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Accounting in the London Stock Exchange's extractive industry: The effect of policy diversity on the value relevance of exploration-related disclosures

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ABSTRACT

The accounting treatment of exploration expenditure in the extractive industry has historically been a challenging issue for regulators. This paper examines the accounting policies for, and value relevance of, the exploration assets of firms listed on the London Stock Exchange from the oil & gas and mining sectors. The policies used by oil & gas firms range from the relatively conservative Successful Efforts to the most aggressive Full Cost method, whereas mining firms employ a range of policies from the Successful Efforts to the most conservative Expense All method. The results suggest that the income statements of Main Market-listed extractive firms contain value relevant information regardless of the policy followed by the firm. There is no significant difference between the value relevance of exploration asset disclosures by Main Market-listed oil & gas firms following the Successful Efforts or Full Cost methods. For AIM-listed oil & gas companies only the Full Cost method provides value relevant information on exploration assets. In the mining sector, exploration-related asset disclosures are only value relevant for AIM-listed firms following the Expense All method. The results suggest that flexibility in accounting for exploration expenditure is necessary to facilitate the disclosure of value relevant accounting information.

1. Introduction

The diversity of accounting policies used by extractive firms to account for exploration expenditure is a contentious topic. Historical attempts by major standard setting bodies such as the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) to standardise the treatment of exploration expenditure using the Successful Efforts policy have been unsuccessful (Asekomeh, Russell, & Tarbert, 2006; Cairnie, 1985; Cortese & Irvine, 2010; Cortese,

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2011). The current accounting standard for exploration expenditure, IFRS 6, effectively permits extractive firms to follow the accounting policy they used prior to the adoption of IFRS.

Disparate methods of accounting for exploration expenditure in the extractive industry, together with the absence of United Kingdom (UK)-based empirical research, motivate us to study the alternative methods. To do so, we use data from companies listed on the London Stock Exchange (LSE) from both the Main Market and Alternative Investment Market (AIM)[1] prepared under IFRS. This paper also differs from prior literature by separately analysing and comparing companies at each stage of the extractive life-cycle, whilst also considering mining firms in addition to the more-often studied oil & gas firms. The data runs from 2006 (2007 for AIM companies) until 2012 and includes both exploration and production-oriented companies.

Consistent with previous studies, the accounting policies of oil & gas firms are found to fall within two categories: the Successful Efforts and the Full Cost methods. In the mining sector, the categories of accounting policies used by firms fall on a more conservative spectrum between the Successful Efforts and Expense All methods. Prior literature on exploration expenditure prepared under the Successful Efforts and Full Cost methods has produced inconsistent results, partially due to differences in the types of extractive industry companies included in the respective samples. For example, Harris and Ohlson (1987) only included mature production-oriented companies in their sample, thereby excluding small exploration companies. To extend the literature in this area and provide results that may be useful to the future regulation of the accounting choices of extractive firms, all types of extractive firms require scrutiny and are therefore included in our sample.

Having undertaken a general value relevance analysis, the study then undertakes a value relevance analysis of the financial statements produced under each accounting policy. The paper also evaluates if the resistance to the Successful Efforts method (previously favoured by the FASB and the IASB) by small oil & gas companies (Cortese, 2011), can be justified by more than mere self-interest. Our results indicate that the flexibility currently availed of by firms in the extractive industry would appear to facilitate them in providing relevant information to investors. This has implications for the IASB's apparent desire to implement the Successful Efforts method across all firms in the extractive sector.

The paper proceeds as follows: the next section describes the evolution of accounting in the extractive industry and also reviews the empirical evidence pertaining to accounting information in the extractive sector. The research design of the study is outlined in section three, while section four outlines the findings and section five offers some conclusions and comments on potential limitations of the study.

2. The development of accounting standards and empirical evidence in the extractive industries

2.1. The development of accounting standards in the extractive industries

Since the 1970s, accounting practices in the extractive industry have been the subject of vigorous academic discussion. The extractive industry includes firms which are involved in finding and removing wasting non-regenerative material located in or near the earth's crust (International Accounting Standards Committee (IASC), 2000). The extractive cycle possesses several unique characteristics such as: extractive sites have finite lives, a weak relationship exists between initial costs incurred on exploration and the associated future economic benefits, the cycle involves high levels of risk and uncertainty, the cycle is capital intensive and the industry faces a greater degree of public accountability relative to other industries. The unique characteristics of the extractive cycle create challenges for traditional accounting conventions such as the revenue recognition and matching concepts (Cairnie, 1985; Luther, 1996; Trueman, 1975). Extractive firms have addressed these financial reporting challenges in a multitude of ways and a variety of accounting practices have been subsequently developed over time by them. Extractive firms quoted on the LSE are drawn from the oil & gas and mining sectors.

2.1.1. The oil & gas sector

Fundamental differences exist in relation to the capitalisation versus expense decisions and amortisation policies of oil & gas firms in relation to exploration expenditure. Firms in the sector have different views on exploration cost centres, with cost centres being defined as either wells, fields, areas, countries or the world (Trueman, 1975).

The two prevalent accounting policies in the oil & gas sector are termed the Successful Efforts and Full Cost methods respectively (Trueman, 1975). Under the Successful Efforts method, exploration expenditure is initially capitalised but if it is subsequently determined that a particular cost centre is not technically feasible or commercially viable, the exploration expenditure is written off. Followers of the Successful Efforts method generally define a cost centre in terms of a well, field or an area. In contrast, under the Full Cost method, exploration expenditure is capitalised and if the viability of a particular well, field or area is subsequently found to be non-viable, the exploration expenditure will be amortised against the revenue streams from successful wells, fields and/or areas. Firms which adopt the Full Cost method typically define a cost centre on a country or world basis.

[1] The Alternative Investment Market (AIM) is the London Stock Exchange's international market for smaller and growing companies, which aims to facilitate them in raising capital to fund their future expansion plans - http://www.londonstockexchange.com/companies-and-advisors/aim/aim/aim.htm (Accessed: 19th June 2017). This market has been included within the scope of this study so as to analyse smaller extractive firms which have historically resisted the standardisation of accounting practices for exploration expenditure in the United States and other countries.

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The major standard setting bodies have attempted to standardise the accounting practice for exploration expenditure. The first attempt to do so in the United States of America (US) followed the oil crisis in 1973, which led to calls for increased regulation of the energy sector. The Securities and Exchange Commission (SEC) was tasked with implementing accounting standards for the oil & gas sector by the end of 1977, and subsequently delegated the task to the FASB. In July 1977, the FASB issued an exposure draft recommending the Successful Efforts method become the mandatory policy to account for exploration expenditure (Cairnie, 1985; Cortese, 2011). The FASB's recommendations triggered a strong reaction from industry constituents. A major lobbying effort by over 100 small exploration firms who used the Full Cost method ensued (Cortese, 2011). These firms argued that the required change to the Successful Efforts method would depress their reported earnings and equity figures and would lead to a significant increase in the volatility of their earnings. Consequently, this would diminish their ability to raise capital, result in a reduction in exploration activity and lead to a deterioration of their competitive position. The FASB argued that the proposed Successful Efforts method was conceptually superior to the Full Cost method. They stated that uniformity in accounting treatment of exploration expenditure would increase comparability in the financial statements of extractive firms, and pointed out that many smaller firms that used the Successful Efforts method, did not suffer adverse effects to their competitive position or in their ability to raise capital. The United States Justice Department urged the SEC to postpone the recommendations until it could be demonstrated that they would improve the flow of information to investors and would not have anti-competitive effects (Lev, 1979). The SEC faced this pressure in the context of the international oil crisis, and in 1978 it overruled the recommendations made by the FASB stating that the recommendations were excessively prudent and contrary to the public interest (Luther, 1996).

The second attempt to standardise accounting practices pertaining to exploration expenditure in the extractive industry was commenced by the IASC in 1998. In November 2000, the IASC issued the paper "Summary of Issues: Extractive Industries" with a comment deadline of 30th June 2001. The paper favoured the Successful Efforts method as the mandatory method to account for exploration and evaluation expenditure. The vast majority (85%) of responses to the paper supported the recommendations. The non-supportive responses primarily came from extractive industry lobby groups whose membership included smaller oil & gas companies following the Full Cost method (Cortese, Irvine, & Kaidonis, 2010).

The IASC was restructured as the IASB in 2000. In September 2002, the IASB announced that it was not feasible to complete the extractive industry project in time for the adoption of IFRS by European-listed entities in 2005. The project was therefore postponed until agenda time permitted. During the same month, the IASB and FASB signed the Norwalk Agreement, acknowledging both standard-setting bodies' commitment to converging the two sets of accounting standards under their remit. The Norwalk Agreement marked a significant and formal step towards the harmonisation of the American financial reporting standards, (i.e. US Generally Accepted Accounting Principles (GAAP)), and IFRS. Given the resistance to the standardisation of accounting practice in the extractive industry experienced by the FASB in the 1970s, the postponement of the extractive industry project avoided a significant potential obstacle in the harmonisation process. In January 2004, the IASB issued Exposure Draft 6 "Exploration For and Evaluation of Mineral Resources", the content of which became the regulations contained in IFRS 6 which was published in December 2004 and became effective for reporting periods beginning on or after 1st January 2006 (Asekomeh et al., 2006; Cortese, Irvine, & Kaidonis, 2007; Cortese, 2013; Cortese, Irvine, & Kaidonis, 2009; Cortese et al., 2010).

The IASB states that one of the objectives of IFRS 6 is to make limited improvements to the accounting treatment of exploration expenditure without requiring major changes that may have to be reversed if/when the IASB undertakes a comprehensive review of accounting practices in the extractive industry (IASB, 2004).

2.1.2. The mining sector

The literature on accounting practices in the mining sector is not as extensive as the oil & gas sector. Vent and Milne (1989) describe early international efforts to establish standardised accounting practice in the mining industry during the period from 1895 to 1930. The first phase was international in scope and driven mainly by professional accountants, engineers and mine managers. National efforts to increase uniformity in accounting were occurring independently in Australia, North America and South Africa. The London-based Institution of Mining and Metallurgy established the Mine Accounts and Cost Sheets Committee in 1908 which received input from mining professionals at major mining sites internationally. In December 1910, the Institution of Mining and Metallurgy adopted a report produced by the Mine Accounts Committee containing recommendations on standardised accounting practices in the mining sector. The recommendations received the approval of several high-profile accounting and mining journals (Vent & Milne, 1989). Despite the efforts of leaders in the mining industry, the adoption of the standards was voluntary and contained many inconsistencies. Although some progress was made towards international standardisation of accounting practice in the extractive industry, the recommendations of the Institution of Mining and Metallurgy were not extensively adopted by industry participants.

Luther (1996) describes how accounting practices for mining firms have developed independently in major mining countries since the 18th century. Country-specific factors, including the influence of developments in British case law in relation to capital maintenance and distributable profit determinations, have influenced accounting practices in mining countries to differing extents. Morris (1975) describes how it is a requirement in some countries that depreciation per the corporation taxation calculation be recognised in the profit or loss of extractive firms. In addition, the extent to which legislation dictates the calculation of distributable profit and the subsequent dividend policy of extractive firms differs between countries (Luther, 1996).

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The requirements of IFRS 6 permit mining firms to continue to use the accounting policy for exploration expenditure that was in use prior to the implementation of the standard. However, the accounting practices of mining firms listed on major capital markets such as the LSE may differ according to the geographical origin of the companies. The academic literature surrounding the accounting practices of mining firms is under-developed when compared to the comprehensive literature which exists on the oil & gas sector.

2.1.3. Other information: reserve disclosures

The previous sections detail the development of accounting standards in relation to historical cost disclosures on the exploration expenditure incurred by extractive firms. There have also been attempts to develop standards for the disclosure of information in relation to the potential and proven reserves of extractive firms (Cairnie, 1985; Luther, 1996; Trueman, 1975). The SEC required US-listed firms to apply Reserve Recognition Accounting (RRA) from December 1977, before discontinuing the practice in February 1979. The listing rules for the Australian and New Zealand Stock Exchanges have required listed firms to apply the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, known as the Joint Ore Reserves Committee Code (JORC Code), since 1989 and 1992 respectively.

Although some prior studies indicate that reserves disclosures are as relevant as historical cost disclosures on exploration expenditure (Asekomeh, Russell, Tarbert, & Lawal, 2010; Boone, 2002), the focus here is on historic cost disclosure of exploration expenditure of extractive firms.

2.1.4. Recent developments on accounting for exploration expenditure

IFRS 6 is intended as an interim standard pending the initial implementation of IFRS for European-listed firms. In April 2010, the findings of an extractive activities research project were published (in which the IASB had participated) which was undertaken by a team of national standard-setters from Australia, Canada, Norway and South Africa. The researchers examined how to estimate and classify discovered reserve quantities, how to account for and measure extractive properties and what information should be disclosed by extractive firms in their financial statements. It was suggested that the IASB should examine extractive activities as part of a broader consideration of intangible assets and research and development activities (IASB, 2016).

In December 2012, the IASB effectively discontinued its efforts to investigate an industry-specific accounting standard for the extractive industries when it activated a broader intangible assets research project as part of the IASB's Agenda Consultation 2011. The IASB-only research project was designed to assess the feasibility of developing one set of reporting requirements for investigative, exploratory and development activities across a wide range of industries. However, the IASB has assigned this project as a low priority and had not carried out extensive work as of May 2016 (IASB, 2016).

The LSE is promoted as the market of choice for companies located throughout the world.[2] Firms listed under the oil & gas and mining categories of the LSE originate from five continents. The country-of-incorporation field on the list of LSE companies shows that there are companies from at least 26 countries in the oil & gas sector and from at least 15 countries in the mining sector.[3] All exploration and evaluation expenditure for LSE-listed extractive firms must comply with IFRS 6. This includes two exemptions which allow diversity of accounting practices in relation to the treatment of exploration and evaluation expenditure. The first exemption is from paragraphs 11 and 12 of IAS 8 (Accounting Policies, Changes in Accounting Estimates and Errors). This exemption removes the need to refer to similar IFRSs and pronouncements from other standard setting bodies with a similar Conceptual Framework when developing a policy for exploration expenditure where no specific IFRS applies. The exemption from IAS 8 allows extractive firms to continue applying the accounting policy in use prior to the issue of IFRS 6. As the firms listed on the LSE originate from multiple countries and continents, this requirement effectively permits a diversity of accounting practices for exploration expenditure while still remaining compliant with IFRS.

IFRS 6 requires that extractive firms test capitalised exploration expenditure for impairment and recognise any impairment loss in accordance with IAS 36 (Impairment of Assets). However, it also allows them to allocate exploration and evaluation expenditure to cash generating units (CGU). A CGU may not be larger than an operating segment determined in accordance with IFRS 8. Nonetheless, an extractive firm is permitted to combine one or more CGUs for the purpose of testing exploration and evaluation assets for impairment (IASB, 2004). By allowing extractive firms to combine CGUs, the standard fails to define a cost centre which must be applied to exploration assets i.e. well, field, area, country or world. Effectively, this permits a spectrum of accounting policies for exploration expenditure as extractive firms define cost centres in alternative ways. The only limitation is that the total cost capitalised for exploration and evaluation expenditure for the entire extractive group must not exceed the total recoverable amount of exploration and evaluation expenditure for the entire group.

IFRS 6 effectively permits firms to use three different categories of accounting policy ranging from the aggressive Full Cost method, to the moderate Successful Efforts method and finally the conservative Expense All method. An examination of the accounting policy notes attached to the financial statements of this study's sample confirms that a diversity of accounting policies are applied by the LSE-listed firms when accounting for exploration expenditure. Table 1 highlights the distinguishing characteristics of the accounting policies employed to account for exploration expenditure. The table outlines and

[2] http://www.londonstockexchange.com/companies-and-advisors/listing/non-uk/countries.htm (Accessed: 26th February 2016).
[3] http://www.londonstockexchange.com/statistics/companies-and-issuers/list-of-all-companies.xls (Accessed: 26th February 2016).

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Table 1
Categories of exploration & evaluation policies used by extractive firms listed on the LSE.

	Full Cost Policy	Successful Efforts Policy	Expense All Policy
Initial recognition criteria:	All exploration expenditure is capitalised (successful and unsuccessful)	All exploration expenditure is capitalised (successful and unsuccessful)	All exploration expenditure is expensed until it is determined to have an associated future economic benefit.
Impairment Assessment Level (Based on firm's definition of a cost centre):	Exploration sites are assigned to cash generating units. All cash generating units are combined. The level at which sites are assessed for impairment is typically based on a country or world basis. No impairment is recognised unless the total carrying amount of exploration assets exceeds the total recoverable amount.	Exploration sites are assigned to cash generating units. Cash generating units are combined to various extents. The level at which sites are assessed for impairment varies between a well, field or area basis. The level of assessment is at a more granular level than the Full Cost method.	Exploration sites are assigned to cash generating units. The level at which sites are assessed for impairment varies between a well, field or area basis. Only exploration expenditure which is determined to have future economic benefits is capitalised initially so fewer impairments are necessary.
Effect/substance of policy:	Unsuccessful sites remain capitalised and are amortised with revenue from successful sites. The policy permits an income smoothing effect and results in increased asset balances. The policy is commonly used by smaller oil & gas entities.	If a site is found to be unsuccessful, at this point an impairment will be recognised. This policy has a comparatively volatile effect on income and asset balances. The policy is prevalent in both the oil & gas and mining sectors.	All exploration expenditure is initially expensed. Once an associated future benefit in relation to expenditure is determined, future exploration expenditure is capitalised. This policy is conservative and restricts the capitalisation of exploration assets. Under this policy, uncertain early-stage expenditure which may have an associated future benefit is expensed which may reduce income and underestimate asset balances. The policy is commonly used by large mining entities.

details three distinct categories of accounting policy for exploration expenditure are used by oil & gas and mining firms listed on the LSE.

2.2. Empirical research in the extractive industries

This section of the paper reviews previous empirical academic studies and first focuses on supplementary information disclosed in relation to reserves before reviewing studies based on historical cost information disclosed on exploration activities.

2.2.1. Reserve value studies

Early research conducted on RRA disclosures is mixed and often contradictory. Connor (1979) concluded that RRA is unacceptably imprecise, whereas Bell (1983) finds that the stock market reacts positively to initial RRA disclosures. Dharan (1984) determines that RRA disclosures do not have an incremental impact on share prices with Magliolo (1986) extending prior research by integrating a capital market analysis of RRA and an analysis of reserve valuation. This study finds RRA measurements contain a large degree of error and that oil & gas firms value reserves more aggressively than investors. Discoveries of new reserves (a component of RRA income) are strongly associated with changes in firm value. However, other than the 'discovery' component of RRA income, minimal association between RRA income and firm value exists.

Harris and Ohlson (1987) find no evidence to support the claim that oil & gas reserve value disclosures are value relevant. Doran, Collins, and Dhaliwal (1988) show that three items of RRA information have information content during the period when RRA was required by the SEC: the present value of discoveries, present value due to price/quantity revisions and RRA net income. However, after the SEC discontinued RRA, the only item of information that continued to possess information content was the present value due to price/quantity revisions. Doran et al. (1988) findings are consistent with a similar study conducted by Kennedy and Hyon (1992). Alciatore (1993) finds changes in the standardised measure have no incremental information content unless separated into individual components. When divided into individual components, six of the ten components contain incremental information: production, discoveries of reserves, purchases of reserves, quantity revisions, price changes and changes in income taxes. This finding is consistent with a study conducted by Spear (1996). The integrity of the reserve estimates produced by RRA was challenged by the accounting profession and the SEC discontinued RRA from February 1979.

The debate was reignited by Boone (2002) who examines the measurement error in both present value measures and historical cost measures of oil & gas assets. The study reports that the measurement error in the present value measures is, on average, less than the measurement error in historical cost measures of oil & gas assets. Also, oil & gas assets measured at present value explain more across-firm and across-time variation in stock prices than oil & gas assets measured at historical cost. The findings by Asekomeh et al. (2010) are consistent with Boone (2002): supplementary disclosures on the present value of reserves are found to be as value relevant as historical cost disclosures.

2.2.2. Reserve quantity studies

A number of studies have examined the information content of reserve quantity disclosures. Clinch and Magliolo (1992) find production quantities are a source of value relevant information. Spear (1994) detects significant information content in relation to disaggregated reserve quantity data. Disaggregated reserve quantity information (e.g. new discoveries, improved recovery, production, purchases and revisions) has value relevance beyond the aggregate figure alone. In addition, new reserves are highly associated with share returns. Berry, Hasan, and O'Bryan (1997) find evidence that capital markets positively value total proven reserve quantity disclosures. The study divides the total reserve quantity disclosure into two components: proven developed reserves and proven undeveloped reserves. Whereas the developed component is valued positively by the market, the undeveloped component is not. Bird, Grosse, and Yeung (2013) examine the market's reaction to JORC-compliant announcements made by Australian mining firms and find that the market reacts positively to both exploration and earnings announcements. Large abnormal returns accrue to smaller firms and to firms whose announcements imply larger percentage increases in resource levels.

2.2.3. Exploration expenditure: historical cost studies

Value relevance studies have focused on the relevance of exploration and evaluation expenditure disclosures prepared under the Successful Efforts and Full Cost methods to investors in oil & gas firms, while the mining sector remains relatively under-researched. Harris and Ohlson (1987) apply a cross-sectional valuation model to a sample of oil & gas firms from 1979 to 1983. The findings indicate that the Successful Efforts method produces more useful information than the Full Cost method because the information produced by the Successful Efforts method explains more variation in market measures than the information produced by applying the Full Cost method. A major drawback of this study is that its sample selection excludes firms with major non-production/exploration activities; this has the effect of removing smaller less mature firms from the sample.

In contrast, Bryant (2003) applies a within-firm design, as opposed to a cross-firm design, to examine the value relevance of information produced under the Successful Efforts and Full Cost methods for a sample of oil & gas firms between 1994 and 1996. By calculating the disclosures that would be made by each sample firm under both the Successful Efforts and Full Cost methods, the findings show that the Full Cost method produces more value relevant disclosures than the Successful Efforts

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Table 2
Number of companies in sample by market and sector.

	Oil & Gas	Mining	Total
LSE: Main Market	21	23	44
LSE: AIM	63	89	152
Total	84	112	196

method. The smoother earnings provided by the Full Cost method contributes to the higher value relevance of information produced by this particular method. The primary business of the sample firms included in the study involves exploration and the development and production of oil & gas. Importantly, the sample selection criteria used in Bryant's (2003) study does not exclude smaller less mature oil & gas firms.

The differences in the research design and sample selection criteria applied by Harris and Ohlson (1987) and Bryant (2003) may explain the inconsistencies in the findings. A key argument presented by smaller oil & gas firms during attempts to standardise accounting practices for exploration expenditure by the FASB and the IASB is that less mature firms require the option of the Full Cost method in order to remain competitive. This assertion is not examined in prior value relevance studies. For example, Harris and Ohlson (1987) exclude smaller firms with significant non-production activities from their sample. Bryant (2003) sample includes smaller firms with significant non-production activities, but she does not analyse the value relevance of small and large firms separately.

3. Research design

The initial objective of this paper is to examine the value relevance of historical cost information disclosed in the financial statements of an inclusive sample of LSE-listed extractive firms. The paper then analyses the current exploration accounting practices of firms listed on both the Main and AIM markets. The descriptive statistics highlight that the bifurcation of the sample into Main Market and AIM-listed firms is a good method of separating large production-oriented firms from small exploration-focused firms. Finally, the paper investigates whether the value relevance of information produced under alternative accounting policies is affected by firm-specific characteristics such as sector and market size.

The base sample was selected from a list of extractive entities listed on the LSE Main Market and AIM. The LSE was selected due to its size as one of the two largest stock exchanges in Europe, along with the requirement for LSE-listed firms to apply IFRS under European Union Regulation (EC) No 1606/2002. [4]

3.1. Identification of extractive firms

A list of oil & gas and mining firms was obtained directly from the LSE's website.[5] As of the 31st December 2013, the LSE had a total of 150 companies listed in the oil & gas sector and 173 companies listed in the mining sector. The mining sector is included within the scope of our sample to address a deficiency in the literature of studies examining accounting practices in the mining sector. Financial data for at least two years was available for 196 firms. Table 2 provides a breakdown of the sample size by market and by sector.

3.2. Determination of sample period

The enactment of Regulation (EC) No 1606/2002 of the European Parliament requires entities listed on European stock exchanges to adopt IFRS as of 2005. IFRS 6 only became effective for annual periods beginning on or after 1st January 2006. The AIM market only adopted IFRS from 2007. The sample period is therefore a seven-year period (2006–2012) for entities listed on the Main Market and a six-year period (2007–2012) for entities listed on the AIM.

3.3. Data sources

Financial information on security prices, net book values and net operating income was collected from Datastream®. Financial information relating to exploration asset balances is only available from companies' financial reports and had to be hand-collected. The accounting policies of the firms are reviewed by accessing policy disclosures made in the notes to the financial reports and categorising the policy according to three areas where exploration policies typically differ: initial recognition criteria, impairment policy (the definition of a cost centre used) and the overall substance of the method. The exploration accounting policies are analysed and categorised according to the above criteria.

[4] http://www.londonstockexchange.com/statistics/markets/markets.htm (Accessed: 14th April 2016).
[5] http://www.londonstockexchange.com/statistics/companies-and-issuers/list-of-all-companies.xls (Accessed: 26th February 2016).

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3.4. Research method

IFRS 6 does not prescribe the definition of a cost centre to be applied by extractive firms when developing an accounting policy and/or assessing exploration assets for impairment. The failure to include a narrow definition of a cost centre in IFRS 6 permits the use of a diversity of accounting practices for exploration expenditure within the extractive industry. Accordingly, the study adapts the methodology used in prior value relevance studies in order to examine the effect of alternative accounting policies for exploration expenditure on the value relevance of the information disclosed under the policies.

Following prior research (Barth, Konchitchki, & Landsman, 2013; Bushman, Chen, Engel, & Smith, 2004; Francis, LaFond, Olsson, & Schipper, 2004), it is assumed that the stock price captures the underlying economic value of the firm as perceived by investors. Value relevance reflects the level of association between accounting data and investors' consensus beliefs pertaining to the economic value of the company. A significant association means that accounting estimates of the asset values are reflected in investors' beliefs on the intrinsic value of the company. A significant relation between an accounting variable and share price implies that the accounting data possesses the fundamental characteristic of relevance as outlined in the IASB's Conceptual Framework.

The Ohlson (1995) model is used to investigate the ability of the accounting data to explain security prices:

$$P_{it} = w_0 + w_1 BVE_{it} + w_2 NI_{it} + \varepsilon_{it} \quad (1)$$

Where P_{it} is the share price of firm i three months after the firms' financial year end at time t. The three month time lag allows a period of time for the financial statements to be published thus avoiding look-ahead bias. BVE_{it} is the book value of equity per share for firm i for financial year t, and NI_{it} is the net operating income per share for firm i for the year ending at time t. BVE and NI are included in (1) as summary measures of information which is reflected in the financial statement accounting data. W_0 and ε_{it} are included to capture the portion of the share price unexplained by BVE and NI.

The book value of equity and earnings are the explanatory variables in (1), yet we are attempting to assess the value relevance of exploration-related assets. Therefore, following Barth and Clinch (1998), BVE is partitioned as follows:

$$BVE = NBV + EE \quad (2)$$

Where NBV is the book value of equity after subtracting the exploration asset balance (EE) capitalised in the financial statements of extractive firms. EE represents exploration & evaluation assets (accounted for under IFRS 6).

Substituting (2) for BVE in (1) and inserting a control variable for the importance of exploration assets in the balance sheet results in the primary regression equation used in this paper:

$$P_{it} = \sum W_{0Y} YR_{Yti} + w_1 NBV_{it} + w_2 NI_{it} + w_3 EE_{it} + w_4 EETA_{it} + \varepsilon_{it} \quad (3)$$

YR represents dummy variables for each year in the sample period and ε_{it} is a two-way (firm and year) cluster-robust bootstrap standard error term as used by Patatoukas, Sloan, and Zha (2015).[6] The NBV, NI and EE variables are deflated by the number of shares outstanding.[7] EETA is a control variable which measures the value of the exploration asset balance to the value of total assets; this variable is intended to control for the focus on the entity's operations between exploration, development and production. If entities are focussed on production EETA will be low whereas if they are focussed on

Table 3
Number and percentage of companies in sample by policy.

	Full Cost Policy	Successful Efforts Policy	Expense All Policy	Total
Oil & Gas – Main	4 (19%)	17 (81%)	0 (0%)	21 (100%)
Oil & Gas – AIM	20 (32%)	43 (68%)	0 (0%)	63 (100%)
Oil & Gas - All	24 (29%)	60 (71%)	0 (0%)	84 (100%)
Mining – Main	0 (0%)	10 (43%)	13 (57%)	23 (100%)
Mining - AIM	2 (2%)	74 (83%)	13 (15%)	89 (100%)
Mining - All	2 (2%)	84 (75%)	26 (23%)	112 (100%)
Total	26 (13%)	144 (74%)	26 (13%)	196 (100%)

[6] Our inferences are unchanged when statistical inferences are based on White's (1980) heteroscedasticity-consistent standard errors with MacKinnon and White's (1985) finite sample correction.

[7] Equations (3) and (4) are estimated separately for larger Main Market-listed firms and smaller AIM-listed firms to resolve any remaining issues related to scale.

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exploration EETA will be high. Where appropriate, variables have been Winsorised at the 2% and 98% level to mitigate the influence of outliers on the results.

An interaction variable (EP) for the category of accounting policy followed by each sample firm is introduced into equation (3) and each variable's coefficient is estimated separately. The inclusion of the interaction term for exploration policy allows a determination of whether any significant difference exists in the relationship between share price and accounting data which has been prepared under different policies. Introducing the EP variable into equation (3) gives us equation (4).

$$P_{it} = \sum \alpha_{0Y} YR_{Yit} + \alpha_1 EP + \beta_1 NBV_{it} + \beta_2 (NBV_{it} xEP) + \beta_3 NI_{it} + \beta_4 (NI \times EP_{it}) + \beta_5 EE_{it} + \beta_6 (EE_{it} xEP) + \beta_7 EETA_{it} + \varepsilon_{it} \quad (4)$$

Where EP is an indicator variable representing the category of exploration policy followed by the extractive firm.

4. Findings

This section begins by analysing the exploration accounting policies of the firms in the sample. It then outlines descriptive statistics for the sample before discussing the value relevance findings for both the oil & gas sector and the mining sector.

4.1. Empirical analysis of exploration accounting policies

Table 3 shows the number and percentage of companies within the sample following each category of policy commonly adopted by extractive firms listed on the LSE. In the LSE's oil & gas sector, the policies followed by firms range between Successful Efforts and extreme Full Cost. The Full Cost method is mainly adopted by smaller AIM-listed oil & gas firms. In the LSE's mining sector, the Full Cost method is not a commonly applied policy as the exploration accounting policies applied by mining firms involves a more conservative range of policies between the Successful Efforts and extreme Expense All methods[8]

4.2. Descriptive statistics for sample firms

For oil & gas companies χ^2 tests of association reveal that the selection of Successful Efforts or Full Cost policies for EE assets is independent of the market on which the company's shares are traded. However, a mining company that is traded on the AIM is far more likely to choose the Successful Efforts policy than a mining company traded on the Main Market.

Each policy offers firms a differing degree of flexibility in relation to the capitalisation of exploration and evaluation expenditure. The more flexible policies will result in increased capitalisation of exploration expenditure. It is necessary to analyse the average magnitude of exploration assets capitalised under each policy and to measure the magnitude of exploration assets relative to the size of the company. Table 4 describes the magnitude of exploration assets by accounting policy. Two measures of magnitude are provided: the gross amount of exploration assets (in thousands of Pounds) and the

Table 4
Magnitude of exploration assets by policy (unwinsorised Figures).

	Oil & Gas Sector Exploration & Evaluation Assets - Net Book Value							Mining Sector Exploration & Evaluation Assets - Net Book Value						
	GBP£/'000			% Total Assets				GBP£/'000			% Total Assets			
	Mean	Median	Std Dev	Mean	Median	Std Dev	n	Mean	Median	Std Dev	Mean	Median	Std Dev	n
FULL COST POLICY														
Main Market	96,059	84,172	55,357	0.39	0.38	0.23	4							
AIM	53,821	25,727	86,341	0.46	0.47	0.29	20							
Oil & Gas	63,812	34,348	81,837	0.44	0.46	0.28	24							
SUCCESSFUL EFFORTS POLICY														
Main Market	1,672,425	150,775	3,980,162	0.19	0.11	0.18	17	1,757,848	116,576	3,855,156	0.15	0.10	0.13	10
AIM	561,501	25,261	1,840,843	0.44	0.43	0.27	43	505,780	10,683	2,063,359	0.30	0.21	0.28	74
Oil & Gas/Mining	1,068,802	47,752	3,053,569	0.32	0.24	0.26	60	844,390	19,047	2,713,072	0.26	0.17	0.25	84
EXPENSE ALL POLICY														
Main Market								509,092	104,681	859,637	0.07	0.03	0.09	13
AIM								5794	5135	5438	0.27	0.16	0.22	13
Mining								338,859	52,946	736,786	0.14	0.09	0.17	26

[8] Variation exists within the three categories of policy as a result of alternative definitions of a cost centre applied by firms when assessing exploration assets for impairment. The definition of a cost centre used by firms following the Successful Efforts method is typically based on either a well, field or area basis; further variation exists within the definitions of an area used. The definition of a cost centre used by firms following the full cost method is based on either a country or world basis. The Expense All method involves less because exploration expenditure is expensed, rather than capitalised, until a site is determined to have associated future economic benefits.

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Table 5
Descriptive statistics for share price model variables by policy.

Variable:	Oil & Gas Sector								Mining Sector							
	Mean	Median	Std Dev	Min	Max	Skewness	Kurtosis	n	Mean	Median	Std Dev	Min	Max	Skewness	Kurtosis	n
P	1.4714	0.3338	3.1151	0.0018	20.6200	3.96	20.69	450	2.0318	0.1513	4.8118	0.0011	20.6200	2.90	10.41	620
NBV	0.7485	0.1029	2.1336	−0.1113	18.6782	5.60	39.63	417	1.4730	0.0854	3.9098	−0.1113	18.6783	3.54	15.03	479
NI	0.0968	−0.0044	0.4997	−0.3340	4.2091	5.91	42.56	495	0.3037	−0.0047	0.9422	−0.3340	4.2091	3.22	12.50	641
EE	0.4285	0.1198	0.9512	0.0001	5.8328	4.40	23.83	417	0.3528	0.0491	0.9775	0.0000	5.8328	4.62	24.81	468
- Full Cost	0.2886	0.1506	0.3285	0.0001	1.6675	1.77	6.23	119	–	–	–	–	–	–	–	–
- Successful Efforts	0.4843	0.1131	1.1015	0.0001	5.8328	3.81	17.77	298	0.3312	0.0525	0.9411	0.0000	5.8328	4.84	27.05	387
- Expense All	–	–	–	–	–	–	–	–	0.4564	0.0438	1.1367	0.0001	5.8328	3.83	17.66	81
EETA	38.1907	33.6020	27.3944	0.0313	98.5590	0.3490	1.9263	417	37.7322	33.1970	30.0690	0.0000	99.6097	0.4464	1.9527	479

Variable Definitions:
P = Share price measured three months after the firms' financial year end at time t to allow a period of time for the financial statements to be finalised and published by the sample firms, i represents the sample firms.
NBV = Book value of equity at end of financial year after removing balance for asset under analysis (EE) (deflated by shares outstanding at end of financial period).
NI = Net operating income for financial year (deflated by shares outstanding at end of financial period).
EE = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – accounted for under accounting standard IFRS 6.
- **Full Cost** = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – for firms following the Full Cost policy to account for exploration expenditure under accounting standard IFRS 6.
- **Successful Efforts** = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – for firms following the Successful Efforts policy to account for exploration expenditure under accounting standard IFRS 6.
- **Expense All** = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – for firms following the Expense All policy to account for exploration expenditure under accounting standard IFRS 6.
EETA = control variable measuring the proportion (percentage) of the value of the exploration asset balance to the value of total assets.

exploration asset figure as a percentage of total assets. These measures allow insights into the size and materiality of exploration assets to firms who adopt particular exploration policies.

Notwithstanding the independence of accounting policy choice from the market on which a company's securities are traded, it is evident from Table 4 that Main Market oil & gas companies which employ the Successful Efforts policy are much larger than those which employ the Full Cost policy.[9] There is no such disparity in the size of oil & gas companies quoted on the AIM which adopt the Successful Efforts and Full Cost policies. The median EE assets for AIM companies under the Full Cost policy is £25,727,000 and is £25,261,000 under the Successful Efforts policy. As a percentage of total asset the average numbers are 47% and 43% respectively.

In the mining sector, entities which adopt the Successful Efforts policy not surprisingly have a larger portion of total assets invested in exploration activities (26%) than entities that have chosen to follow the Expense All policy. The Expense All policy is prevalent among larger mining companies and this is reflected by the descriptive statistics. Although the overall median EE asset balance for all entities following the Expense All policy outweighs the median for all entities following the Successful Efforts policy, the balance only represents a median of 9% of total assets for these entities. Thus, in the mining sector firms with an exploration focus tend to select the exploration accounting policy, Successful Efforts, which is less conservative than the alternative policy (Expense All) used in the sector.

A description of each of the variables used in the share price model is provided in Table 5, which also displays statistics for the total number of companies for each variable included in it. The independent exploration asset variable is partitioned according to policy and separate statistics provided for each policy type.

4.3. General value relevance findings for extractive firms listed on LSE

An analysis of the value relevance of net operating income and exploration asset disclosures for the LSE's extractive industry is contained in Table 6. This analysis does not take into consideration the particular exploration accounting policy followed by companies in the sample. The table reveals that the Net Income variable is significant for every partition except for the smaller AIM-listed mining firms. This indicates information contained in the income statement of extractive firms, with the exception of those mining companies listed on the AIM, is relevant to investors.

[9] Note, however, that there are only four oil & gas companies choosing the Full Cost method quoted on the Main Market so too much should not be made of this difference.

Table 6
Relationship between exploration asset measurement and share price.

$P_{it} = \sum \alpha_{0Y} YR_{Yit} + \beta_1 NBV_{it} + \beta_2 NI_{it} + \beta_3 EE_{it} + \beta_4 EETA_{it} + \varepsilon_{it}$ (3)

Variable:			LSE MAIN MARKET		LSE AIM	
	Oil & Gas Sector	Mining Sector	Oil & Gas	Mining	Oil & Gas	Mining
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(p-value)	(p-value)	(p-value)	(p-value)	(p-value)	(p-value)
NBV	0.0591	−0.9428	0.3769	−0.2119	0.0478	−0.0139
	(0.664)	(0.232)	(0.078)	(0.038)	(0.651)	(0.677)
NI	5.1394	5.2599	2.2899	5.9068	2.9412	−0.1954
	(0.000)	(0.000)	(0.002)	(0.000)	(0.053)	(0.655)
EE	0.7344	−0.1776	2.9721	−0.1197	0.2529	0.1112
	(0.032)	(0.684)	(0.000)	(0.858)	(0.209)	(0.577)
EETA	−0.7709	−0.0157	−0.0170	−0.0150	−0.0072	−0.0044
	(0.002)	(0.000)	(0.168)	(0.632)	(0.000)	(0.000)
N	395	473	103	100	292	373
Adj. R^2	0.7073	0.7606	0.8511	0.7962	0.2529	0.0780
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes

The estimations in Table 6 are based on two-way (firm and year) cluster-robust standard errors using 1000 iterations.
Variable Definitions:
NBV = Book value of equity at end of financial year after removing balance for asset under analysis (EE) (deflated by shares outstanding at end of financial period).
NI = Net operating income for financial year (deflated by shares outstanding at end of financial period).
EE = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – accounted for under accounting standard IFRS 6.
EETA = control variable measuring the proportion of the value of the exploration asset balance to the value of total assets.

The exploration asset variable is significant for the full sample of oil & gas firms, the large Main Market-listed oil & gas firms but not for AIM-listed oil & gas firms. Exploration asset disclosures for all partitions of the mining sector are not value relevant.

The Adjusted R^2 statistics for the regressions in Table 6 reveal that the information in the financial statements explains a larger proportion of the value of Main Market firms: 85% and 80% for Oil & Gas and Mining respectively. However only a small proportion of the variation in value of extractive firms listed on the AIM (oil & gas: 25.3% and mining: 7.8%) is explained by the financial statements. The Adjusted R^2 statistics imply that investors in AIM-listed extractive firms are reliant on other sources of information for valuation purposes. These other sources of information may include information disclosed on the firm's potential and proven reserves.

Overall, the results reveal that the income statement contains value relevant information for investors in extractive firms except for small mining entities. In contrast, the balance sheet contains minimal value relevant information particularly in the mining sector. The findings show that only the financial statements of larger oil & gas firms appear to contain sufficient value relevant information. This is consistent with the unique characteristics of the extractive industry (the high levels of risk and uncertainty associated with expenditure) eroding the relevance of asset measurements in the balance sheet. Table 3 revealed that extractive firms account for exploration expenditure using a range of different policies. Accordingly, it is necessary to examine directly whether the accounting policies adopted by firms have an effect on the relevance of the exploration asset measurements disclosed in the balance sheet. The next section of this paper addresses this issue.

4.4. Value relevance findings: oil & gas sector

We estimate equation (4) for the oil & gas sector with the exploration policy interaction term (EP) designated as 0 for firms using the Successful Efforts method and designated as 1 for those using the Full Cost method. The results are presented in Table 7 for the combined sample, Main Market and AIM-listed partitions.

The results show that the net operating income reported by firms that follow the Successful Efforts method is statistically significant for all partitions, although the AIM partition is only significant at the 10% level. Furthermore the net operating income figures reported under the Successful Efforts method are significantly more value relevant than those reported under the Full Cost method. This latter result stems exclusively from the failure of AIM quoted oil & gas firms to report value relevant income figures using the Full Cost method.

EE is value relevant for the combined sample regardless of the accounting policy adopted. It is noteworthy that EE balance sheet valuations are value relevant for all Main Market firms though only marginally so for those companies using the Full Cost method. EE is value relevant for AIM companies only when the Full Cost accounting policy is used: EE is not at all value relevant for AIM oil & gas companies if Successful Efforts is used. This result is consistent with the lobbying efforts of smaller

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Table 7
Oil & gas sector: Relationship between exploration asset measurement by policy and share price.

$$P_{it} = \sum \alpha_{0Y} YR_{Yit} + \alpha_1 EP + \beta_1 NBV_{it} + \beta_2 (NBV_{it} \times EP) + \beta_3 NI_{it} + \beta_4 (NI \times EP_{it}) + \beta_5 EE_{it} + \beta_6 (EE_{it} \times EP) + \beta_7 EETA_{it} + \varepsilon_{it} \quad (4)$$

		OIL & GAS SECTOR (MAIN MARKET & AIM)	OIL & GAS SECTOR (MAIN ONLY)	OIL & GAS SECTOR (AIM ONLY)
		Coefficient	Coefficient	Coefficient
		(p-value)	(p-value)	(p-value)
NBV	β_1	0.0631	0.3895	0.0561
		(0.641)	(0.087)	(0.647)
NBV x EP	β_2	0.5925	0.0068	0.6198
		(0.009)	(0.989)	(0.026)
NI	β_3	5.1821	2.3166	2.9593
		(0.000)	(0.004)	(0.075)
NI x EP	β_4	−3.6102	−0.1416	−6.4957
		(0.010)	(0.952)	(0.008)
EE	β_5	0.6703	2.9141	0.1989
		(0.048)	Variable	(0.332)
EE x EP	β_6	1.2584	−0.9541	1.0928
		(0.003)	(0.308)	(0.013)
EETA	β_7	−0.0081	−0.0103	−0.0081
		(0.001)	(0.463)	(0.000)
N		395	103	292
Adj. R^2		0.7165	0.8456	0.3011
Year F.E.		Yes	Yes	Yes
Significance levels for coefficients under the Full Cost method:				
	F-Test	**Prob**	**Prob**	**Prob**
NBV	$\beta_1 + \beta_2 = 0$	0.0006	0.4366	0.0086
NI	$\beta_3 + \beta_4 = 0$	0.2303	0.3227	0.0601
EE	$\beta_5 + \beta_6 = 0$	0.0000	0.0514	0.0010

The estimations in Table 7 are based on two-way (firm and year) bootstrapped cluster-robust standard errors using 1000 iterations.
Variable Definitions.
EP = a dummy variable for Exploration & Evaluation accounting policy. EP = 0 if the firm follows the Successful Efforts method; EP = 1 if the firm follows the Full Cost method in the oil & gas sector or follows the Expense All method in the mining sector.
NBV = Book value of equity at end of financial year after removing balance for asset under analysis (EE) (deflated by shares outstanding at end of financial period).
NI = Net operating income for financial year (deflated by shares outstanding at end of financial period).
EE = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – accounted for under accounting standard IFRS 6.
EETA = control variable measuring the proportion of the value of the exploration asset balance to the value of total assets.

oil & gas companies for the Full Cost method when the FASB and the IASB attempted to mandate the Successful Efforts method to account for exploration expenditure.

We next test if the disparity between the most value relevant policy is driven by the proportion of EE assets in the firm's balance sheet or on the company's size measured by total assets[10]. To test these suppositions we ranked all companies on the basis of EETA and allocated them into three portfolios based on this ranking. We found that the EETA portfolio and accounting policy choice to be completely independent of one another, both for oil & gas and for mining companies. Similarly, we allocated stocks to three portfolios having first ranked them by Total Assets. The book value of total assets was also found to be independent of accounting policy choice. Thus while the value relevance of a particular accounting policy is related to the market on which a firm's stock is traded, and hence their market value, we are not able to readily distinguish precisely why this choice was made. We note that there are many differences between the AIM companies traded on the Main Market. The latter contains more valuable mature firms that can afford a higher regulatory burden, also the type of investor attracted to the former may be different to investors in Main Market companies, perhaps they are less risk averse. Thus while we cannot be categorical as to reasons for the divergence between AIM and Main Market extractive industry companies we note that the information needs of investors in Main Market and AIM companies do appear to diverge.

4.5. Value relevance findings: mining sector

The two accounting policies that are commonly used in the mining sector are the Successful Efforts method and a more conservative alternative entitled the Expense All method. The results for the mining sector are presented in Table 8. The findings indicate that the income statement information reported by extractive firms is value relevant for the full sample but this result stems entirely from the large Main Market-listed firms. The interaction variables show there is no significant

[10] It is clear that AIM companies are smaller in market value terms than Main Market companies.

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Table 8
Mining Sector: Relationship between Exploration Asset Measurement by Policy and Share Price.

$P_{it} = \sum \alpha_{0Y} YR_{Yit} + \alpha_1 EP + \beta_1 NBV_{it} + \beta_2 (NBV_{it} \times EP) + \beta_3 NI_{it} + \beta_4 (NI \times EP_{it}) + \beta_5 EE_{it} + \beta_6 (EE_{it} \times EP) + \beta_7 EETA_{it} + \varepsilon_{it}$ (4)

Variable		MINING SECTOR (MAIN MARKET & AIM)	MINING SECTOR (MAIN ONLY)	MINING SECTOR (AIM ONLY)
		Coefficient	Coefficient	Coefficient
		(p-value)	(p-value)	(p-value)
NBV	β_1	−0.1696	−0.2617	−0.0152
		(0.134)	(0.290)	(0.738)
NBV x EP	β_2	0.0821	0.2071	−0.8812
		(0.691)	(0.466)	(0.236)
NI	β_3	4.3581	5.5984	−0.1619
		(0.000)	(0.000)	(0.741)
NI x EP	β_4	1.4409	−0.4982	−6.4411
		(0.125)	(0.628)	(0.007)
EE	β_5	0.4996	0.7800	0.1014
		(0.353)	(0.500)	(0.645)
EE x EP	β_6	−1.2299	−1.6183	6.7175
		(0.343)	(0.291)	(0.000)
EETA	β_7	−0.0158	−0.0229	−0.0052
		(0.000)	(0.470)	(0.000)
N		462	100	362
Adj. R^2		0.7777	0.7978	0.0876
Year F.E.		Yes	Yes	Yes
Significance levels for coefficients under the Expense All Method:				
	F-Test	**Prob**	**Prob**	**Prob**
NBV	$\beta_1 + \beta_2 = 0$	0.6111	0.7265	0.2271
NI	$\beta_3 + \beta_4 = 0$	0.0000	0.0000	0.0046
EE	$\beta_5 + \beta_6 = 0$	0.5430	0.4842	0.0000

The estimations in Table 8 are based on two-way (firm and year) cluster-robust standard errors using 1000 iterations.

Variable Definitions:

EP = a dummy variable for Exploration & Evaluation accounting policy. EP = 0 if the firm follows the Successful Efforts method; EP = 1 if the firm follows the Full Cost method in the oil & gas sector or follows the Expense All method in the mining sector.

NBV = Book value of equity at end of financial year after removing balance for asset under analysis (EE) (deflated by shares outstanding at end of financial period).

NI = Net operating income for financial year (deflated by shares outstanding at end of financial period).

EE = Balance of exploration and evaluation assets at end of financial year (deflated by shares outstanding at end of financial period) – accounted for under accounting standard IFRS 6.

EETA = control variable measuring the proportion of the value of the exploration asset balance to the value of total assets.

difference ($P < 0.628$) between the value relevance of net operating income reported by large Main Market firms which follow the Successful Efforts ($P < 0.000$) and Expense All ($P < 0.000$) methods.

The findings in relation to exploration asset variables reveal the exploration asset variable is insignificant for Main Market mining firms and AIM firms who adopt the Successful Efforts method. However, EE assets are significant for AIM quoted mining companies which follow an Expense All policy ($P < 0.000$). Not surprisingly there is also a significant difference between the value relevance of the exploration asset variable for AIM-listed firms who follow the Successful Efforts and Expense All methods.

Apart from the income statement information reported by large mining firms and the exploration assets information disclosed by AIM firms following the Expense All method, none of the other variables are significant for the sector.

The findings indicate that the value relevance of financial reports of extractive firms listed on the LSE is associated with the market on which the firm is quoted and the accounting policy choice made. There are also clear differences between the oil & gas and mining sectors that may partially explain the findings. The oil & gas sector is focused on a specific resource. In contrast, the mining sector encompasses a wide range of different minerals. The information needs of investors in the mining industry may differ according to the type of mineral being exploited by a company. For example, during periods where the gold price is high an investor in a gold mining company may not have an interest in the current exploration activities of a gold mining firm as the gold price will fluctuate significantly by the time the future benefits associated with the company's current exploration activities come to fruition. In contrast, an investor in a diamond mining company may have a more consistent interest in the exploration activities of the company as the demand and price for the mineral is comparatively stable. The analysis becomes more complex for mining companies that are involved in the exploration, development and production of multiple types of mineral. The lack of value relevance associated with the information contained in the financial reports of mining firms may be due to noise occasioned by the heterogeneity of minerals in the sector increasing the standard errors of the coefficients in the regression.

In addition, Vent and Milne (1989) outline how the accounting practices of mining companies developed independently in countries around the world. Legislation surrounding the calculation of taxable income for corporation tax purposes and

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distributable profit for dividend decisions had an effect on the development of accounting practices for mining firms to differing extents. The country of incorporation field for mining firms listed on the LSE reveals that the sample of mining firms used in this study originate from at least 15 countries[11] on five continents. The accounting policies of the mining firms may have developed to conform to particular laws in different countries rather than to meet the information needs of the capital providers to the firm. This may be a factor contributing to the noise in the standard errors of the regression and consequent failure to find that the financial reports of mining firms contain value relevant information.

5. Conclusions

The analysis of the accounting policy descriptions provided by LSE-listed extractive firms in the notes to the financial statements shows that firms exploit the latitude provided by IFRS 6 to use a diversity of accounting policies for exploration expenditure. In the oil & gas sector, the prevalent accounting policies used by firms' range from the Successful Efforts to the Full Cost methods. The selection of accounting policy in the oil & gas sector is independent of whether the company is quoted on the Main Market or AIM. In the mining sector, the analysis reveals that the accounting policies used by firms vary over a more conservative range between the Successful Efforts and Expense All methods. It is noticeable that the smaller AIM-listed mining companies are relatively less conservative in their choice of accounting policies than mining companies listed on the Main Market.

The results obtained in this study reveal that the income statements of both Main Market and AIM oil & gas and mining companies are value relevant. The income statement is value relevant for oil & gas companies quoted on all markets provided the company follows the Successful Efforts method. The exploration and evaluation assets of oil & gas companies are value relevant provided they either follow the Successful Efforts method and are quoted on the Main Market or if they follow the Full Cost method and are quoted on the AIM. This finding provides a rationale and justification for the resistance of smaller AIM-quoted oil & gas companies to standardisation on the Successful Efforts method preferred by regulators. The income statements of AIM oil & gas companies are not value relevant under the Full Cost method. We suggest that it is only the lowly valued non-production-orientated oil & gas firms that require adoption of the Full Cost method to provide value relevant information. It is noteworthy that the conservative Expense All method adopted by a minority of firms in the mining sector does provide value-relevant exploration-related balance sheets for AIM-listed mining firms only. It is also apparent that the Successful Efforts policy is generally associated with more value relevant historic cost accounting information than other policies. However, it is clearly not the optimal policy in all scenarios.

As with all research efforts, there are a number of caveats pertaining to this particular research that need to be acknowledged. Firstly, value relevance studies have been criticised by Holthausen and Watts (2001) who argue that they are conducted solely from the perspective of investors and therefore have limited implications for standard setters who have to consider the information needs of a wider range of stakeholders. Nevertheless, the study provides some insight on the extent to which accounting data conforms to some of the principles contained in the IASB's Conceptual Framework. Accordingly, any lessons for accounting regulators must be interpreted in this context. Secondly, the International Accounting Standards Board has directed its research efforts on the possibility of combining accounting for exploration activities as part of a broader intangible assets project and placing a greater emphasis on supplementary reserve disclosures in the future. Prior academic research by Asekomeh et al. (2010) shows reserves disclosures are as value relevant as historical cost disclosures. However, historical cost information will continue to remain an important source of information, particularly for smaller extractive firms that are yet to make a discovery of reserves. Therefore, the findings of this study are still relevant to the standard-setting debate on accounting practices in the extractive industry.

IFRS 6 does not define, or place any significant limitation on the definition of, a cost centre which should be utilised when developing an accounting policy for exploration expenditure or when assessing exploration assets for impairment. The implications for accounting regulators such as the IASB include ensuring that clear and comprehensive accounting policy descriptions are provided by extractive firms particularly in relation to the cost centres used to assess exploration assets for impairment. Also, a framework for accounting policy statements in relation to the accounting treatment of exploration and evaluation expenditure is a crucial component for future amendments to accounting standards on exploration expenditure. If the definition of the cost centre used is not adequately disclosed by firms, the users of the financial reports cannot fully understand the impact of the firms' accounting policies for exploration expenditure on the financial statements. This issue was highlighted by Trueman (1975) and still persists today in the financial statements of extractive firms in both the oil & gas and mining sectors.

Finally, the value relevant evidence suggests that the current flexibility afforded to exploration focused companies is helpful to them in providing useful information to investors. Accordingly, some flexibility in regulation may be justified for firms in the extractive industries on the basis of market value or stage in their life cycle.

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[11] http://www.londonstockexchange.com/statistics/companies-and-issuers/list-of-all-companies.xls (Accessed: 26th February 2016).

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