	8	21	4	0	0	52
Diamonds & Gemstones	3	3	10	0	0	1	20	6	0	0	43
General Mining	92	21	62	19	2	143	450	115	0	11	915
Gold Mining	76	14	80	5	0	89	168	41	0	3	476
Iron & Steel	9	7	0	1	0	1	30	8	0	0	56
Plat.& Precious Metal	21	7	25	0	0	19	15	21	0	0	108
Total	213	72	188	25	2	263	767	204	0	14	1,748
Panel B. Oil & Gas											
Alternative Fuels	2	0	6	0	0	0	0	0	0	0	8
Integrated Oil & Gas	0	0	0	26	0	6	0	0	0	0	32
Offshore Drill & Svs	0	0	0	5	0	0	0	0	0	0	5
Oil: Crude Producers	4	7	0	116	26	139	165	74	30	27	588
Total	6	7	6	147	26	145	165	74	30	27	633

Oil & Gas firms operate in the following ICB subsectors: alternative fuels; oil: crude producers; integrated oil and Gas; and offshore drilling and services (bolded). Mining firms operate in the following ICB subsectors: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper.

Appendix 2: Variable definition

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
<i>CODI</i>	The ratio of interest expense at time $t+1$ to the sum of short- and long-term interest-bearing debt as separately provided by Datastream, averaged over years $t+1$ and t .	Interest expense: WC01075 Short term debt: WC03051 Long term debt: WC03251
<i>CAP_EE</i>	The amount of capitalized E&E costs during the year scaled by total assets, at the beginning of year t .	Annual report
<i>ACC_POL</i>	Categorical variable that ranges between zero and one (with 0, 0.33, 0.67 and 1 capturing firms that apply the ‘expense all’, ‘successful efforts’, ‘area-of-interest’, and ‘full cost’ policy respectively)	Coded by the authors
<i>EE_EXP</i>	The amount of extraction and exploration costs expensed scaled by total assets at the beginning of year t .	Total assets: WC02999
<i>EE_IMPR</i>	The amount of E&E impaired during the year, scaled by total assets at the beginning of year t .	Total assets: WC02999
<i>BM</i>	The book to market ratio.	Common equity: WC03501 Market Capitalisation: WC08001
<i>Big4AR</i>	Indicator variable that takes the value of one when a company has one of the big four international auditors (i.e., Deloitte Touche Tohmatsu, Ernst & Young, KPMG or Price Waterhouse Coopers) and zero otherwise.	TR.BSAuditorCode
<i>LnSIZE</i>	The natural logarithm of market value at the end of year t .	Market Capitalization: WC08001
<i>ROA</i>	The ratio of income to total assets.	Income before extraordinary items: WC01551 Total assets: WC02999
<i>LEV</i>	The ratio of total debt to book value of equity.	Total debt: WC03255 Common equity: WC03501
<i>PCTSHORTDEBT</i>	The ratio of short-term debt to total debt.	Short-term debt: WC03051 Total debt: WC03255
<i>CF</i>	The ratio of cash generated from operations to total assets.	Funds from operations: WC04201 Funds from other operating activities: WC04860, Total assets: WC02999
<i>LIQ</i>	The ratio of current assets to current liabilities	current assets: WC02201 current liabilities: WC03101
<i>REVD</i>	An indicator variable that equals to one for "explorers", two for "developers" and three for "producers". To categorise firm-year observations into explorers or developers and produces we adopt the following approach. We initially partition our sample based on the yearly value of operating revenues into terciles. Given that the data item from Datastream/Worldscope, includes income from sources other than income from E&E activities, we manually verify all firm-year observations classified in the bottom and middle tercile that report non-zero revenues. Firm-year observations that have no revenue from E&E activities are reclassified as explorers, while those firm-year observations that report revenue from E&E activities are classified as developers.	Sales (WC01001)

Appendix 2 continued

TA	Total assets at the end of year t expressed in thousands of €s.	Total assets: WC02999
$\sigma(NI_{t+1, t+3})$	The standard deviation of future earnings measured over time $t+1$ to $t+3$ scaled by market value at time t .	Income before extraordinary items: WC01551 Market Capitalization: WC08001
$\sum NI_{t+1, t+3}$	The sum of future earnings measured over time $t+1$ to $t+3$ scaled by market value at time t .	Income before extraordinary items: WC01551 Market Capitalization: WC08001

Appendix 3. Accounting policies across periods

Accounting policy (Column 2, Table 1)	Mining			Oil & Gas		
	2011-2012	2014-2015	2017-2018	2011-2012	2014-2015	2017-2018
1	135	172	166	9	6	4
2	10	7	8	49	50	48
3	0	0	2	9	11	6
4	93	93	77	50	56	39
5	328	351	292	85	80	74
6	5	6	3	17	20	20
Total	571	629	548	219	223	191

Mining firms operate in the following ICB subsectors: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper. Oil & Gas firms operate in the following ICB subsectors: alternative fuels; oil: crude producers; integrated oil and Gas; and offshore drilling and services. Appendix 1 presents the distribution of the sample by accounting policy and ICB subsector.

Appendix 4. Results of probit model employed for estimation of IMR

Panel A. Probit estimation	(1)
<i>ACC_POL</i>	1.645*** (10.272)
<i>Big4AR</i>	-0.054 (-0.490)
<i>LnSIZE</i>	0.057** (2.101)
<i>ROA</i>	-0.031* (-1.728)
<i>LEV</i>	-0.012 (-0.716)
<i>LIQ</i>	-0.006* (-1.714)
<i>CF</i>	0.333*** (4.314)
<i>REVD</i>	0.150 (1.225)
<i>BM</i>	0.040 (1.637)
<i>PCTSHORTDEBT</i>	0.035 (0.351)
Constant	-0.402 (-1.106)
Country/Year FE	YES
Observations	2,381
Chi2	207.4
Pseudo R2	0.223

See Appendix 2 for all variables definitions. Standard errors are clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1%, respectively. *t*-statistic in brackets.

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Table 1. Accounting policies for E&E expenditure and associated groupings

(1)	(2)	(3)
Accounting policy	Aggregation of accounting policies	Alternative aggregation of accounting policies
Stadler and Nobes (2025, Table 1, Page 611)	Stadler and Nobes, 2025 (Appendix C. Robustness tests, Page 638)	
1. Expense all costs related to E&E	Aggregation 1	Aggregation 1
2. Expense all costs except exploration rights		
3. Expense E&E costs except those incurred after an E&E asset is expected to be viable, which are deferred pending appraisal of whether viability is demonstrable		
4. Expense E&E costs except drilling and evaluation, which are deferred until appraisal; then expense the deferred costs unless related to a successful project [US ‘successful efforts’ method]: - Focus on well or mine - Focus on field or licence	Aggregation 2	Aggregation 2
5. As 4, but widen the asset tested to (geological) area or unspecified	Aggregation 3	
6. Defer all E&E costs until appraisal; then expense the deferred costs unless related to a successful project: - Focus on well or mine - Focus on field or licence	Aggregation 4	Aggregation 3
7. As 6, but widen the pool tested to (geological) area or unspecified with policy label ‘area of interest’ [Australian ‘area of interest’ method] ^a	Aggregation 5	
8. As 6, but widen the pool to country or unspecified without policy label ‘area of interest’		
9. As 6, but widen to segment	Aggregation 6	Aggregation 4
10. As 6, but widen to single pool CGU		
11. Capitalize all E&E costs including those before legal rights are obtained; ceiling test on a country basis [US ‘full cost’ method]	Not applicable since it is not found to be applied by IFRS reporting firms	Not applicable since it is not found to be applied by IFRS reporting firms

Notes: This table summarises the information in Stadler and Nobes (2025) and shows the different treatments of E&E costs that the authors identified by looking at companies’ financial statements. The policies are shown in decreasing order of conservatism and consider two dimensions: the scope of costs capitalized and the size of the pool for impairment. In Stadler and Nobes (2025), Appendix B presents extracts that reflect these policies and Appendix C discusses the alternative aggregations of these accounting policies, which they refer to as “Methods, and we summarise in Columns 2 and 3.

Table 2: Sample selection process

	Firm-year observations
All firms in ICB Level 5 sector for each of the five countries in our sample (Australia, Canada, Norway, South Africa and the UK) for the years 2011, 2012, 2014, 2015, 2017, 2018	15,250
<i>Excluding firm-year observations:</i>	
Not reporting under IFRS	(936)
That have their financial year end changed	(1,086)
With missing firm level data in Datastream	(5,795)
Not appearing in all six years (2011, 2012, 2014, 2015, 2017, 2018)	(2,347)
<i>Firm-year observations for which we searched for annual reports</i>	5,086
Firm-year observations with annual report unavailable	(425)
<i>Firm-year observations manually analysed</i>	4,661
Firm-year observations which are not involved in extractive activities	(494)
<i>Firm-year observations for which we look for the E&E amounts and related accounting policy</i>	4,167
Firm-year observations in which E&E amounts are not disclosed separately	(1,786)
<i>Final sample (667 firms)</i>	2,381
<i>Of which are classified as Mining (506 firms)</i>	1,748
<i>Of which are classified as Oil & Gas (161 firms)</i>	633

Mining firms operate in the following ICB subsectors: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper. Oil & Gas firms operate in the following ICB subsectors: alternative fuels; oil: crude producers; integrated oil and Gas; and offshore drilling and services.

Table 3: Accounting policy for E&E costs, type of firms and country of company domicile

Panel A. Mining								
Accounting policy (Column 1, Table 1)		Australia	Canada	Norway	South Africa	United Kingdom	Total	% Frequency
1	Expense all.	70	104	0	17	22	213	12.19%
2	As 1 but exploration rights.	19	41	6	0	6	72	4.12%
3	As 1 until commercial viability expected.	14	134	0	20	20	188	10.76%
4	As 1 except drilling and evaluation. Impair by project.	9	5	1	0	10	25	1.43%
5	As 4 but impair by geological area (or unspecified).	2	0	0	0	0	2	0.11%
6	Defer all except pre-licence costs. Impair by project.	50	128	2	4	79	263	15.05%
7	As 6 but impair by geological area.	488	218	0	6	55	767	43.88%
8	As 6 but impair by country (or unspecified).	5	187	0	0	12	204	11.67%
9	As 6 but impair by segment.	0	0	0	0	0	0	0.00%
10	As 6 but impair by single pool.	0	10	0	0	4	14	0.80%
Total		657	827	9	47	208	1,748	100.00%
Panel B. Oil & Gas								
Accounting policy (Column 1, Table 1)		Australia	Canada	Norway	South Africa	United Kingdom	Total	% Frequency
1	Expense all.	2	2	0	0	2	6	0.95%
2	As 1 but exploration rights.	4	3	0	0	0	7	1.11%
3	As 1 until commercial viability expected.	0	6	0	0	0	6	0.95%
4	As 1 except drilling and evaluation. Impair by project.	7	18	33	3	86	147	23.22%
5	As 4 but impair by geological area (or unspecified).	10	12	0	0	4	26	4.11%
6	Defer all except pre-licence costs. Impair by project.	11	106	10	0	18	145	22.91%
7	As 6 but impair by geological area.	101	54	0	0	10	165	26.07%
8	As 6 but impair by country (or unspecified).	0	63	0	0	11	74	11.69%
9	As 6 but impair by segment.	0	28	0	0	2	30	4.74%
10	As 6 but impair by single pool.	0	14	0	0	13	27	4.27%
Total		135	306	43	3	146	633	100.00%

Mining firms operate in the following ICB subsectors: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper. Oil & Gas firms operate in the following ICB subsectors: alternative fuels; oil: crude producers; integrated oil and Gas; and offshore drilling and services. Appendix 1 presents the distribution of the sample by accounting policy and ICB subsector.

Table 4: Aggregation of accounting policies for E&E expenditure and country of domicile

Panel A. Mining								
Aggregation of accounting policies (Column 2, Table 1)	Accounting policy (Column 1, Table 1)	Australia	Canada	Norway	South Africa	United Kingdom	Total	% Frequency
1	Policy 1 or 2 or 3	103	279	6	37	48	473	27.06%
2	Policy 4	9	5	1	0	10	25	1.43%
3	Policy 5	2	0	0	0	0	2	0.11%
4	Policy 6	50	128	2	4	79	263	15.05%
5	Policy 7 or 8	493	405	0	6	67	971	55.55%
6	Policy 9 or 10	0	10	0	0	4	14	0.80%
Total		657	827	9	47	208	1,748	100.00%
Panel B. Oil & Gas								
Aggregation of accounting policies (Column 2, Table 1)	Accounting policy (Column 1, Table 1)	Australia	Canada	Norway	South Africa	United Kingdom	Total	% Frequency
1	Policy 1 or 2 or 3	6	11	0	0	2	19	3.00%
2	Policy 4	7	18	33	3	86	147	23.22%
3	Policy 5	10	12	0	0	4	26	4.11%
4	Policy 6	11	106	10	0	18	145	22.91%
5	Policy 7 or 8	101	117	0	0	21	239	37.76%
6	Policy 9 or 10	0	42	0	0	15	57	9.00%
Total		135	306	43	3	146	633	100.00%

Mining firms operate in the following ICB subsectors: aluminium; coal; diamonds and gemstones; general mining; gold mining; iron and steel; platinum and precious metals; and copper. Oil & Gas firms operate in the following ICB subsectors: alternative fuels; oil: crude producers; integrated oil and Gas; and offshore drilling and services. Appendix 1 presents the distribution of the sample by accounting policy and ICB subsector.

Table 5: Descriptive statistics.

Variable	Mining (N=1,748)				Oil & Gas (N=633)				Test of mean's difference	
	Mean	SD	Min	Max	Mean	SD	Max	Max	Difference	t-statistic
<i>CoD</i>	0.092	0.163	0.000	1.386	0.082	0.137	0.000	1.386	0.010*	1.329
<i>ACC_POL</i>	0.546	0.347	0.000	1.000	0.592	0.281	0.000	1.000	-0.046***	3.025
<i>CAP_EE</i>	0.170	0.500	0.000	5.407	0.142	0.363	0.000	4.678	0.028*	1.294
<i>EE_EXP</i>	0.065	0.248	0.000	3.261	0.017	0.059	0.000	0.698	0.048***	4.829
<i>EE_IMPR</i>	0.056	0.161	0.000	0.997	0.047	0.125	0.000	0.911	0.009*	1.307
<i>TA⁺</i>	2,738,281	13,100,000	34	106,000,000	4,064,511	14,600,000	37	106,000,000	-1,326,230**	-2.123
<i>Big4AR</i>	0.377	0.485	0.000	1.000	0.559	0.497	0.000	1.000	-0.182***	-8.050
<i>LnSize</i>	10.516	2.955	2.819	18.498	12.084	2.762	4.147	18.498	-1.568***	-11.641
<i>ROA</i>	-0.702	3.058	-38.761	0.910	-0.252	0.860	-8.777	0.910	-0.450***	-3.648
<i>LEV</i>	0.341	2.163	-13.792	33.521	0.346	1.403	-13.792	11.615	-0.005	0.055
<i>PCTSHORTDEBT</i>	0.322	0.405	0.000	1.000	0.255	0.388	0.000	1.000	0.067***	3.630
<i>LIQ</i>	5.456	10.712	0.007	83.733	4.912	11.090	0.007	83.733	0.544	1.084
<i>CF</i>	-0.205	0.762	-6.954	0.541	-0.033	0.471	-5.470	0.350	-0.172***	-5.322
<i>BM</i>	1.056	2.116	-14.381	16.618	1.079	1.715	-14.381	16.618	-0.023	0.246
<i>REVD</i>	0.606	0.489	0.000	1.000	0.243	0.429	0.000	1.000	0.363***	16.526

See Appendix 2 for all variables definitions. ⁺Thousands of €. *, ** and *** denote significance at the 10%, 5% and 1%, respectively.

Table 6: Cost of debt and capitalized E&E expenditure.

VARIABLES	(1)	(2)	(3)	(4)
	Mining		Oil & Gas	
<i>CAP_EE</i>	-0.010** (-2.029)	-0.011** (-2.265)	0.004 (0.272)	0.045 (1.550)
<i>CAP_EE*ACC_POL</i>		0.003 (0.309)		-0.057 (-1.552)
<i>ACC_POL</i>	0.001 (0.105)	0.001 (0.068)	0.007 (0.378)	0.013 (0.704)
<i>EE_EXP</i>	0.003 (0.154)	0.003 (0.149)	0.034 (0.523)	0.024 (0.368)
<i>EE_IMPR</i>	-0.036 (-1.377)	-0.035 (-1.373)	-0.039 (-0.650)	-0.049 (-0.783)
<i>Big4AR</i>	0.008 (0.705)	0.008 (0.701)	-0.004 (-0.339)	-0.005 (-0.383)
<i>LnSIZE</i>	-0.008** (-2.563)	-0.008** (-2.563)	-0.006** (-2.574)	-0.006*** (-2.616)
<i>ROA</i>	-0.002 (-0.712)	-0.002 (-0.714)	-0.011 (-0.607)	-0.012 (-0.657)
<i>LEV</i>	0.001 (0.825)	0.001 (0.821)	-0.001 (-0.477)	-0.001 (-0.456)
<i>PCTSHORTDEBT</i>	0.084*** (5.852)	0.084*** (5.855)	0.057*** (2.739)	0.057*** (2.741)
<i>LIQ</i>	-0.001*** (-4.551)	-0.001*** (-4.550)	-0.001*** (-2.941)	-0.001*** (-2.963)
<i>CF</i>	0.029*** (3.060)	0.029*** (3.062)	0.009 (0.390)	0.009 (0.395)
<i>BM</i>	0.001 (0.672)	0.001 (0.675)	0.005* (1.862)	0.005* (1.909)
<i>REVD</i>	-0.012 (-0.844)	-0.012 (-0.844)	-0.034** (-2.030)	-0.035** (-2.193)
Constant	0.162*** (3.785)	0.162*** (3.788)	0.146*** (3.810)	0.143*** (3.758)
Country/Year FE	YES	YES	YES	YES
Observations	1,748	1,748	633	633
Adj. R2	0.0853	0.0848	0.0660	0.0662
F	9.734	9.069	4.925	4.577

See Appendix 2 for all variables definitions. *, ** and *** denote significance at the 10%, 5% and 1%, respectively. *t*-statistic in brackets. Standard errors are clustered at the firm level.

Table 7: Future earnings and capitalized E&E expenditure.

	(1)	(2)	(3)	(4)
	$\sigma(NI_{t+1, t+3})$		$\sum NI_{t+1, t+3}$	
VARIABLES	Mining	Oil & Gas	Mining	Oil & Gas
<i>CAP_EE</i>	-0.104** (-2.098)	-0.203 (-1.323)	0.254** (2.186)	0.434 (1.385)
<i>CAP_EE* ACC_POL</i>	-0.124 (-1.148)	0.125 (0.621)	0.107 (0.567)	-0.082 (-0.175)
<i>ACC_POL</i>	0.231* (1.888)	0.012 (0.086)	-0.046 (-0.242)	0.017 (0.066)
<i>EE_EXP</i>	-0.037 (-0.182)	0.520 (0.493)	0.002 (0.003)	1.298 (0.927)
<i>EE_IMPR</i>	0.418 (1.231)	-0.541 (-1.007)	-1.737** (-2.471)	-0.132 (-0.124)
<i>Big4AR</i>	0.181 (1.607)	-0.008 (-0.115)	-0.102 (-0.687)	0.308** (2.092)
<i>LnSIZE</i>	-0.135** (-2.461)	-0.080*** (-3.159)	0.318*** (4.929)	0.199*** (4.781)
<i>ROA</i>	-0.059 (-1.625)	-0.081 (-1.040)	0.119 (1.467)	0.183 (1.241)
<i>LEV</i>	0.004 (0.349)	0.146 (1.107)	-0.009 (-0.254)	-0.259 (-0.963)
<i>PCTSHORTDEBT</i>	0.315** (2.077)	0.167* (1.672)	-0.272 (-1.133)	-0.253 (-1.212)
<i>LIQ</i>	-0.007*** (-3.027)	-0.002 (-1.205)	0.021*** (4.414)	0.006 (1.289)
<i>CF</i>	0.240* (1.798)	0.099 (1.643)	-0.411 (-1.145)	-0.151 (-0.721)
<i>BM</i>	0.048 (0.356)	-0.035 (-0.537)	-0.272** (-2.077)	0.058 (0.485)
<i>REVD</i>	-0.182 (-1.098)	-0.069 (-0.670)	-0.055 (-0.158)	-0.242 (-1.184)
Constant	1.791** (2.500)	1.366*** (3.221)	-4.043*** (-4.362)	-3.292*** (-5.150)
Country/Year FE	YES	YES	YES	YES
Observations	1,748	633	1,748	633
Adj. R2	0.0477	0.104	0.195	0.170
F	2.826	3.701	7.444	7.524

See Appendix 2 for all variables definitions. *, ** and *** denote significance at the 10%, 5% and 1%, respectively. *t*-statistic in brackets. Standard errors are clustered at the firm level.

Table 8: Cost of debt and capitalized E&E expenditure across explorers and developers and producers.

	(1)	(2)	(3)	(4)
	Explorers		Developers and producers	
VARIABLES	Mining	Oil & Gas	Mining	Oil & Gas
<i>CAP_EE</i>	-0.010** (-2.175)	0.043 (1.130)	-0.014 (-0.747)	0.028 (0.444)
<i>CAP_EE* ACC_POL</i>	0.003 (0.280)	-0.019 (-0.275)	0.010 (0.335)	-0.060 (-0.848)
<i>ACC_POL</i>	-0.002 (-0.133)	0.040 (0.956)	-0.006 (-0.333)	0.001 (0.055)
<i>EE_EXP</i>	0.001 (0.054)	0.073 (0.707)	0.061 (0.543)	0.141 (0.991)
<i>EE_IMPR</i>	-0.029 (-0.990)	-0.050 (-0.472)	-0.094 (-1.225)	-0.008 (-0.086)
<i>Big4AR</i>	0.005 (0.386)	-0.035* (-1.690)	0.006 (0.343)	0.006 (0.416)
<i>LnSIZE</i>	-0.003 (-0.857)	-0.004 (-0.563)	-0.011** (-2.152)	-0.008** (-2.594)
<i>ROA</i>	-0.002 (-0.609)	-0.052 (-1.201)	-0.051 (-1.057)	0.013 (1.250)
<i>LEV</i>	-0.001 (-0.949)	0.002 (0.362)	0.002* (1.782)	-0.001 (-0.335)
<i>PCTSHORTDEBT</i>	0.093*** (4.988)	0.035 (0.785)	0.057** (2.462)	0.055** (2.273)
<i>LIQ</i>	-0.001*** (-5.098)	-0.001*** (-2.697)	0.001 (0.304)	-0.001 (-1.078)
<i>CF</i>	0.026** (2.486)	0.072 (0.998)	0.074* (1.969)	-0.011 (-0.647)
<i>BM</i>	0.000 (0.098)	0.005 (0.861)	0.005** (2.064)	0.005* (1.879)
Constant	0.109*** (2.777)	0.078 (1.049)	0.201*** (2.787)	0.164*** (3.403)
Country/Year FE	YES	YES	YES	YES
Observations	1,060	154	688	479
Adj. R2	0.107	0.173	0.0614	0.0489
F	6.612	3.024	4.065	3.275

We define explorers, developers and producers based on the tercile rank of revenue (*REVD*). To categorise firm-year observations into explorers or developers and produces we adopt the following approach. We initially partition our sample based on the yearly value of operating revenues into terciles. Given that the data item from Datastream/Worldscope, includes income from sources other than income from E&E activities, we manually verify all firm-year observations classified in the bottom and middle tercile that report non-zero revenues. Firm-year observations that have no revenue from E&E activities are reclassified as explorers, while those firm-year observations that report revenue from E&E activities are classified as developers. See Appendix 2 for all variables definitions. *, ** and *** denote significance at the 10%, 5% and 1%, respectively. *t*-statistic in brackets. Standard errors are clustered at the firm level.

Table 9: Sensitivity tests.

	Alternative CoD measure		Trimming COD 5%		Tobit regressions		Excluding firms with no debt		Addressing endogeneity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas
<i>CAP_EE</i>	-0.011**	0.037	-0.008***	0.031	-0.034*	0.073	-0.020*	0.044	-0.011**	0.044
	(-2.155)	(1.371)	(-2.626)	(1.330)	(-1.930)	(1.643)	(-1.652)	(1.067)	(-2.228)	(1.527)
<i>CAP_EE* ACC_POL</i>	0.002	-0.046	0.009	-0.043	0.021	-0.108	0.003	-0.102	0.003	-0.056
	(0.208)	(-1.321)	(1.323)	(-1.642)	(0.695)	(-1.635)	(0.136)	(-1.599)	(0.345)	(-1.545)
<i>ACC_POL</i>	0.002	0.009	-0.002	0.000	0.008	0.022	0.001	0.017	0.037	-0.024
	(0.121)	(0.503)	(-0.319)	(0.013)	(0.411)	(0.857)	(0.056)	(0.758)	(0.963)	(-0.309)
<i>EE_EXP</i>	0.004	0.001	-0.008	0.025	-0.002	0.033	0.031	0.042	0.000	0.024
	(0.193)	(0.013)	(-0.790)	(0.541)	(-0.038)	(0.376)	(0.948)	(0.538)	(0.022)	(0.360)
<i>IMR</i>									0.048	-0.059
									(1.045)	(-0.509)
Constant	0.163***	0.129***	0.063***	0.088***	-0.067	0.054	0.251***	0.225***	0.113*	0.199
	(3.833)	(3.500)	(3.935)	(4.242)	(-1.209)	(0.982)	(4.665)	(4.657)	(1.917)	(1.615)
County/Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,748	633	1,654	611	1,748	633	1,208	482	1,748	633
Adj. R2	0.0865	0.0657	0.210	0.211	0.693	-1.005	0.0437	0.0555	0.0846	0.0650
F	8.966	4.553	15.03	6.681	7.291	3.826	4.466	3.473	8.478	4.497

Columns 1 and 2 repeat the analysis by defining the cost debt financing as the ratio of interest expense at time t+1 to the sum of short-term debt, long-term interest-bearing debt and convertible debt, as separately provided by Datastream, averaged over years t+1 and t. Columns 3 and 4 repeat the main analysis by trimming the cost of debt financing variable at the 5 and 95 percentiles. Columns 5 and 6 present the results when we exclude firms with no debt. Columns 7 and 8 presents the results of Tobit regressions. Columns 9 and 10 presents the results when we control for endogeneity associated with capitalizing E&E expenditure by including the Inverse Mills Ratio (IMR). Columns 7 and 8 presents the results of Tobit regressions.

Table 9 continued.

	Additional control variables		Capitalizers only		Excluding earnings management suspect firm-year observations		Alternative aggregation of accounting policies (Column 3, Table 1)		No aggregation of accounting policies (Column 1, Table 1)	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas	Mining	Oil & Gas
<i>CAP_EE</i>	-0.011** (-2.005)	0.032 (0.984)	-0.019*** (-3.091)	0.045 (1.403)	-0.013** (-2.404)	0.044 (1.474)	-0.011** (-2.364)	0.053 (1.635)	-0.012* (-1.957)	0.057* (1.805)
<i>CAP_EE* ACC_POL</i>	0.004 (0.394)	-0.049 (-1.211)	0.014 (1.197)	-0.052 (-1.306)	0.004 (0.332)	-0.051 (-1.374)	0.003 (0.275)	-0.071** (-2.002)	0.005 (0.369)	-0.077** (-2.189)
<i>ACC_POL</i>	0.002 (0.175)	0.012 (0.615)	-0.025 (-1.132)	-0.001 (-0.057)	-0.002 (-0.160)	0.016 (0.773)	-0.000 (-0.031)	0.026 (1.226)	0.001 (0.060)	0.024 (0.968)
<i>EE_EXP</i>	0.006 (0.251)	0.032 (0.527)	-0.007 (-0.220)	-0.025 (-0.311)	-0.014 (-0.630)	0.022 (0.312)	0.003 (0.127)	0.027 (0.413)	0.003 (0.148)	0.028 (0.428)
Constant	0.377 (0.535)	1.339* (1.915)	0.192*** (3.395)	0.133*** (3.055)	0.175*** (3.574)	0.135*** (3.254)	0.164*** (3.819)	0.134*** (3.599)	0.162*** (3.736)	0.137*** (3.557)
County/Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,748	633	1,285	563	1,451	533	1,748	633	1,748	633
Adj. R2	0.0848	0.0692	0.0943	0.0644	0.0819	0.0573	0.0847	0.0669	0.0848	0.0669
F	6.897	3.646	7.303	4.519	9.277	4.191	9.030	4.626	8.953	4.649

Columns 1 and 2 repeat the analysis by defining the cost debt financing as the ratio of interest expense at time $t+1$ to the sum of short-term debt, long-term interest-bearing debt and convertible debt, as separately provided by Datastream, averaged over years $t+1$ and t . Columns 3 and 4 repeat the main analysis by trimming the cost of debt financing variable at the 5 and 95 percentiles. Columns 5 and 6 present the results when we exclude firms with no debt. Columns 9 and 10 present the results when we control for endogeneity associated with capitalizing E&E expenditure by including the Inverse Mills Ratio (IMR). Columns 7 and 8 presents the results of Tobit regressions. Columns 9 and 10 presents the results when we control for endogeneity associated with capitalizing E&E expenditure by including the Inverse Mills Ratio (IMR). Columns 7 and 8 presents the results of Tobit regressions. Columns 11 and 12 present the results when adding further firm- and country-level control variables. Columns 13 and 14 exclude the firm-year observations with zero capitalized E&E expenditures. Columns 15 and 16 exclude earnings management suspect firm-year observations which are defined if earnings at t assuming full capitalization (expensing) are lower (greater) than previous year's earnings or earnings at t assuming full capitalization (expensing) are lower (greater) than the zero earnings threshold. Columns 17 and 18 show the results when we aggregate the accounting policy to four distinct categories, as in Stadler and Nobes (2025), instead of six employed in our main analysis. Finally, Columns 19 and 20 present the results when we avoid aggregating the accounting policies. See Appendix 2 for all variables definitions. *, ** and *** denote significance at the 10%, 5% and 1%, respectively. t -statistic in brackets. Standard errors are clustered at the firm level.