Restoration and rehabilitation provisions in the Australian materials and energy sectors; Estimation and valuation implications

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ABSTRACT

This paper examines restoration and rehabilitation provisions in the Australian materials and energy sectors. The issue is interesting in light of recent moves by the Obama administration to introduce an Abandoned Mine Land fee on hard rock mining in the U.S. context. We provide evidence on a descriptive level that restoration and rehabilitation provisions are economically significant to the firm when compared with total provision, liabilities, assets and market capitalisation. Our study has two primary objectives. First, we identify the firm characteristics which influence the level of the provision. In doing so this paper contributes to the prior literature such as Barth and McNichols (1994) by developing an 'ex-ante' levels model of environmental provisions. Prior studies have mainly examined 'ex-post' regulatory enforced obligations such as superfund liabilities. Second, we examine whether the market prices the difference between the expected and recognised restoration and rehabilitation accrual and find evidence of the value relevance of under provisions.

Keywords; restoration and rehabilitation provisions, disclosure, extractive industries.
JEL classification: M4, L72

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1. Introduction

Firm's environmental obligations are becoming increasingly important to stakeholders. Events such as the BP oil spill off the Gulf of Mexico and the Fukushima nuclear disaster in Japan have brought these issues to the forefront of public attention. Perhaps not surprisingly, regulators are also increasingly interested in rehabilitation issues. In the US context this is evidenced by the Obama administration's recent proposed introduction of an Abandoned Mine Land fee. This fee is aimed at the hard rock mining industry having previously been imposed on coal companies as a means of dedicating and prioritizing funds to clean up abandoned mines. Despite this increased regulatory interest, no research attention has been directed towards empirically examining environmental restoration provisions. We address this gap in the literature by examining the publically disclosed restoration and rehabilitation provisions in the financial statements of Australian mining companies. We consider two main issues. First, we propose a model which aims to examine the factors which influence the level of restoration and rehabilitation accrual. Second, we attempt to examine whether the market prices the difference between the predicted and recognised restoration and rehabilitation provision and how that impacts the firms share price.

We develop the prior literature by reporting the first empirical evidence on 'ex-ante' determined restoration and rehabilitation provisions. Prior related studies in the accounting literature consider potentially responsible parties (PRP's) to superfund liabilities in the US (Barth and McNichols 1994, Barth et al. 1997, Li et al. 1997 and Campbell et al. 1998). These studies focus on 'ex-post' regulatory enforced obligations. This paper is motivated to address the lack of attention paid by the literature to environmental liabilities which are determined 'ex-ante'. Further, our study has the benefit of examining provisions within a

single industry. Prior US studies such as Barth and McNichols (1994) examine superfund liabilities across multiple industries. By focussing on one sector, we have the benefit of ensuring our sample constituents have homogeneous corporate aims and objectives.

Further, the mining industry is highly material in two ways. Firstly, in terms of site remediation, the mining sector features prominently. For example, the US Bureau of Land Management has an inventory of nearly 31,000 abandoned hard rock mines with only 25% having been remediated. This gives some idea of the scale of potential remediation issues in the hard rock sector in the US. Secondly, Australia provides a unique institutional setting in which to undertake research on rehabilitation due to the size of the industry. The materials and energy sectors in Australia account for over 44% of the firms listed on the Australian Stock Exchange (ASX) and comprise around 33% of the ASX's market capitalisation. Together they constitute the largest grouping in terms of market capitalisation and number of firms respectively on the ASX. A further benefit of the Australian setting is that regulation pertaining to restoration is governed by Australia's respective State and Territory governments. This allows consideration of the impact of competing regulatory environments on provisioning after controlling for firm level financial and non-financial characteristics. .

We find that restoration and rehabilitation provisions are economically significant to the firm. The provision is found to be on average 57% of total provisions, 18% of liabilities, 4.5% of assets and 4.4% of market capitalisation. Logically, the provision is found to be more economically significant in terms of assets and market capitalisation for firms operating in the production phase vis a vis those firms in the exploration and development phases. Our levels model proposes to investigate the factors which influence the level of the restoration

and rehabilitation provisions. It appears well specified and provides a comparable, and in some cases improved level of explanatory power than previous studies such as Barth and McNichols (1994). The empirical results suggest that firm size, ex-ante financing considerations, level of disclosure and the political sensitivity of the firm's operations as positively influencing the level of restoration and rehabilitation provision. Interestingly, the levels model identifies mixed findings for the impact managerial and auditor influence. The levels model predicts that on average firms under accrue their restoration and rehabilitation obligations, with the amount being more pronounced in the explorer sub-sample. Our value relevance analysis indicates that firms' under-accrual possesses incremental explanatory power in explaining the firms' market value of equity. The coefficient on the under-accrual is found to be negative and significant in both the pooled and producer sub-samples providing evidence that investor's price the under-accrual into share price.

The remainder of this paper is structured as follows. In section 2, a review of the literature surrounding environmental liabilities, disclosure and value relevance is presented along with the research hypothesis. Section 3 contains a description of the sample selection process and research methods. Section 4 includes the descriptive evidence on the economic significance of restoration and rehabilitation provisions and the multivariate results. Section 5 concludes the paper.

2.0 Literature review and hypothesis

2.1 Regulatory Framework

Restoration and rehabilitation provisions arise from firm's mine site restoration obligations which form part of their mining license agreements. These obligations require the entity to rehabilitate the mine site both during and upon completion of mining activities to ensure that the lands' end use can be appropriately enacted. The jurisdiction of mining regulation in Australia is held by the respective state and territory governments and administered by the state level Department of Mineral Resources, or its equivalent. Mining operations are primarily controlled through mining licenses and the requirements attached to them. Broadly these licences include prospecting and exploration licences (which provide firms with approval to conduct grass roots exploration activities such as surface sampling, trenching and drilling) to full mining licences which enable the holder to develop and exploit the mineral resource..

Potential mining licensees are required to lodge a Mining and Rehabilitation Program with the respective state/territory Department of Mineral Resources which outlines their proposed activities as well as an environmental assessment which includes a detailed cost estimate of the general and site specific rehabilitation goals that they have set for each mine site. [1,2] This

[1] In New South Wales, discretion exists as to the basis for the calculation of the rehabilitation costs. The leaseholder can either provide (i) an estimate of the maximum disturbance or greatest liability at any one point in time, or (ii) a snap shot of the current disturbance calculated as a snapshot of current liabilities for the titleholders accounting purposes (DPI 2006).

[2] The calculation of these estimates is often aided by the respective regulatory bodies who offer assistance in the form of overhead costing estimates and proforma templates. This cost estimate then usually forms the basis for the calculation of the security deposit. Security deposits have become an increasingly important part of the regulatory framework. These deposits ensure adequate funds are available to rehabilitate the mine site in the event that the firm is unable to meet their outstanding obligations. The level of assistance provided varies between jurisdictions with New South Wales, Queensland and Northern Territory providing detailed cost calculation tools compared to other states and territories. The costs submitted as part of the entity's Mining and

assessment follows an environmental risk based approach which places the onus on the licensee to identify potential environmental risks and formulate a set of agreeable outcomes. These outcomes can either be in the form of strategies that attempt to mitigate (or minimise) the potential risk factors or in the form of rehabilitation and restoration activities undertaken throughout the projects life.[3]

The level of restoration and rehabilitation required by the regulatory bodies has steadily increased in recent years. Given that the guidelines for restoration and rehabilitation vary on a state by state level, the state based regulatory oversight provides a unique institutional setting to examine the impact of differing geographic regulatory levels within a certain country on accounting outcomes. The literature on the impact of differing regulation in geographic domiciles and its impact on economic outcomes is scant. One recent study, Djankov, La Porta, Lopez-De-Silanes and Shleifer (2002) examines the cost of entry of start-up firms in 85 different countries. They find that countries with democratic governments have lighter regulation, whilst in less democratic governments, regulation is greater. They conclude that higher regulation does not produce social benefits, with the principal beneficiaries in high regulation settings appearing to be the politicians themselves. We contribute to the regulation and geographic domicile literature by considering within country regulatory differences and

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Rehabilitation Program is biased upwards, as the estimate reflects the cost for the rehabilitation to be undertaken by the Department of Mineral Resources in the event of the entity defaulting.

[3] The operations of the license holder are under constant scrutiny, although the level and frequency appears to differ between states. Each respective state Department of Mineral Resources has various management tools at their disposal to ensure that leaseholders comply with the environmental conditions of licence. These tools include premise inspection, environmental and compliance audits and security bonds sufficient to meet the costs of outstanding rehabilitation. Similarly, some states such as New South Wales and Queensland require entities to lodge periodic environmental reporting which tracks the firm's performance against their environmental objectives for the site. Non-compliance can result in fines, increased regulatory oversight or in more serious cases, criminal charges or the cancellation of licenses. An example of such an enforcement occurred in September 2010 where Xstrata Copper's Enerest Henry Mine was fined $100,000 for discharging stormwater containing high levels of sulphates into a local creek system in Cloncurry (QLD). < http://www.abc.net.au/news/stories/2010/09/10/3007863.htm>

their impact on accounting after controlling for firm level financial and non financial characteristics.

We examine the impact of the state level environmental regulatory framework on firm provisions by using the Fraser Institute's Annual Survey of Mining Companies environmental regulation index. The annual Fraser Institute survey collates participant's perceptions of the attractiveness of various regulatory frameworks to investment. The survey examines the extent to which existing environmental regulation encourages or discourages investment on a state by state level. [4] Table 1 provides a synopsis of the findings for the surveys from 2005 to 2009 inclusively. The state based survey results suggest, the environmental regulation appears to becoming more onerous over time. The surveys found that Tasmania and Victoria have environmental regulations which are considered to be the least conducive to mining investment, whilst the Northern Territory and South Australia appear to be more investment friendly.

H1: The higher the environmental regulation of a firm's state based operations in Australia, the higher the level of restoration and rehabilitation provision.

TABLE 1: Fraser Institute's annual survey (environmental regulation by state)

	2004/05	2005/06	2006/07	2007/08	2008/09
New South Wales	20%	50%	59%	35%	48%
Northern Territory	17%	36%	44%	22%	29%
Queensland	16%	48%	54%	38%	43%
South Australia	16%	37%	46%	26%	33%
Tasmania	0%	22%	62%	51%	51%
Victoria	34%	52%	80%	42%	58%
Western Australia	12%	41%	32%	44%	44%

Source: Fraser Institute

[4] Respondents were asked to respond using a five point scale which range from; 1: Encourages Investment, 2: Not a deterrent to investment, 3: Mild deterrent, 4: Strong deterrent, and 5: Would not pursue investment due to this factor. The figures in Table 1 represent the aggregation of 3 to 5.

In recent times and especially since the election of the Rudd / Gillard Labour Government in 2007 there has been a heightened level of government interest in the Australian mining industry. Most notably, this interest has been centred on the proposed Resource Super Profits Tax (RSPT) and the more recently proposed Carbon Tax. There have also been controversial developments' regarding specific commodities. April 2007 saw changes to the Labor party's federal stance on uranium mining, which up until that time had been governed by the restrictive Three Mines Policy (3MP). This policy which originated under the Hawke Labour government in 1984 had limited the number of uranium mines in Australia to 3. The relaxation of the 3MP in April 2007 effectively saw the transfer of jurisdiction for uranium mining regulation and approval from the Federal sphere to the respective State and Territory Governments.[5] All facets of uranium mining, transport and export in Australia remain highly regulated and consequently we propose *H2* as follows;

H2: Firms with an interest in uranium exploration or mining in Australia will have a higher provision for restoration and rehabilitation.

2.2 Accounting and Financial Reporting Framework

Restoration and rehabilitation provisions are covered under Australian Accounting Standards Board (AASB) 137 – Provisions, Contingent Liabilities and Contingent Assets. AASB 137 states that a provision arises when a present obligation (legal or constructive) exists as a result of a past event and a probable and reliable estimate can be made. Due to the nature of

[5] 2008 saw a further changes to the policy environment with the lifting of bans on uranium exploration in Western Australia following the election of the Barnett Liberal government and the relaxation of Uranium mining approvals in South Australia with the approval of the Honeymoon Uranium mine. However, opposition still exists in states hostile to uranium development such as Queensland which remains opposed to the issuing of uranium mining licences to this day.

mine operations, a significant part of a firm's legal or constructive obligation to rehabilitate the environment effected by its operations arises during the construction phase with the provision growing as their operations expand.[6]

AASB 137 also states that where the time value of money is material, the entity is required to discount the provision using a pre-tax, risk adjusted, country specific bond rate. No specific guidance is provided as to what is included within the provision although the provision generally includes the costs associated with the facility decommissioning and dismantling, the removal and treatment of waste materials and site and land rehabilitation requirements.[7]

From a disclosure point of view, AASB 137 requires that a reconciliation of movements for each class of provision are disclosed in the notes to the financial statements showing at a minimum the opening and closing balances; any additional provisions raised; any amounts used; any amounts which have been reversed; and any changes in assumptions underlying the provisions time value of money. Disclosure without recognition is consistent with generally accepted accounting principles (GAAP) when the probability and estimability criteria of AASB 137 are not met.[8]

[6] Project lifecycle is controlled for in the pooled regression through the use of a dummy variable. The sample is then split on the lifecycle stage with further analysis performed.

[7] Outside of the environmental reporting options prescribed in New South Wales, there is no information to suggest how the cost estimate that is provided to the Department of Mineral Resources relates to the level of provision accrued by the firm.

[8] A number of firms identified in the sample cite estimation uncertainty and materiality concerns as the reason for not accruing a provision for their restoration and rehabilitation obligations. This evidence is consistent with the prior findings of Price Waterhouse (1992).

2.3 Environmental Liabilities Studies

Various studies have examined the inherent estimation uncertainty implicit in environmental liabilities (Barth and McNichols 1994, Campbell et al. 1998 and Khurana et al. 2001). The first of these studies examined estimability of environmental liabilities by assessing the explanatory power of costs proxies with mixed success (Barth and McNichols 1994). The various cost based models proposed by Barth and McNichols (1994) demonstrated only limited explanatory power reporting adjusted R^2*'s* that ranged from 3% to 20%. It has been argued by subsequent studies such as Barth et al. (1997), Li et al. (1997), Campbell et al. 1998 and Alciatore et al. (2004) that the estimation uncertainty identified by Barth and McNichols (1994) allows firms to report either the minimum required provision under Generally Accepted Accounting Principles (GAAP) or as the survey conducted by Price Waterhouse (1992) found, no liability or disclosure at all. This setting also provides an interesting backdrop to examine the role of the auditor in determining the level and disclosure of environmental liabilities. The impact of auditors is acknowledged as being explicit in ensuring that the entity's disclosures comply with GAAP (Li et al. 1997) whilst also adding credibility to the disclosures themselves (Singhvi and Desai 1971 and Gibbins et al. 1990).

The literature has argued that the estimation uncertainty stems from the complexity in legal, technical and political considerations (Roussey 1992 and Li et al. 1997). Shifts in the regulatory environment as well as a level of ambiguity regarding the firm's obligations under the regulatory framework create significant uncertainty. Li et al. (1997) argues that where political costs are high, increasing public pressure may force companies to take increasingly costly cleanup or abatement measures above what is otherwise required. Barth et al. (1997) also found managerial influence and the firms' dependency on capital markets impacted their

estimates. Barth et al. (1997) posits that the uncertainty created by these competing factors gives rise to significant management discretion around the estimation and disclosure of environmental liabilities. Although Li et al. (1997) goes one step further by proposing that these factors give rise to a situation where not all firms will comply with the required disclosure standards.

2.4 Disclosure Studies

Studies of disclosure have found substantial cross-sectional variation in disclosure practices with wide discretion existing is terms of information provided (Singhvi and Desai 1971, Lang and Lundholm 1993, Barth and McNichols 1994, Barth et al. 1997 and Li et al. 1997). The cross-sectional variation is posited to come from the estimation uncertainty surrounding environmental liabilities. The estimation uncertainty creates a setting where management can plausibly withhold *'bad news'*. This situation affords management the opportunity to either withhold disclosure to protect their proprietary information for economic advantage (Dye 1985) or the opportunity to enhance firm value through disclosure (Verrecchia 1983). These two outcomes give rise to cross-sectional variation in the quantity and quality of disclosure provided by firms.

The prior literature finds support for both assertions. Studies such as Barth and McNichols (1994), Barth et al. (1997), Li et al. (1997) and Alciatore et al. (2004) are in line with the model proposed by Dye (1985). Dye (1985) posits that where no mandatory disclosure is required, management tends to suppress the disclosure of *'bad news'* and discloses the bare minimum. However, incentives exist to reduce the information asymmetry between

management and investors through disclosure. These incentives include lower transaction costs (Frankel et al. 1995), lower estimation risk (Botosan 1997), lowering of litigation risk (Skinner 1994) and lowering of potential political costs (Blacconiere and Patten 1994 and Li et al. 1997). This proposition has been explored in the environmental liabilities literature by Blacconiere and Patten (1994) who examined the market reaction of chemical firms following the Union Carbide chemical leak in Bhopal. They found that firms with more extensive environmental disclosures prior to the catastrophe experienced a less negative reaction than firms with less extensive disclosures. They posited that investors interpreted such disclosures as a positive sign of the firm's ability to manage their exposure to future regulatory costs. Therefore the following hypothesis is proposed;

H3: Firms with greater environmental disclosures, accrue larger environmental liabilities.

2.5 *Value Relevance*

Beyond the levels and disclosure considerations discussed above, the literature has also examined the value relevance of environmental liabilities. The literature has focused its attention on two main areas, (i) the explanatory power of accrued and un-accrued liabilities in explaining the market value of equity (Barth and McNichols 1994, Campbell et al. 1998 and Khurana et al. 2001) and (ii) the use of various environmental disclosures to assess the firms implied environmental performance (i.e. Blacconiere and Patten 1994). This paper like that of Barth and McNichols (1994) focuses on the explanatory power of accrued and un-accrued liabilities in explaining the market value of equity.

Barth and McNichols (1994) examined the explanatory power of various cost proxies for un-accrued superfund liabilities in explaining the market value of equity. They found that all of their cost proxies provided incremental explanatory power in explaining the market value of equity. They concluded that their findings implied that the market assessed firms' exposure to environmental liabilities to be higher than that already accrued by the firm (Barth and McNichols 1994). They argued that their results were either driven by either a crude assessment by the market regarding a company's exposure to environmental liabilities or that their cost-based proxies were noisy. The first of these two propositions is somewhat supported by the findings of Campbell et al. (1998) and Khurana et al. (2001) who show that estimation uncertainty in environmental liability is priced by the market. However, the second proposition cannot be rejected due to the low R^2's on the levels models used in their study (Holthausen 1994).

Holthausen (1994) provides a number of alternate explanations for their result including; "(i) that the market systematically overstates the present value of existing environmental costs under current legislation and legal interpretation, (ii) that the market systematically understates the insurance recoveries that firms expect to receive, or (iii) that the market correctly assesses the expected value of existing environmental costs under current legislation and legal interpretations, but the market also prices the expected increases associated with existing environmental problems based on the anticipated changes in legislation and legal interpretations which will make environmental liabilities even more costly" (pp. 215). Campbell et al. (1998) cast further doubt over the findings in Barth and McNichols (1994) by findings cross-sectional variation in the capital markets valuation of implicit and explicit environmental liabilities.

3.0 Data and research method

This paper employs two models to empirically examine the factors which influence the level of restoration and rehabilitation provisions and its value relevance in firms listed on the ASX between 2005 and 2009. This paper focuses on firms that operate predominately in Australia thus allowing us to examine the effects of the different state and territory based regulatory environments more closely. As a result those firms listed on the ASX that do not operate predominately in Australia are excluded from our sample. The total sample of firm year observations for companies listed on the ASX between 2005 and 2009 were obtained from the SIRCA's Share Price / Price Relative (SPPR) database.[9] Using Standard & Poors Global Industry Classification Standard (GICS), an initial sample was formed by removing all firm year observations that were not classified as either an energy firm (GICS code: 10) or a materials firm (GICS code: 15). Firm year observations were then excluded from the sample if they failed to lodge an annual report with the exchange during the observation period.

The sample was further refined using the text analysis software *ISYS*. The remaining annual reports were then loaded into *ISYS* and screened for readability. 383 annual reports were excluded as they were not deemed readable by *ISYS*. Using *ISYS's* location metric, firms were ranked based on the percentage of hits that were attributable to Australia.[10] The sample was then split at the median, retaining the top 50% of firms. According to ISYS at least 63% of the remaining firms location hits were related to Australia. As a result of the inherent bias in this approach, a secondary test was carried out to ensure that the remaining firms operations

[9] SIRCA (Security Industry Research Corporation Asia-Pacific)
[10] The location metric provides a list of locations that were deemed readable and recognisable to ISYS in each specified document.

were predominately Australian.[11] The ISYS output was then compared to the percentage of the firms' subsidiaries which were incorporated in Australia. Firms that had a variance greater than 50% were removed from the sample.[12] Observations were also removed from the sample if their annuals reports contained missing data or the firms operations were not undertaking mining related activities.[13] These exclusions left a sample of 1389 firm year observations of which 307 firm year observations accrued a restoration and rehabilitation provision. As a result of the data considerations required for the value relevance model a further 58 firm year observation were excluded when the tests of model 3 and 4 were undertaken. Table 2 provides a reconciliation of the sample selection process.

TABLE 2: Sample selection procedure

Total firm year observations for the material and energy sectors	4,086
Less: Firms not reporting	(333)
Less: Annual reports readable in ISYS	(383)
Less: Firms deemed to not be predominately Australian	(1,685)
Less: Observations incorrectly classified by ISYS	(44)
Less: Missing Data	(163)
Less: Non-mining firms	(89)
Total observations for Model 1	1,389
(Less) Missing Share Price Data	(58)
Total observations for Model 2	1,331
Observations with a restoration and rehabilitation accrual	370
Observations without a restoration and rehabilitation accrual	1,019
	1,389

The data was obtained through a mixture of hand collection, text analysis software, and databases. The dependent variable, restoration and rehabilitation provisions as well as a

[11] The inherent bias related the home exchange effect. Firms that are listed on the ASX will tend to have a higher proportion of hits relating to Australia due to the location of the ASX, the firms directors, their auditor, bankers and lawyers.
[12] The *ISYS* and subsidiary measure had a pair-wise correlation of 0.2744 which was significant at $p<.001$.
[13] Firms were assessed for their applicability by reviewing their annual report for information regarding the company's operations. Where no evidence suggested that the firm operated as a mining company they were removed from the sample.

number of explanatory variables were hand collected from the respective firm's annual reports. All other balance sheet and cash flow items were obtained from Morningstar FinAnalysis. The state-based measure of policy attractiveness measure was obtained from the Fraser Institute's Annual Survey of Mining Companies. Share price and market capitalisation data was obtained from Thomson Reuters DataStream. A listing of the financing activities of the firm was obtained from Connect4 whilst the remaining variables were obtained using text analysis software (*ISYS)* on the firm's annual reports. All continuous variables were winsorised at the 1% and 99% levels to remove the effect of outliers.

Based on the timing of additions to the accrual for mine site restoration costs, the pooled sample was split into two sub-groups representing the two distinct lifecycle stages of a mining firm. These stages are (i) the exploration and development stage which includes all firms that are pre-production, and (ii) the production stage which encompasses all firms producing commodities.[14] This split was performed by undertaking a cash flow analysis with all firms that had positive cash flows from customers deemed to be in the production stage, with all other firms deemed to be in the exploration and development stage

3.1 *Restoration and rehabilitation levels*.

The findings in Barth and McNichols (1994), Barth et al. (1997) and Li et al. (1997) give support to systematic under-accrual of environmental liabilities. Based on the findings of these studies and a review of the regulatory framework a model is proposed to examine the factors which influence the level of restoration and rehabilitation provisions. This study

[14] From here onwards, 'exploration' is used to describe firm's that are pre-production in nature. This includes both exploration and development stage firms.

incorporates both companies which currently accrue for their restoration and rehabilitation obligations and those which don't and as a result a number of observations remain unobserved. The literature posit that the estimation uncertainty that surrounds environmental liabilities gives rise to a situation where not all firms will comply with the required recognition and disclosure requirements. As a result the dependent variable is left censored at zero, thus violating a number of the assumption underlying OLS regression. Therefore, a Tobit regression is undertaken to model the effects of various firm level characteristics on their restoration and rehabilitation provision. The Tobit model developed by Tobin in 1958 assumes that the dependent variable has a number of its values clustered at a limiting value, usually zero. The Tobit approach uses all observations, both those at the limit and those above it to estimate the regression line.

Consistent with prior literature a number of factors have been perceived to influence the level of environmental liabilities accrued. These factors give rise to the levels regression which is depicted in model 1;

$$\begin{aligned} REST_{it} = \; & SIZE_{it} + CASHB_{it} + OFFER_{it} + DISC_{it} + LIFE_{it} + (LIFE_{it}*EXPLOR_{it}) + \\ & FOCUS_{it} + FRASER_{it} + ENVIRO_{it} + URAN_{it} + BCOMP_{it} + INSIDE_{it} + \\ & SUBST_{it} + CEO_{it} + AUDIT_{it} + SPEC_{it} + OPIN_{it} + SUBS_{it} + INDUST_{it} + \varepsilon \end{aligned} \quad \textbf{(1)}$$

Where, the dependent variable *REST* is measured as the book value of restoration and rehabilitation provision. The model contains the following control variables. Based on prior studies, the impact of size has weighed heavily on the results. *SIZE* is measured as the book

value of total assets. *SIZE* has been found to positively influence the size of environmental liabilities and therefore a positive coefficient is predicted. *CASHB* denotes the financing requirements of the firm. It is calculated as the ending cash balance divided by the sum of cash flows from operations and investing. A negative ratio implies that the firm has future external financing requirements.

The need for external financing has been found to promote increased disclosure in the periods prior to financing being sought (Frankel et al. 1992 and Barth et al. 1997). A positive coefficient is predicted for this variable. *OFFER* measures whether the firm has sought external equity or debt financing during the current period. This variable examines whether firm's have greater incentives to provide information to potential external suppliers of finance in order to reduce their external monitoring and bonding costs (Jensen and Meckling 1976). Lee and Tweedie (1981) and Gibbins et al. (1990) both found support for the assertion that managers consider the need to attract new capital as being the primary motivation for voluntary disclosure.[15] Barth et al. (1997) also found a positive association in the level of environmental liabilities disclosed by the firm's and their greater level of dependence on the capital markets. Therefore a positive co-efficient is expected for *OFFER*.

DISC is a measure of mandatory and voluntary disclosure provided in the in the notes to the accounts in the annual report for restoration and rehabilitation provisions. *DISC* uses a self constructed disclosure index to measure the quantity of firm's mandatory and voluntary

[15] Lee and Tweedie (1981) based their conclusions on survey evidence around earnings forecasts whilst Gibbins et al. (1990) evidence comes from interview based testing.

disclosures.[16] Advantages of utilizing self constructed disclosure indicia are documented in Francis, Nanda and Olsson (2008).[17] This index is constructed to capture a mixture of financial, non-financial, quantitative and qualitative data. The index was created by initially reviewing the disclosure index literature for guidance as to the construction of the index (Marston and Shrives 1990). The mandatory disclosure requirements of AASB 137 were then examined as well as any voluntary information that could potentially appear in the annual report. The initial index was then refined by comparing the contents with a sample of ten annual reports to ensure that no essential items were omitted. A list of the components of the index can be found in Table 3.

TABLE 3: Contents of the self constructed disclosure index

PANEL A: Financial Disclosures
1.0 Reconciliation Provided
2.0 Addition to the provision during the period
2.1 Provisions recognised during the period
2.2 News provisions recognised during the period
2.3 Provisions acquired during the period
3.0 Amounts used during the period
3.1 Amounts released during the period
3.2 Payments made during the period
3.3. Reduction due to disposal of business combination
4.0 Unused amounts reversed
5.0 Changes due to discounting
5.1 Unwinding of the discount rate
5.2 Change in the discount rate
6.0 Changes due to foreign currency differences
6.1 Changes in foreign currency rates
6.2 Changes in foreign currency translation

[16] No attempt in made in this chapter to distinguish the usefulness of items within the index (it is equally weighted).

[17] Francis et al. (2008) describes the potential benefits of a self constructed disclosure index. They acknowledge that a self constructed index enables the researcher to examine the construct of interest directly rather than relying on third party assessments. They also acknowledge that it allows the researcher to adapt the measure to any firm, reducing the inherent limitations associated with sample size constraints and bias which exists in measures commonly used in the literature, such as AIMR scores. However, it is not without its disadvantages. Self constructed disclosure scores are often hard to replicate because of the research judgement element and the labour intensity of the coding process. However, this index comprises a census of all possible restoration and rehabilitation related disclosure which assists in coding objectivity.

7.0 Transfers to/from provisions
8.0 Comparative information provided

PANEL B: Non-Financial Disclosures
9.0 Description of the provision and underlying factors
10.0 Expected timing of cash outflows
11.0 Discount rate
12.0 Break down between opening and closing sites

The index consists of 12 main items which are split between financial (Panel A) and non-financial disclosures (Panel B). Items one through eight is considered financial in nature and form part of the reconciliation required under AASB 137. These items come in two forms (i) those that are self contained, and (ii) those that can be disaggregated. Items such as comparative data were deemed to be self-contained as they were either provided or they weren't. Whereas data regarding additions to the provision during the period (2.0) can be presented in a more disaggregated manner to capture a greater degree of information (i.e. 2.1 to 2.3). The second group are items which did not form part of the reconciliation but provided complementary information to the provision. This data contained information about the uncertainties that surround the provision, including a description of the provision, the timing of the potential cash outflows and the discount rate used. As with prior studies both groups were considered to have significant information content (Buzby 1974, Gibbins et al. 1990). Each item in the index was equally weighted, with one point awarded for each item disclosed. Failure by a company to disclose a particular item was treated as a non-disclosure and therefore awarded zero points.[18] Thus the disclosure score is calculated as follows;

[18] This issue has been raised in prior studies. Marston and Shrives (1990) suggest the firm should not be penalised in the event that the disclosure is not applicable to their firm. This issue will be discussed further in the sensitivity testing.

The level of disclosure is hypothesised to positively impact the level of accrual (Dye 1985 and Blacconiere and Patten 1994). Thus a positive co-efficient is predicted for *DISC*.

LIFE is a dummy variable representing the lifecycle stage of the firm denoted 1 if the firm is in the exploration stage and 0 if they are in the production stage. This variable was calculated by dividing the sample into firms with positive cash receipts from customers (producers) and those with zero (explorers). Operational factors have been found to influence the level of accrual associated with environmental liabilities. A negative co-efficient is expected for *LIFE*. *EXPLOR* acts as a control for project maturity. *EXPLOR* is the book value of capitalised exploration costs. This deferred balance is hypothesised to be larger for exploration firms, since the balance for production firms is amortised or converted to deferred production costs. Therefore *EXPLOR* is used as an interaction variable with *LIFE* to proxy for the size of the exploration firms. A positive coefficient is expected for *EXPLOR*. *FOCUS* is a dummy variable that proxies for the broad commodity focus of the entity. 1 = Hard rock, 0 = Liquids. This variable was calculated using *ISYS* to measure the word count of all commodities from the entity's announcement history. With the exception of uranium, both groups are subject to similar levels of regulation within Australia and thus no specific direction of prediction is made.

FRASER measures the overall policy attractiveness of the jurisdictions in which the entity operates. This variable was calculated by obtaining a weighted average listing of the firms locations from their announcement history using *ISYS* and multiplying the weights by the Policy Potential Index (PPI) score given by the Fraser Institute's Annual Survey of Mining

Companies for each project location.[19] The higher the PPI score the greater the attractiveness of the jurisdiction to investment.[20] Firms with lower scores are deemed to be associated with higher political costs. Prior studies have found that where political costs are high firms tend to increase their disclosure (Cooke 1989 and Blacconiere and Patten 1994). Therefore a negative coefficient is predicted. *ENVIRO* acts as a firm specific measure of political sensitivity to environmental regulation. The variable is calculated as the number of times a word associated with restoration activities or environmental concerns are disclosed in the firm's annual report, deflated by the total number of words in the report. The mining industry is heavily regulated in terms of both operational and environmental aspects with substantial pressure on governments to increase their oversight and regulatory guidelines.[21] Thus political costs in the extractive industry maybe high. Prior studies have shown that where political costs are high, a greater level of disclosure is expected (Jensen and Meckling 1976, Cooke 1989 and Blacconiere and Patten 1994). A positive coefficient is predicted for *ENVIRO*.

URAN is a dummy variable which measures whether the entity has an interest in uranium exploration or production denoted 1 = if the firm has interests in uranium, 0 = otherwise. This variable is measured by examining the firm's announcement history using *ISYS* for words associated with uranium during the observation period. If 50% or more of the firms' hits during the period relate to Uranium, they were considered to have an interest in uranium. *URAN* acts as a separate variable from *FOCUS* as it attempts to examine *H1*; whether a

[19] The PPI is a composite index that measures the effects on exploration of government policies including uncertainty concerning the administration, interpretation, and enforcement of existing regulations including; environmental regulations; regulatory duplication and inconsistencies; taxation; uncertainty concerning native land claims and protected areas; infrastructure; socioeconomic agreements; political stability; labor issues; geological database; and security (Fraser Institute 2005, 2006, 2007, 2008, 2009).
[20] The attractiveness of the jurisdiction is measured from the perspective of exploration managers and mining consultants.
[21] Refer to Wade (2008) for an example.

firm's interest in uranium impacts the level of restoration and rehabilitation provisions accrued due to the higher levels of overall regulation for uranium projects vis a vis other commodities. A positive coefficient is predicted for *URAN*.

BCOMP is a measure of the percentage of independent non-executive directors on the board of directors. Directors are deemed independent when they meet the requirements of *'Recommendation 2.1 of the ASX Principles of Good Corporate Governance and Best Practice Recommendations* (ASX 2003). Independent directors are identified from the firm's annual report under the requirements of listing rule 4.10.3.[22] *BCOMP* is calculated as the number of independent directors divided by the total number of directors. This variable proxy's for the level of management influence which exists over the governance of the firm (Barth et al. 1997, Shleifer and Vishny 1997 and Core et al. 1999). The greater the level of independence on the board of directors the lower the level of managerial influence on the release of proprietary information and therefore a higher accrual is expected. Therefore a positive coefficient is predicted. *INSIDE* is the percentage ownership of the firm that is held by the firm's directors and key management personnel. This variable proxy's for the level of managerial influence on the firm in similar way to *BCOMP* (Barth et al. 1997, Shleifer and Vishny 1997 and Core et al. 1999). As the level of inside ownership increases the level managerial influence also increases. Therefore a negative coefficient is expected. *SUBST* measures the number of external substantial shareholders the entity has during the observation period. This variable is calculated as the number of external shareholders with a shareholding greater than 5%. This variable acts as a proxy for the level of corporate governance of the firm (Shleifer and Vishny 1997 and Core et al. 1999). Block holders may

[22] Companies listed on the ASX are required by listing rule 4.10.3 to make disclosures in their annual reports of the extent to which they do or do not follow these Guidelines.

act as a positive influence on the governance of the firm, potentially pressuring management to increase their level of disclosure. However an alternate hypothesis is that larger block holders might act to entrench managers and hence lower levels of disclosure might be expected. As a result no sign is predicted for the coefficient on *SUBST*. *CEO* is a dummy variable which examines whether the position of the CEO and Chairman are held by the same individual. 1 = if the CEO and Chairman as the same person, and 0 = Otherwise. This variable acts as a proxy for managerial influence as the CEO is responsible for running the day to day operations of the firm, whilst the Chairman is responsible for leadership of the board. (Barth et al. 1997, Shleifer and Vishny 1997 and Core et al. 1999). Therefore a negative coefficient is predicted for *CEO*.

AUDIT is a dummy variable for the size of the auditor ('1' if the entity is audited by a Big 4 firm, and '0' otherwise). The impact of auditors is acknowledged as being explicit in ensuring that the entity's disclosures comply with GAAP (Li et al. 1997) whilst also adding credibility to the disclosures themselves (Singhvi and Desai 1971 and Gibbins et al. 1990). Although audit quality is not deemed to be a homogeneous quantity, the size of the audit firm is believed to influence the level of audit quality (DeAngelo 1981). Therefore a positive coefficient is predicted on *AUDIT*. *SPEC* is a dummy variable coded '1' if the firm is an industry specialist and '0' otherwise. This variable is constructed using the approach identified in Ferguson et al. (2006) where the industry specialist is the audit firm with the largest proportion of clients within a particular industry. Due to the perceived increased industry knowledge held by the specialist, audit quality is expected to be higher in these firm's (Ferguson et al 2006). A positive coefficient is predicted for this variable. *OPIN* measures the audit opinion that has been issued for the firm's annual report. This variable has

been calculated based on an index formulated to track the severity of different types of audit opinions. Scores were attributed as follows;

0 = Unqualified

1 = Unqualified with Emphasis of Matter

2 = Qualified (with/without Emphasis of Matter)

3 = Disclaimer (with/without Emphasis of Matter)

4 = Adverse (with/without Emphasis of Matter)

Although the audit opinion may not relate specifically to the provision itself, the type of opinion acts as a proxy for the accounting quality of the firm. The index has an inverse relation with accounting quality and therefore a negative co-efficient is predicted for *OPIN*. *SUBS* is a variable which represents the number of subsidiaries owned by the firm. The number of subsidiaries is a proxy for the number of projects which the firm is undertaking as firms tend to incorporate a new subsidiary for each project they undertake. As a result a positive co-efficient is predicted for *SUBS*. Lastly, *INDUST* is a dummy variable denoted 1= materials sector firm, '0' for an energy sector firm. This variable attempts to control for the cross-sectional variation that is attributed to industry specific disclosure patterns (Gibbins et al. 1990, Campbell et al. 1998). No directional prediction is made for *INDUST*.

3.2 *Restoration and rehabilitation valuation implications*

To investigate whether the under or over accrual of restoration and rehabilitation provisions are reflected in the share price of public firms, we have employed an augmented form of the Edwards Bell Ohlson (EBO) residual income model. According to Lo and Lys (2000) the origins of the model can be found in the studies by Preinreich (1938) and Edwards and Bell (1961) who posited that firm value can be expressed as book value plus, discounted future abnormal

earnings. Their approach provided a direct link between financial statement data and firm value without explicitly referring to dividends. Ohlson (1995) and Feltham and Ohlson (1995) further developed this approach by creating a logically consistent framework for thinking about the valuation of accounting numbers. The EBO approach suggests that the market value of equity can be expressed as a function of the book value of equity, abnormal earnings and other information where clean surplus accounting applies (2).

$$\boldsymbol{SP_{it} = \quad BV_{it} + NI_{it} + \upsilon_{it}} \qquad \textbf{(2)}$$

Where *SP* is the market value of equity per share, *BV* is the book value of equity per share, *NI* is the book value of net income per share and $\boldsymbol{\upsilon}$ is the other information term. The EBO approach was chosen due its superior explanatory power when compared with other valuation techniques (Francis, Olsson and Oswald 2000) and its suitability based on the characteristics of the firms in the sample. Francis, Olsson and Oswald (2000) results suggest that the superior performance of the residual income model is driven by the sufficiency of book value of equity as a measure of intrinsic value, and possibly the greater predictability of abnormal earnings. Another advantage of using this model is the ability to incorporate other information into equity valuation. An example of this can be seen in Trueman, Wong & Zhang (2001) who incorporated web usage as other information in valuing internet stocks. This notion has also been utilised in the resource industry through the examination of the value relevance of disclosed oil and gas reserves (Maglioli 1986, Harris and Ohlson 1987, 1990, and Bryant 2003).

For the purpose of this paper *BV* in model 2 is decomposed to allow the book value of capitalised exploration costs (*EXPLOR*) to be examined as a separate regressor. Capitalised exploration costs are a balance sheet items unique to the mining industry. This item is expected to capture the level of project maturity and provide a proxy for the future profitability of firms. Capitalised exploration costs represent the consideration spent on exploration and development activities to date. This balance is

then amortised either during the development of a project or when the balance is no longer recoverable. Therefore *EXPLOR* has potential incremental explanatory power beyond its incorporation into *BV*. Therefore a positive coefficient is predicted for *EXPLOR*. The other information variable '$\boldsymbol{v}$' represents the standardised residual (*RESID*) from model 1. RESID represents the expected over/under provision as predicted in model 1. A negative coefficient is predicted for *RESID* as it is expected that the market will penalise those firms which under-accrue their restoration and rehabilitation obligations.

$$SP_{it} = BV_EQUITY_{it} + EXPLOR_{it} + NI_{it} - RESID_{it} \quad \textbf{(3)}$$

Where, *SP* is the market value of equity per share, *BV_EQUITY* is the book value of equity less capitalised exploration per share, *EXPLOR* is the book value of capitalised exploration costs per share, *NI* is the book value of net income per share and *RESID* represents the standardised residual from model 1. However, the frequency of loss making entities particularly firms operating in the exploration stage adds an additional layer of complexity to the EBO approach. Collins, Pincus and Xie (1999) found that negative earnings have little predictive ability and book value serves a relevant proxy for future residual income. Miller and Modigliani (1966) had earlier suggested a similar conclusion positing that negative earnings are a poor proxy for the earning power of a firm's assets. Since the majority of exploration companies were loss making in the current period, *NI* is excluded from the valuation model for the explorer sub-sample. As a result model 4 is proposed for the explorer sub-sample;

$$SP_{it} = BV_EQUITY_{it} + EXPLOR_{it} - RESID_{it} \quad \textbf{(3)}$$

4.0 Results

4.1 *Descriptive statistics (levels of restoration and rehabilitation)*

The economic significance of restoration and rehabilitation provisions is examined by considering the provisions proportion of total provisions, total liabilities, total assets and market capitalisation for those firms which accrue. These four variables will provide a useful benchmark for the economic significance of the provision to the firm. Table 4, Panel A-C provides descriptive statistics for the raw (unwinsorised) variables for the pooled and sub-samples. The average (median) restoration and rehabilitation provision (*REST*) for the pooled sample is $9.5m ($1.24m) with the average total provision (*PROV*) being $43m ($3.07m). The pooled sample has an average (median) total liability (*LIAB*) of $170m ($16.1m), total assets (*ASSET*) of $370m ($53.2m) and market capitalisation (*MVAL*) of $545m ($81.6m). It is obvious from the descriptive statistics that all five variables have large positive skewness. This is also evident in the two sub-samples.

[INSERT TABLE 4 HERE]

The descriptive statistics reported in Table 4 consistent with expectations as firms in the producer sample have significantly larger balances for all five variables (Panel's B and C). The value of the restoration and rehabilitation provision (*REST*) in the 1st percentile of the explorer sample appears to be particularly small at just $1.

Table 4, (Panels D-F) provides a descriptive of the economic significance of the restoration and rehabilitation provision (*REST*) to the firm. Restoration and rehabilitation provisions on

average account for 57% of total provision (*REST/PROV*) and 18.23% of liabilities (*REST/LIAB*) although these figures can be as high as 100% and 85.18% respectively. As a proportion of liabilities the restoration and rehabilitation provision is a material item. The restoration and rehabilitation provisions relation with total assets (*REST/ASSET*) and market capitalisation (*REST/MVAL*) is not as pronounced as its relation to liabilities with the obligation accounting for on average 4.5% and 4.4% respectively.

When the sample is split into lifecycle stages (Panels E and F), the restoration and rehabilitation provision on average accounts for a greater percentage of total provisions (*REST/PROV*) and liabilities (*REST/LIAB*) in the exploration sample compared with the producer sample. This is reversed with the provision accounting for a greater proportion of total assets (*REST/ASSET*) and market capitalisation (*REST/MVAL*). This result might be driven by the financing and operational considerations of firms within the two sub-samples. Firms operating as exploration firms have greater financing needs but are often restricted in their financing options. These firms appear to have a greater reliance on equity financing and tend to issue securities more regularly due to cash flow constraints. Whereas producers are on average large in size and have the option of issuing either debt or equity financing. This result may also be driven by operational considerations with firms in the exploration stage having a greater proportion of deferred costs capitalised (i.e. capitalised exploration costs) compared with producers which would increase the asset base.

The significance of the provision appears to be more pronounced in the producer sample. The provision on average accounts for 4.74% of assets (*REST/ASSET*) and 4.91% of market

capitalisation (*REST/MVAL*) but can be as high as 30.79% and 28.26% respectively. However, the standard deviation of provisions is also greater for the producer sample.

Table 5 provides descriptive data for the dependent and explanatory variables. Table 5 is split into five panels. Panel A provides descriptive evidence for the pooled sample with Panel B and C providing descriptive evidence for the sample of firm year observations where the firm accrues and does not accrue respectively. Panel D and E provide descriptive statistics for the two sub-samples explorer and producer firms. The average restoration and rehabilitation provision is (*REST*) is $1.6m with the average firm size (*SIZE*) being $77.9m (Panel A). The restoration and rehabilitation provision accounts for on average 1.15% of total assets. Firms appear to disclose (*DISC*) on average 0.72 pieces of information out of a possible score of 22 with a maximum score of 8 and a minimum score of 0.

[INSERT TABLE 5 HERE]

The average cash burn ratio (*CASHB*) is -2.3047 indicating that on average firms in the sample have potential financing needs, with firms appearing to approach the capital market (*OFFER*) 1.3182 times per year. Firm's annual reports appear to be sensitive to environmental disclosures (*ENVIRO*) with ten out of every thousand words being an environmentally sensitive word. 90% of firms operate primarily in hard rock commodities (*FOCUS*) with 6.55% of the sample having a primary focus towards uranium mining (*URAN*). Around 79% of the sample appears to be made up of firms operating in the materials sectors (*INDUST*). 62% (861) of firms are in the exploration stage of their lifecycle

(*LIFE*) with the remaining 38% (528) in the production stage. Firms also have on average 3 subsidiaries.

On average 41% of the firm's board of directors (*BCOMP*) appear to be independent whilst around 15% of the firm is owned by the directors and key management personnel (*INSIDE*). On average each firm appears to have 2.4190 substantial shareholders. 17.49% of firms have a joint chief executive officer and chairman (*CEO*). 29.73% of firms have a Big 4 auditor (*AUDIT*) whilst 11.74% have an industry specialist as their auditor.[23] The majority of the audit opinions (*OPIN*) issued during the observation are unqualified opinions although at least one adverse opinion was issued. Firms have on average a market capitalisation (*MVAL*) of $149m with an average net profit after tax (*NI*) of 2.5m

As expected those firms which accrue a restoration and rehabilitation provisions are larger in size (*SIZE*) and are predominately in the producer lifecycle stage (*LIFE*). This is also reflected in the average number of subsidiaries (*SUBS*) with accruing firms having on average 6.86 subsidiaries compared to 1.72 for those who don't. The profitability of the two groups appears different as well. Those firms which accrue are on average profitable with an average net profit after tax (*NI*) of $14.5m although more than half of the firms in this group are loss making. In the non-accrual group firms on average are recording a loss (*NI*) of $1.9m. Not surprisingly, these firms also have a greater ex-ante financing need (CASHB) (-2.9180 versus -0.6156) but they appear to seek external financing at approximately the same rate. As expected those firms which accrue a restoration and rehabilitation provide increased disclosure, however firms which do not accrue still provide some disclosure and

[23] A non-Big 4 specialist was identified in the energy sector in 2008. The industry specialist for all other periods and industries was deemed a Big 4 specialist.

discussion about their environmental considerations. These firms on average disclose 0.2 of the items in the disclosure checklist, although some firms in the sample disclosed substantially more information.

Firms which accrue restoration and rehabilitation provisions appear to be more inclined to utilise a Big-4 auditor (AUDIT) (52.16 versus 21.59%) as well as an industry specialist (16.76% versus 9.91%). On average the audit opinion issued to both groups of firms is the same at unqualified. In terms of the other governance measures, those firms which accrue appear to have strong corporate governance with a greater percentage of their boards (BCOMP) being independent (45.57% versus 39.78%) a lower level of internal ownership (11.91% versus 16.17%) and a smaller percentage of firms who have a joint Chief Executive Officer and Chairman (14.59% versus 18.55%).

As expected the size the scenario is the same when comparing firms between the explorer and producer sub-samples. The size (*SIZE*) of the firm and the restoration and rehabilitation provision (*REST*) for firms operating in the exploration sample are on average smaller than those in the producer sample. The exploration firms have a higher ex-ante financing need (*CASHB*) (-2.9323 versus -1.2781) and greater instance of seeking external finance (*OFFER*) during the period (Panel D). In line with the findings of Singhvi and Desai (1971), firms in the producer sample (Panel C) disclose a greater level of information (*DISC*) (3.2865 versus 2.6414) and are deemed to be more politically sensitive to environmental issues (*ENVIRO*) (0.0012 versus 0.0009).

When the explorer and producer sub-samples are compared the descriptive statistics are similar to that of the comparison between the accruing and non-accruing firms. The average and median REST is significantly larger for firms in the producer sample, which is in line with expectation. Producers are also larger in terms in *SIZE* ($175m versus $18.7m), EXPLOR ($15.8m versus $6.8m), the number of subsidiaries (SUBS) (5.6 versus 1.6) and the level of disclosure (*DISC*). Both sub-samples appear to have ex-ante financing (*CASHB*) requirements although, this is lower for firms in the producer sample (-1.2781 versus -2.9323), with both sub-samples seeking external financing (*OFFER*) in similar frequencies. A higher proportion of explorer's than producers have an interest in uranium (*URAN*) which is in-line with our expectations. Explorer's also have a higher proportion of inside ownership (*INSIDE*) (15.5% versus 14.3%); joint CEO/Chairman (18.8% versus 15.4%) and a lower number of substantial shareholders (*SUBST*) (1.56 versus 2.43).

4.2 *Multivariate results (levels of restoration and rehabilitation)*

Results from running a Tobit regression specified in (1) are reported in Table 6 for the pooled sample as well as the explorer and producer sub samples.[24] The pooled sample obtained a pseudo R^2 of 7.97% of with the F-statistic significant at $p<.0000$. This level of explanatory power on ex-ante provisions is contrasted with the findings of Barth and McNichols (1994) whose cost based models achieved adjusted R^2's ranging between 3% and 20%.[25] The coefficient on *LIFE* was found to be negative and significant at $p<.01$ signifying that firms operating in the production stage of their lifecycle have higher provisions. The coefficient on *SIZE* appeared positive and significant at $p<.01$ signifying that size is an important factor.

[24] Standard errors were cluster by firm in line with the approach adopted in Secik and Thompson (1986).
[25] Veall and Zimmermann (1994) find that pseudo R^2's are substantially lower than the R^2's obtained from OLS estimates on uncensored data. They acknowledge that R^2's are best used as an informal means of comparison across equations.

The coefficient on *DISC* is positive and significant at $p<.01$ in all three regressions. This finding provides support for *H3*. The model also finds the coefficient on *ENVIRO* to be positive and significant at $p<.01$ showing that the greater the political sensitivity of the firm to environmental issues the higher the level of the provision recognised. However, the model finds the coefficient on the proxy for the level of regulation *FRASER* to be insignificant in all three regressions, thus resulting in *H1* being rejected. As *FRASER* uses the results from a periodic survey of mining stakeholder a more appropriate proxy may need to be developed to examine the impact of regulation on the level of restoration and rehabilitation provisions.

[INSERT TABLE 6 HERE]

Interestingly, only two of the corporate governance variables are significant in the pooled sample. *SUBST* and *CEO* are significant but only at a $p<.05$ and $p<.10$ level respectively with *BCOMP* and *INSIDE* remaining insignificant in all three regressions. The results also find that no corporate governance measures are significant in the explorer sample. Thus mixed results are found for the role of managerial influence on the level of restoration and rehabilitation provisions. The auditor variables *AUDIT*, *SPEC* and *OPIN* appear to be significant in the pooled, with *SPEC* remaining significant in the other two regressions. Interestingly, the coefficient on *SPEC* is negative which implies that firms which employ a specialist audit have smaller restoration and rehabilitation provision. This result is interesting for two reasons. Firstly, the mining industry is a highly specialised industry with experience and understanding required in order to adequately comprehend the complex information

environment. Second, the supposed credibility auditors provide to financial statements may be more important in this industry due to the high level of information asymmetry that exists between managers and shareholders (Ball and Brown 1968, Ferguson and Crockett 2002). This finding is contrasted with the insignificance of audit quality (proxied by auditor size) in the explorer and producer sub-samples. These finds suggest that industry leadership of an audit firm and not the size of the firm impact the level of restoration and rehabilitation provision.[26]

The findings in the producer sub-sample are qualitatively the same as the pooled sample despite a lower degree of explanatory power. The model achieved a pseudo R^2 of 5.74% with the F-statistic significant at $p<.0000$. The two main differences between the pooled and producer sub-samples are with regards to *URAN* and *AUDIT* with auditor size no longer significant in the model. A more interesting observation occurs with regards to the coefficient on *URAN*. The coefficient is only positive and significant in the producer regression at $p<.05$ providing some support for the *H3*. This finding is interesting due to the small number of uranium producers currently operating in Australia. Although this finding only applies to twenty observations in the sample, it does provides some level of support to the findings in Li et al. (1997) that where political sensitivity is high, firms are likely to go above and beyond their minimum obligations.

The results of the explorer sub-sample appear slightly better specified than the producer sample with an adjusted R^2 of 6.76% with the F-statistic significant at $p<.0000$. However, only a handful of the coefficients on the explanatory variables appear significant in this

[26] These findings may be somewhat driven by a non-big 4 specialist being identified in the energy sector in 2008 and 2009.

model. The difference in explanatory power and the significance of different variables implies that the two sub-samples have different drivers and therefore more appropriate proxies need to be developed to examine the factors which influence the restoration and rehabilitation provisions for exploration firms.

Based on model 1 firms in the sample appear to be systematically under-accruing their restoration and rehabilitation provisions. The descriptive statistics for the raw and standardised regression residuals are presented in Table 7.

TABLE 7: Regression Residuals from Model 1

Panel A: Raw Regression Residuals			
	Explorer	Producer	Pooled
N	862	527	1,389
Mean	9,250,848	145,016	6,329,211
Median	7,916,783	2,874,125	8,992,335
SD	7,132,312	10,300,000	8,489,035
Min	-13,700,000	-47,700,000	-47,500,000
Max	37,800,000	18,600,000	21,800,000

Panel B: Standardised Regression Residuals			
	Explorer	Producer	Pooled
N	862	527	1389
Mean	0.000	0.000	0.000
Median	0.1870	-0.2649	-0.3137
SD	1.000	1.000	1.000
Min	-4.0077	-1.7956	-1.8283
Max	3.2189	4.6473	6.3423

On average (median) model 1 specifies that firms in the pooled sample under accrue their restoration and rehabilitation provision by $6.3m ($8.9m). This figure is larger for the explorer sample with an average (median) under-accrual of $9.25m ($7.9m) whilst being significantly smaller in the producer sub-sample at $145,000 ($2.8m). The raw residuals suggest that firms in the producer sample appear to accruing a more appropriate level of restoration rehabilitation provisions than firms in the exploration sample. This finding is intuitive as 90% of firm year observations in the explorer sample do not accrue restoration and rehabilitation provisions.

4.3 *Multivariate results (valuation)*

Results from running OLS regression models 3 and 4 are reported in Table 8 for the pooled sample as well as the explorer and producer sub samples.[27] The pooled sample obtained an adjusted R^2 of 50.75% of with the F-statistic significant at $p<.0000$. All independent variables in the model behaved as predicated and were significant at $p<.01$. More importantly the coefficient on the standardised residual (*RESID*) was negative and significant at $p<.05$. This finding implies that the difference between the predicted and recognised accrual provides incremental explanatory power in explaining the market value of equity. The negative coefficient on *RESID* is in line with our expectation that investors predict a larger provision than is recognised by the firm and value the firm accordingly. This finding holds for the producer sample which achieves an adjusted R^2 of 55.01% although the significance level on *RESID* is lower than in the pooled sample ($p<.10$). These results are line with the findings in

[27] Standard errors were cluster by firm in line with the approach adopted in Secik and Thompson (1986).

Barth & McNichol's (1994) and provide a similar level of explanatory power to their value relevance models.

[INSERT TABLE 8 HERE]

The findings for the explorer model are not as well specified as the pooled or producer sub-sample. The model achieves an adjusted R^2 of 7.56%. This finding alludes to the existence of omitted variables from the model and also suggests that accounting information has low explanatory power in terms of explaining the market value of equity. The explorer model also finds the coefficient on *RESID* to be insignificant in the model providing some support to the assertion that the market does not incorporate a level of under-accrual into their valuation of exploration firms.[28]

The results from model 3 and 4 suggest one of two outcomes. First, being that the market correctly identifies and prices under accruing firms were applicable. Alternatively, the result could be driven by a noisy levels impacted by the low explanatory power in model 1. This outcome cannot be ruled out. Further analysis was performed to examine whether particular groups within the distribution of *RESID* were driving the results. *RESID* was split into deciles and models 3 and 4 re-run to test the sign and significance of RESID at varying degrees of the distribution. The results are provided in Table 9.

[28] Sensitivity testing was also performed using $t + 3$ months, which captured the firms share price at the month-end following the release of their annual report. The results were qualitatively the same.

[INSERT TABLE 9 HERE]

Qualitatively the results for the explorer sub-sample are similar to those in Table 8 with the *BV_EQUITY* being significant in most deciles. Similar to the results in Table 8 *RESID* is found to be insignificant in all ten deciles. *RESID* was found to be significant in only one of the pooled regression (5^{h} decile) where the regress achieved a comparably lower level of explanatory power with an adjusted R^2 of 37.32%. *RESID* was found to be negative and significant at $p<.05$ in line with expectation, however the coefficient on *NI* appeared negative.

In the producer sub-sample, *RESID* appears significant in two deciles. In the 5th decile, interestingly the coefficient is positive and significant at $p<.05$ which is contrary to our predictions. However, when the 10th decile is examined the coefficient on *RESID* is found to be negative and significant. This result is interesting as it appears that the market on accrues an additional provision for the largest under providers.

In the pooled regression *RESID* is only significant in the 5th decile. Whilst, *RESID* is found to be significant in both the 5th and 10th deciles in the producer sub-sample. This finding is interesting as the coefficient is positive in the 5th decile ($p<.05$) but negative 10th ($p<.01$). The results from the 10th decile are slightly more interesting as they show that the market is able to identify and price appropriately those firms which are deemed to be the largest under providers.

5.0 Conclusion

This paper documents the economic significance of restoration and rehabilitation provisions in the Australian mining industry. The provision is found to be on average 57% of total provisions, 18.23% of liabilities, 4.5% of assets and 4.4% of market capitalisation. We examine two key issues relating to restoration and rehabilitation provisions in the Australian mining industry. First, we examine and produce the first empirical model to predict ex–ante restoration and rehabilitation levels. We find support for firm size, level of disclosure and political sensitivity as positively influencing the level the level of firm provisioning whilst mixed results are found for the firm's reliance on the capital markets and their choice of auditor. We also examine the valuation implication of firm's restoration and rehabilitation provisions. We find that the standardised residual from the levels model has incremental explanatory power in explain the market value of equity. The results suggest that the market identifies and prices firms which under provide with the results being driven by the larger under providers.

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TABLE 4: Descriptive Statistics

PANEL A Pooled Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST	370	9,502	5	361	1,244	5,638	188,000	30,100
PROV	370	43,000	23	600	3,070	19,600	499,000	174,000
LIAB	370	170,000	91	2,210	16,100	80,000	4,020,000	789,000
ASSET	370	370,000	2,088	18,800	53,200	199,000	5,330,000	1,450,000
MVAL	364	545,000	2,310	22,400	81,600	336,000	6,010,000	2,070,000

PANEL B Explorer Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST	86	1,914	0.001	58	337	1,161	54,300	6,310
PROV	86	3,363	7	166	554	2,435	78,600	9,387
LIAB	86	14,500	30	632	2,049	9,005	293,000	39,300
ASSET	86	46,200	863	9,378	20,600	49,500	356,000	65,100
MVAL	85	94,900	1,870	11,900	32,400	120,000	1,060,000	173,000

PANEL C Producer Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST	284	11,800	10	535	1,878	7,690	197,000	33,900
PROV	284	55,100	91	948	4,592	36,200	950,000	197,000
LIAB	284	217,000	300	4,338	27,000	121,000	5,020,000	896,000
ASSET	284	467,000	2,834	24,600	86,100	295,000	8,010,000	1,650,000
MVAL	279	682,000	3,450	28,700	102,000	468,000	6,210,000	2,340,000

PANEL D Pooled Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST/PROV	370	0.5710	0.0048	0.2150	0.6493	0.8945	1.000	0.3429
REST/LIAB	370	0.1823	0.0014	0.0388	0.1022	0.2590	0.8518	0.1958
REST/ASSET	370	0.0450	0.0004	0.0085	0.0222	0.0531	0.4281	0.0661
REST/MVAL	364	0.0440	0.0002	0.0051	0.0161	0.0431	0.4042	0.0796

PANEL E Explorer Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST/PROV	86	0.6770	0.0000	0.4811	0.7758	0.9391	1.0000	0.3168
REST/LIAB	86	0.2224	0.0000	0.0507	0.1378	0.3130	0.9172	0.2206
REST/ASSET	86	0.0369	0.0000	0.0034	0.0134	0.0487	0.3079	0.0556
REST/MVAL	85	0.0273	0.0000	0.0027	0.0076	0.0299	0.2826	0.0457

PANEL F Producer Sample

			Percentile					
	N	Mean	1%	25%	50%	75%	99%	SD
REST/PROV	284	0.5389	0.0076	0.1943	0.5937	0.8860	1.0000	0.3446
REST/LIAB	284	0.1701	0.0033	0.0373	0.0965	0.2226	0.8518	0.1864
REST/ASSET	284	0.0474	0.0010	0.0105	0.0249	0.0531	0.4550	0.0689

REST/MVAL	279	0.0491	0.0005	0.0068	0.0182	0.0514	0.4415	0.0868

REST is the book value of total restoration and rehabilitation provision, $'000; *PROV* is the book value of total provision, $'000; *LIAB* is the book value of total liabilities, $'000; *ASSET* is the book value of total assets, $'000; *MVAL* is the market value of total equity (calculated as the number of shares outstanding at year end multiplied by the year end share price), $'000.*REST/PROV* = Book value of total restoration and rehabilitation provision divided by the book value of total provisions*; REST/LIAB* = Book value of total restoration and rehabilitation provision divided by the book value of total liabilities*; REST/ASSET* = Book value of total restoration and rehabilitation provision divided by the book value of total assets*; REST/MVAL* = Book value of total restoration and rehabilitation provision divided by the market value of total equity (calculated as the number of shares outstanding at year end multiplied by the year end share price).

TABLE 5: Descriptive Statistics for the Dependent and Explanatory Variables – Split by provision

PANEL A: Pooled Sample

Variable	N	Mean	Median	SD	Min	Max
REST	1,389	1,609	0.0000	5,945	0.0000	40,700
SIZE	1,389	77,900	10,300	263,000	641	2,080,000
REST/SIZE	1,389	0.0115	0.0000	0.0380	0.0000	0.5087
CASHB	1,389	-2.3047	-.9404	5.8192	-39.5817	12.7151
OFFER	1,389	1.3182	1.0000	1.4929	0.0000	6.0000
DISC	1,389	0.7207	0.0000	1.5861	0.0000	8.0000
LIFE	1,389	0.6206	1.0000	0.4854	0.0000	1.0000
EXPLOR	1,389	10,200	3,712	20,500	0.0000	146,000
FOCUS	1,389	0.9042	1.0000	0.2944	0.0000	1.0000
FRASER	1,389	45.2827	44.0374	11.5852	16.2952	71.5334
ENVIRO	1,389	0.0010	0.0009	0.0006	0.0002	0.0030
URAN	1,389	0.0655	0.0000	0.2475	0.0000	1.0000
BCOMP	1,389	0.4133	0.4000	0.2566	0.0000	1.0000
INSIDE	1,389	0.1503	0.0990	0.1630	0.0000	0.8107
SUBST	1,389	2.4190	2.0000	1.4224	0.0000	6.0000
CEO	1,389	0.1749	0.0000	0.3801	0.0000	1.0000
AUDIT	1,389	0.2973	0.0000	0.4573	0.0000	1.0000
SPEC	1,389	0.1174	0.0000	0.3220	0.0000	1.0000
OPIN	1,389	0.1591	0.0000	0.4034	0.0000	3.0000
SUBS	1,389	3.0907	1.0000	6.9517	0.0000	108.0000
INDUST	1,389	0.7927	1.0000	0.4055	0.0000	1.0000
MVAL	1,332	149,000	16,500	50,7000	1,210	3,790,000
SP	1,332	0.8114	0.2000	2.1121	0.0030	15.95
NI	1,389	0.0015	-0.0117	0.1371	-0.4100	1.5696
BV_EQUITY	1,389	0.1541	0.0533	0.4448	-3.3607	5.0675

PANEL B: Those with REST

Variable	N	Mean	Median	SD	Min	Max
REST	370	6,040	1,245	10,300	0.0000	40,700
SIZE	370	233,000	53,200	437,000	727	2,080,000
REST/SIZE	370	0.0430	0.2218	0.0637	0.0000	0.5087
CASHB	370	-0.6156	-0.4001	4.2249	-39.5817	12.7151
OFFER	370	1.3324	1.0000	1.6331	0.0000	6.0000
DISC	370	2.6324	3.0000	2.0601	0.0000	8.0000
LIFE	370	0.2324	0.0000	0.4230	0.0000	1.0000
EXPLOR	370	19,500	9,371	28,300	0.0000	146,000
FOCUS	370	0.8595	1.0000	0.3480	0.0000	1.0000
FRASER	370	43.3431	41.9444	11.7114	16.2952	71.5334

ENVIRO	370	0.0015	0.0014	0.0006	0.0003	0.0030
URAN	370	0.0189	0.0000	0.1364	0.0000	1.0000
BCOMP	370	0.4557	0.5000	0.2469	0.0000	1.0000
INSIDE	370	0.1191	0.0499	0.1631	0.0000	0.8107
SUBST	370	2.4486	2.0000	1.5066	0.0000	6.0000
CEO	370	0.1459	0.0000	0.3535	0.0000	1.0000
AUDIT	370	0.5216	1.0000	0.5002	0.0000	1.0000
SPEC	370	0.1676	0.0000	0.3740	0.0000	1.0000
OPIN	370	0.1676	0.0000	0.4019	0.0000	3.0000
SUBS	370	6.8676	3.0000	12.2038	0.0000	108.0000
INDUST	370	0.7649	1.0000	0.4247	0.0000	1.0000
MVAL	366	409,000	81,600	827,000	1,870	3,790,000
SP	366	1.8182	0.4175	3.3571	0.0030	15.95
NI	370	0.0589	-0.0068	0.2451	-0.4100	1.5696
BV_EQUITY	370	0.3908	0.0796	0.7673	-0.2569	5.0675

PANEL C: Those without REST

Variable	N	Mean	Median	SD	Min	Max
SIZE	1019	21,700	7,550	116,000	641	2,080,000
CASHB	1019	-2.9180	-1.1709	6.1877	-39.5817	12.7151
OFFER	1019	1.3131	1.0000	1.4394	0.0000	6.0000
DISC	1019	0.0265	0.0000	0.2843	0.0000	5.0000
LIFE	1019	0.7615	1.0000	0.4264	0.0000	1.0000
EXPLOR	1019	6,891	2,777	15,400	0.0000	146,000
FOCUS	1019	0.9205	1.0000	0.2706	0.0000	1.0000
FRASER	1019	45.9869	44.9288	11.4638	16.2952	71.5334
ENVIRO	1019	0.0008	0.0007	0.0004	0.0002	0.0029
URAN	1019	0.0824	0.0000	0.2752	0.0000	1.0000
BCOMP	1019	0.3978	0.3333	0.2584	0.0000	1.0000
INSIDE	1019	0.1617	0.1150	0.1615	0.0000	0.8107
SUBST	1019	2.4082	2.0000	1.3912	0.0000	6.0000
CEO	1019	0.1855	0.0000	0.3889	0.0000	1.0000
AUDIT	1019	0.2159	0.0000	0.4116	0.0000	1.0000
SPEC	1019	0.0991	0.0000	0.2990	0.0000	1.0000
OPIN	1019	0.1560	0.0000	0.4040	0.0000	2.0000
SUBS	1019	1.7193	1.0000	2.1997	0.0000	21.0000
INDUST	1019	0.8027	1.0000	0.3981	0.0000	1.0000
MVAL	978	51,300	10,500	248,000	1,210	3,790,000
SP	978	0.4346	0.1730	1.1831	0.0030	15.95
NI	1019	-0.0194	-0.0129	0.04696	-0.3022	0.7818
BV_EQUITY	1019	0.0681	0.0485	0.1692	-3.3607	2.4826

PANEL D: Explorer Sample

Variable	N	Mean	Median	SD	Min	Max
REST	862	175	0.0000	1,665	0.0000	40,700
SIZE	862	18,700	7,341	77,300	641	2,080,000
REST/SIZE	862	0.0036	0.0000	0.0204	0.0000	0.3079
CASHB	862	-2.9323	-1.1894	6.2289	-39.5817	12.7151
OFFER	862	1.3805	1.0000	1.4631	0.0000	6.0000
DISC	862	0.1775	0.0000	0.7418	0.0000	6.0000
EXPLOR	862	6,848	2,687	14,500	0.0000	146,000
FOCUS	862	0.9432	1.0000	0.2317	0.0000	1.0000
FRASER	862	45.4245	44.3107	11.0700	16.2952	71.5334
ENVIRO	862	0.0009	0.0008	0.0004	0.0002	.0030
URAN	862	0.0824	0.0000	0.2751	0.0000	1.0000
BCOMP	862	0.3900	0.3333	0.2609	0.0000	1.0000
INSIDE	862	0.1551	0.1089	0.1561	0.0000	0.8107
SUBST	862	2.4095	2.0000	1.4193	0.0000	6.0000
CEO	862	0.1879	0.0000	0.3909	0.0000	1.0000
AUDIT	862	0.2077	0.0000	0.4059	0.0000	1.0000
SPEC	862	0.0998	0.0000	0.2999	0.0000	1.0000
OPIN	862	0.1520	0.0000	0.4048	0.0000	2.0000
SUBS	862	1.5557	1.0000	1.9299	0.0000	14.0000
INDUST	862	0.8399	1.0000	0.3669	0.0000	1.0000
MVAL	826	38,500	10,200	155,000	1,210	3,790,000
SP	826	0.3929	0.17	0.9747	0.0030	15.95
NI	862	-0.0218	-0.0129	0.0387	-0.3884	0.3534
BV_EQUITY	862	0.0635	0.0461	0.1601	-3.3607	1.8496

PANEL E: Producer Sample

Variable	N	Mean	Median	SD	Min	Max
REST	527	3,954	183	8,936	0.0000	40,700
SIZE	527	175,000	25,400	398,000	641	2,080,000
REST/SIZE	527	0.0243	0.0048	0.0535	0.0000	0.5087
CASHB	527	-1.2781	-0.5744	4.9139	-39.5817	12.7151
OFFER	527	1.2163	1.0000	1.5362	0.0000	6.0000
DISC	527	1.6091	0.0000	2.1126	0.0000	8.0000
EXPLOR	527	15,800	6,349	26,700	0.0000	146,000
FOCUS	527	0.8406	1.0000	0.3664	0.0000	1.0000
FRASER	527	45.0506	43.5491	12.3890	16.2952	71.5334
ENVIRO	527	0.0012	0.0012	0.0006	0.0002	0.0030
URAN	527	0.0380	0.0000	0.1913	0.0000	1.0000
BCOMP	527	0.4513	0.3333	0.2449	0.0000	1.0000
INSIDE	527	0.1426	0.0812	0.1736	0.0000	0.8107
SUBST	527	2.4345	2.0000	1.4286	0.0000	1.0000

CEO	527	0.1537	0.0000	0.3610	0.0000	1.0000
AUDIT	527	0.4440	0.0000	0.4973	0.0000	1.0000
SPEC	527	0.1461	0.0000	0.3536	0.0000	1.0000
OPIN	527	0.1708	0.0000	0.4011	0.0000	3.0000
SUBS	527	5.6015	3.0000	10.5474	0.0000	108.0000
INDUST	527	0.7154	1.0000	0.4517	0.0000	1.0000
MVAL	516	324,000	41,900	758,000	1,210	3,790,000
SP	516	1.4788	0.3380	3.0571	0.003	15.95
NI	527	0.0396	-0.0084	0.2116	-0.4100	1.5696
BV_EQUITY	527	0.3021	0.0712	0.6669	-0.2569	5.0675

REST is the book value of restoration and rehabilitation provisions, $‘000; *SIZE* is the book value of total assets, $‘000; *REST/SIZE* is the book value of restoration and rehabilitation provision deflated by the book value total assets; *DISC* is the firms disclosure score calculated as the sum of the number of items disclosed in the restoration and rehabilitation note to the annual report; *CASHB* is the ending cash balance deflated by the sum of cash flow from operations and cash flow from investing; *OFFER* is the number times the firm has sought external financing during t_0; *FOCUS* is a dummy variable, 1= Hard rock commodity focus, 0 = Liquid commodity focus; *URAN* a dummy variable, 1 = if the firm has an interest in Uranium, 0 = otherwise: *LIFE* a dummy variable, 1 = if the firm operations in the development or exploration stage, 0 = if they operate in the production stage; *EXPLOR* is the book value of capitalised exploration costs, $‘000; *FRASER* is the regulatory attractiveness of a geographic location calculated as the weight average of the firms geographic locations multiplied by the score provided by the Fraser Institute; *ENVIRO* is the number of times environmental words are mentioned in the annual report deflated by the total number of words; *BCOMP* is the percentage of the board of directors that is independent as defined by the ASX Principles of Good Corporate Governance and Best Practice Recommendations; *INSIDE* is the percentage shareholding of the firm held by directors and key management personnel; *SUBT* is the number of external shareholder with a shareholding of 5% or greater. *CEO* a dummy variable, 1 = if the CEO and Chairman are the same person, 0 = otherwise; *AUDIT* a dummy variable, 1= if the firm is audited by a Big 4 firm, 0 = otherwise, *SPEC* a dummy variable, 1 = if the firm is audited by an industry specialist auditor, 0 = otherwise; *OPIN* is an interval variable that measures the audit opinion attributed to the annual report, 0 = Unqualified, 1 = Unqualified with Emphasis of Matter, 2 = Qualified with/without an Emphasis of Matter, 3 = Adverse with/without an Emphasis of Matter, and 4 = Disclaimer with/without an Emphasis of Matter; *SUBS* is the number of subsidiaries incorporated by the firm; *INDUST* a dummy variables, 1 = if the firm is a member of the materials sector (GICS code 15), 0 = if the firm is a member of the energy sector (GICS code 10); *MVAL* is the market value of total equity (calculated as the number of shares outstanding at year end multiplied by the year end share price), $‘000; *SP* is the market value per share; *NI* is the net profit after tax per share; *BV_EQUITY* is the book value of equity less book value of capitalised exploration costs per share.

TABLE 6: Tobit Regression Results for Model 1

REST = $\alpha + \beta_1 SIZE + \beta_2 CASHB + \beta_3 OFFER + \beta_4 DISC + \beta_5 LIFE + \beta_5 (LIFE*EXPLOR) + \beta_7 FOCUS + \beta_8 FRASER + \beta_9 ENVIRO + \beta_{10} URAN + \beta_{11} BCOMP + \beta_{12} INSIDE + \beta_{13} SUBST + \beta_{14} CEO + \beta_{15} AUDIT + \beta_{16} SPEC + \beta_{17} OPIN + \beta_{18} SUBS + \beta_{19} INDUST + \varepsilon$

	Explorer		Producer		Pooled	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
INTERCEPT	-5,417,830	-2.5***	-10,300,000	-3.61***	-8,775,001	-4.01***
SIZE	0.0068	1.47	0.0107	3.69***	0.0103	4.04***
CASHB	212,923	1.77*	174,483	2.54***	204,830	3.38***
OFFER	-277,055	-0.98	-10,917	-0.04	-102,597	-0.52
DISC	2,761,639	3.23***	2,280,388	6.38***	2,416,474	7.03***
LIFE					-2,615,253	-3.42***
*LIFE*EXPLOR*	0.0200	0.97			0.0039	0.21
FOCUS	-1,805,208	-1.16	-1,370,742	-0.86	-1,431,442	-1.11
FRASER	-26,290	-0.84	19,655	0.61	-4,512	-0.18
ENVIRO	1,450,000,000	1.84*	3,700,000,000	4.07***	3,510,000,000	4.51***
URAN	-21,700,000	0.00	7,999,403	2.13**	2,759,256	1.19
BCOMP	-264,567	-0.2	-926,884	-0.42	-1,037,641	-0.70
INSIDE	-188,4587	-0.87	-2,949,669	-1.36	-30,60,344	-1.40
SUBST	43,306	0.19	-706,296	-2.57**	-480,197	-2.18**
CEO	633,134	0.74	1,666,375	1.81*	1,415,030	1.77*
AUDIT	1,352,845	1.58	673,322	0.67	1,317,347	1.64*
SPEC	-2,824,826	-2.02**	-3,109,970	-2.31**	-3,382,560	-3.01***
OPIN	-955,802	-1.15	-1,556,892	-2.04**	-1,217,795	-1.89*
SUBS	-170,044	-0.93	189,976	2.42**	158,668	1.97**
INDUST	521,196	0.49	2,606,062	1.99**	1,755,672	1.71*
Residual						
N	862		527		1389	
Pseudo R^2	0.0676		0.0574		0.0797	
Prob > F	0.000		0.0000		0.0000	

*** Significant at the 1% level (2-tailed)
** Significant at the 5% level (2-tailed)
* Significant at the 10% level (2-tailed)

REST is the book value of restoration and rehabilitation costs; *CASHB* is the ending cash balance deflated by the sum of cash flow from operations and cash flow from investing; *OFFER* is the number times the firm has sought external financing during t_0; *DISC* is the firms disclosure score calculated as the sum of the number of items disclosed in the restoration and rehabilitation note to the annual report; *LIFE* a dummy variable, 1 = if the firm operations in the development or exploration stage, 0 = if they operate in the production stage; *EXPLOR* is the book value of capitalised exploration costs; *FOCUS* is a dummy variable, 1= Hard rock commodity focus, 0 = Liquid commodity focus; *FRASER* is the regulatory attractiveness of a geographic location calculated as the weight average of the firms geographic locations multiplied by the score provided by the Fraser Institute; *ENVIRO* is the number of times environmental words are mentioned in the annual report deflated by the total number of words; *URAN* a dummy variable, 1 = if the firm has an interest in Uranium, 0 = otherwise; *BCOMP* is the percentage of the board of directors that is independent as defined by the ASX Principles of Good Corporate Governance and Best Practice Recommendations; *INSIDE* is the percentage shareholding of the firm held by directors and key management personnel; *SUBT* is the number of external shareholder with a shareholding of 5% or greater. *CEO* a dummy variable, 1 = if the CEO and Chairman are the same person, 0 = otherwise; *AUDIT* a dummy variable, 1= if the firm is audited by a Big 4 firm, 0 = otherwise, *SPEC* a dummy variable, 1 = if the firm is audited by an industry specialist auditor, 0 = otherwise; *OPIN* is an interval variable that measures the audit opinion attributed to the annual report, 0 = Unqualified, 1 = Unqualified with Emphasis of Matter, 2 = Qualified with/without an Emphasis of Matter, 3 = Adverse with/without an Emphasis of Matter, and 4 = Disclaimer with/without an Emphasis of Matter; *SUBS* is the number of subsidiaries incorporated by the firm; *INDUST* a dummy variables, 1 = if the firm is a member of the materials sector (GICS code 15), 0 = if the firm is a member of the energy sector (GICS code 10).

TABLE 8: OLS Regression Results for Models 3 and 4

$SP = \alpha + \beta_1 NI + \beta_2 BV_EQUITY + \beta_3 EXPLOR - \beta_4 RESID + \varepsilon$ **(3)**

$SP = \alpha + \beta_1 BV_EQUITY + \beta_2 EXPLOR - \beta_3 RESID + \varepsilon$ **(4)**

	Explorer		Producer		Pooled	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
INTERCEPT	0.1625	3.6***	0.5634	2.7***	0.3585	3.38***
NI			4.0789	2.34**	3.4078	2.22**
BV_EQUITY	2.0433	7.43***	1.7048	2.71***	1.9869	4.00***
EXPLOR	1.7646	5.44***	3.0996	2.24**	2.0626	4.91***
RESID	-0.0366	1.27	-0.4122	1.83*	-0.2844	-2.31**
N	826		518		1344	
Adjusted R^2	0.0756		0.5501		0.5075	
Prob > F	0.0000		0.0000		0.0000	

*** Significant at the 1% level (2-tailed)
** Significant at the 5% level (2-tailed)
* Significant at the 10% level (2-tailed)

SP is the market price of each share at year end; *NI* is the book value of net profit after tax deflated by the number of shares outstanding at year-end: *BV_EQUITY* is the book value of equity less the book value of capitalised exploration costs deflated by number of shares outstanding: *EXPLOR* is the book value of exploration costs deflated by the number of share outstanding at year end; *RESID* is the standardised residual generated using model 1.

TABLE 9: OLS Regression Results for Model 3 & 4 by Decile

$SP = \alpha + \beta_1 NI + \beta_2 BV_EQUITY + \beta_3 EXPLOR - \beta_4 RESID + \varepsilon$ **(3)**

$SP = \alpha + \beta_1 BV_EQUITY + \beta_2 EXPLOR - \beta_3 RESID + \varepsilon$ **(4)**

Deciles	N	*INTERCEPT*		*NI*		*BV_EQUITY*		*EXPLOR*		*RESID*		*Adjusted* R^2	*Prob > F*
		Estimate	*t-value*	*Estimate*	*t-value*	*Estimate*	*t-value*	*Estimate*	*t-value*	*Estimate*	*t-value*		
PANEL A: Pooled Sample													
1st	122	0.0140	0.07	-5.9569	-2.11***	2.2205	0.91	-1.0472	-0.71	0.1720	0.62	0.0346	0.0469
2nd	133	-0.0591	-0.20	-0.9698	-1.15	2.2768	3.89***	-0.2583	-0.76	0.2081	0.49	0.3075	0.0053
3rd	134	-0.0006	0.00	-1.2746	-0.40	4.8302	1.63*	1.3117	1.35	-0.0419	-0.02	0.1335	0.0309
4th	138	0.0229	0.08	-0.6096	-0.48	1.4700	4.98***	1.5142	5.48***	0.1108	0.19	0.2056	0.0000
5th	135	1.1718	2.51**	-6.3001	-5.63***	1.8388	2.36**	-0.1116	-0.15	-3.0795	-2.47**	0.3732	0.0000
6th	134	-0.0050	-0.01	-3.3262	-1.73*	3.5288	2.40**	2.2702	2.11**	0.3134	0.24	0.0583	0.0022
7th	137	0.2324	2.31**	0.4752	0.56	1.6552	2.20**	2.3464	2.88**	-0.1197	-0.10	0.0589	0.0019
8th	137	0.1624	0.61	-4.9960	-1.79*	3.1010	3.14***	-2.1234	-1.16	-3.0025	-1.15	0.0814	0.0492
9th	137	-0.1064	-0.28	1.2868	0.76	2.7636	3.30***	2.7768	1.42	-0.5536	-1.16	0.3341	0.0000
10th	137	-0.4234	-0.51	4.7737	2.44**	1.4501	1.99	4.1660	2.05**	-0.5855	-1.23	0.6186	0.0000
PANEL B: Explorer Sample													
1st	75	0.1725	1.05			1.9514	1.28	1.0033	1.18	-0.0026	-0.05	0.0623	0.3651
2nd	81	0.2250	0.99			-1.7855	-0.44	-2.4616	-0.83	2.2770	1.14	0.0373	0.5301
3rd	83	-0.0262	-0.33			3.3232	3.91***	2.8230	1.37	-2.7296	-1.10	0.1063	0.0012
4th	81	-0.0873	-0.65			1.6964	3.93***	0.7245	1.78*	-2.0235	-1.36	0.1634	0.0005
5th	84	0.1584	1.01			1.0087	2.38**	0.4750	0.89	0.0153	0.02	0.0546	0.0472
6th	84	-0.0142	-0.02			4.3946	3.73***	-0.0939	-0.05	-0.3841	-0.15	0.4483	0.0042
7th	86	-0.6633	-0.78			6.5005	2.18**	-1.2631	-0.80	-2.4248	-0.82	0.2570	0.0367
8th	85	0.3156	0.12			1.4966	0.90	1.0372	0.62	-0.1099	-0.02	0.0170	0.1440
9th	84	1.8677	0.82			2.2599	2.5**	2.1738	2.53***	3.4943	0.77	0.0411	0.0853
10th	83	-0.0939	-0.28			1.6764	7.63***	1.0460	1.14	-0.3798	-1.32	0.3160	0.0000
PANEL C: Producer Sample													
1st	52	0.2392	0.50	-4.4458	-1.33	2.0614	2.39	2.9559	1.59**	-0.1714	-0.43	0.3307	0.0035
2nd	50	-0.1971	-0.24	0.5416	0.31	0.5560	0.69	1.9063	2.75***	0.4707	0.47	0.1881	0.0223
3rd	52	1.8483	1.14	-1.9741	-0.69	2.2888	2.14**	1.2830	1.33	-2.3658	-1.07	0.1967	0.0024
4th	52	1.3902	0.86	-4.7153	-0.90	4.6482	2.15**	0.0827	0.04	-2.2979	-0.79	0.2645	0.0028
5th	52	-0.8626	-1.93*	1.1148	0.42	3.6745	3.69***	3.1281	1.91*	2.2103	2.12**	0.7716	0.0000

6th	53	-0.2536	-0.37	1.5927	0.32	5.6105	2.47**	-16.6335	-1.54	15.0573	1.47	0.1627	0.0536
7th	52	0.7191	1.47	1.5993	2.44**	1.2059	2.47**	-0.0777	-0.03	-0.6307	-0.47	0.0767	0.0000
8th	51	0.2964	0.33	3.3617	3.18***	3.7018	4.96***	1.7088	1.30	-0.3279	-0.21	0.7800	0.0000
9th	52	2.5049	1.65*	6.3068	6.39***	1.4368	2.46**	2.7722	1.57	2.0026	1.32	0.7170	0.0000
10th	52	-2.1674	-2.05**	3.9403	1.27	0.9202	1.00	5.6015	1.18	-1.9681	-3.4***	0.5043	0.0000

*** Significant at the 1% level (2-tailed)
** Significant at the 5% level (2-tailed)
* Significant at the 10% level (2-tailed)

SP is the market price of each share at year end; *NI* is the book value of net profit after tax deflated by the number of shares outstanding at year-end: *BV_EQUITY* is the book value of equity less the book value of capitalised exploration costs deflated by number of shares outstanding: *EXPLOR* is the book value of exploration costs deflated by the number of share outstanding at year end; *RESID* is the standardised residual generated using model 1.