

THE TRANSPARENCY OF DERIVATIVE DISCLOSURES BY AUSTRALIAN FIRMS IN THE EXTRACTIVE INDUSTRIES

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Abstract

This paper investigates the transparency of derivative disclosures of Australian firms in the extractive industries using 1998 to 2001 financial reports. The quality of financial reporting has become a major corporate governance issue since the collapse of prominent companies such as Enron in the United States, HIH Insurance in Australia, and, of particular relevance here, Barings PLC in the United Kingdom, where the losses were caused by derivative instruments. Disclosure transparency is an important component of the quality of financial reporting. We measure transparency based on a disclosure index developed from AASB 1033 *Presentation and Disclosure of Financial Instruments*. We examine the relationship between transparency and firm characteristics represented by size, performance, growth opportunities, auditor and type of extractive firm. The results indicate that the transparency of derivative disclosures among firms in the extractive industries has increased over the period. However, there is still evidence of non-compliance with the disclosure requirements, especially in relation to net fair value. We find that firm size, price-earnings ratio and debt-to-equity ratio, and to a lesser extent, market-to-book ratio and profitability are associated with disclosure transparency.

Keywords: Disclosure quality; transparency; derivatives; extractive industries

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1. Introduction

This paper investigates the transparency of derivative disclosures of Australian firms in the extractive industries.¹ The quality of financial reporting has become a major corporate governance issue since the collapse of prominent companies such as Enron in the United States, HIH Insurance in Australia, and Barings PLC, the United Kingdom merchant bank. Of particular relevance here is the case of Barings PLC where the losses were caused by derivative instruments. Disclosure transparency is an important component of the quality of financial reporting. In this paper we explore the association between the transparency of derivative disclosures and various firm characteristics. We focus on the extractive industries as they extensively use derivative financial instruments to hedge their exploration and production risks (Berkman, Bradbury, Hancock, and Innes, 1997). Concern about the risks attached to hedging

instruments has forced accounting standard setters to promulgate rules for the disclosure and presentation of these instruments so that users are aware of their existence and therefore will be able to make more informed decisions.

We examine the transparency of derivative disclosure for a sample of publicly listed firms in the extractive industries for the period 1998 to 2001. We use a disclosure index based on five categories of information as required in AASB 1033 *Presentation and Disclosure of Financial Instruments*.² These categories are accounting policy, hedges of anticipated future transactions, risk information, net fair value information, and commodity contracts regarded as financial instruments.

The study contributes to the existing literature in a number of ways. We measure the transparency of

¹ According to Deegan (2005), extractive industries refer to firms which engage in the search for natural substances of commercial value such as minerals, oil and natural gas.

² With the move to full harmonization in January 2005, Australia has now adopted AASB 132 *Financial Instruments: Disclosure and Presentation* and AASB 139 *Financial Instruments: Recognition and Measurement* which are essentially identical to their international equivalents (IAS 32 and IAS 139 respectively).

derivative disclosures over a recent time period prior to the adoption of international accounting standards in Australia. Further, we examine the association between our measure of transparency and various firm characteristics. These characteristics are represented by size, performance, type of auditor, type of extractive firm, leverage and growth opportunities. While our study focuses on the Australian regulatory environment, it contributes to the international accounting literature by providing evidence on disclosure transparency in a setting where accounting standards are mandatory but compliance with those standards is not always rigidly enforced (Hope, 2003a).

The results show that, while the transparency of derivative disclosures among firms in the extractive industries has increased, firms still use their discretion especially in relation to the disclosure of net fair value information. We find that larger firms and firms with high price-earnings ratios and debt to equity ratios provide more transparent derivative disclosures in their annual reports. We also find that performance, measured by profitability, and growth opportunities, measured by research and development and market-to-book value, are significant in some years but not in others.

The remaining sections of the paper are as follows. Section 2 explains the Australian reporting requirements relating to derivative financial instruments. Section 3 discusses prior research and develops the research questions examined in the study. Section 4 describes the sample selection, research design, and the variables. Section 5 presents the results and section 6 concludes the paper.

2. Background: Derivatives and financial reporting

The relevant accounting standard relating to financial instruments in Australia at the time of this study was AASB 1033 *Presentation and Disclosure of Financial Instruments*. This standard was issued in 1996³ and subsequently amended in 1999 to achieve greater harmonization with the international standard, IAS 32 *Financial Instruments: Disclosure and Presentation*.⁴ It followed the withdrawal of an exposure draft, ED59, which attempted to introduce recognition and measurement rules for financial instruments in addition to disclosure requirements. As a result of extensive lobbying against this exposure draft, the Australian standard setters decided to defer the recognition and measurement issue until an equivalent international standard was issued.

³ The standard was based on ED65 *Presentation and Disclosure of Financial Instruments*, which was issued in 1995.

⁴ Since AASB 1033 does not differ significantly from AASB 132, we refer to the relevant paragraphs of the former standard as this was current at the time of our study and formed the basis of our disclosure index.

Many derivative financial instruments are not recognized as assets and liabilities in the balance sheet and the unrealized gain or loss on these instruments is not recorded in the income statement. Therefore, firms are required to disclose information related to the instruments. This includes the objectives of holding or issuing derivative financial instruments (AASB 1033 paragraph 5.3). The disclosure is expected to help users to understand why entities use derivatives (by explaining the risks attached to the entity), and what they plan to achieve by the use of the derivatives. In addition, firms are required to disclose information about hedge activities, if they use financial instruments to manage risk associated with anticipated future transactions.⁵

AASB 1033 paragraph 5.6 requires firms to disclose the net fair value of financial assets and liabilities, including unrecognised derivative financial instruments. The methods adopted and any significant assumptions made in determining net fair value must also be disclosed. Paragraph 5.7 requires more information when one or more financial assets are recognized at an amount in excess of their net fair value including the reasons for not reducing the carrying amount.

In addition to the above, firms are also required to disclose terms, conditions, and accounting policies adopted (paragraph 5.2), interest rate risk (paragraph 5.4), credit risk (paragraph 5.5), and commodity contracts which are regarded as financial instruments (paragraph 5.9).

3. Prior research and development of research questions

3.1. Disclosure Transparency of Derivative Information

Two Australian studies on the transparency of derivative disclosure have been documented in Chalmers and Godfrey (2000), and Chalmers (2001). Chalmers and Godfrey (2000) explore the disparity between the accounting treatment of derivative instruments encouraged by the 1996 version of AASB 1033 and firms' accounting practices based on the 1998 financial statements of Australia's largest 500 firms. This study extends previous survey research by identifying firms' derivative accounting policies and approaches to fair value determination. The study found that the quality of the disclosures was less than satisfactory, with the major weaknesses being:

- The lack of accounting policy disclosures relating to specific types of instruments, and incompleteness in fair value disclosures.
- Considerable variation in note disclosure both across firms and within firms, hindering

⁵ AASB 1033 paragraph 5.8 requires firms to disclose a description of the anticipated transactions and the hedging instruments used plus the amount of any deferred or unrecognized gain or loss and the expected timing of revenue or expense recognition.

the understandability, comparability and consistency of derivative instruments information.

□ Limited variation in firms' derivative instruments accounting policies, with most sample firms employing hedge accounting techniques.

The study also suggests that, while firms appeared to have accepted the requirement to make quantitative disclosures about the fair values of derivative instruments, these disclosures varied in detail and clarity.

Chalmers (2001) examines Australian firms' derivative instrument disclosures over three phases, namely a pure voluntary disclosure phase, a coercive voluntary disclosure phase, and a mandatory disclosure phase. The study examines firms' responses to information demands in a changing regulatory environment from 1992 to 1998. Chalmers used a voluntary reporting disclosure index to capture derivative disclosures. The index was constructed using the disclosures suggested in the Australian Society of Corporate Treasurers' Industry Statement⁶ and ED65: *Presentation and Disclosure of Financial Instruments*. The results indicated that firms were responsive to quasi-contractual disclosure regulation since the number of firms registering a positive voluntary reporting disclosure index increased in each phase. The release of ED65, combined with the increased probability of the development of a standard, was found to be influential in achieving enhanced reporting of derivative instruments.

3.2 Disclosure Transparency of Derivative Information and Firm Characteristics

While a number of studies have examined the relation between the use of derivative instruments and firm characteristics (Berkman et al., 2002; Nguyen and Faff, 2002; Nance, Smith and Smithson, 1993; Smith and Stulz, 1985; Géczy, Minton and Schrand, 1997)⁷, no prior studies have identified the characteristics associated with the disclosure of derivative information. To develop our research questions, we therefore draw on prior research that has explored the quality of other disclosures in financial statements (Firth, 1979; Cooke, 1989, 1991 and 1992; Imhoff, 1992; Malone, Fries and Jones, 1993; Singhvi and Desai, 1971; Ahmed and Nicholls, 1994; Wallace, Naser and Mora, 1994; Wallace and Naser, 1995). These studies provide evidence on the association between corporate disclosure practices and firm characteristics such as size, leverage, profitability,

listing status, external auditor, scope of business and industry type. Researchers use several theories to explain these characteristics. These theories include agency costs, political costs, proprietary costs, corporate governance and information asymmetry (Ahmed and Courtis, 1999). Sengupta (1998) investigates the link between disclosure quality and cost of debt financing. This study indicates that firms with high disclosure quality ratings enjoy a lower effective interest cost of issuing debt. This is because timely and detailed disclosures may reduce the perception of default risk which leads to a lower cost of debt. The results indicate that disclosure quality is an important factor for lenders and underwriters in estimating a firm's default risk.

3.2.1. Size

Firm size is one of the characteristics that have been extensively related to disclosure policy. There are many reasons why large firms might disclose more information (Cooke 1991). Singhvi and Desai (1971), indicate that this is because these firms are expected to provide more transparent information since they incur lower cost of accumulating detailed information, they have more marketable securities and they have greater ease of financing. Cooke (1989) suggests that a further incentive for greater transparency is to reduce political costs. Cooke (1989, 1991), Firth (1979), Singhvi and Desai (1971), Wallace et al. (1994), Wallace and Naser (1995), Ahmed and Nicholls (1994), Riahi-Belkaoui (2001), and Ali, Ahmed and Henry (2003) provide evidence that firm size is positively associated with disclosure level. With respect to the oil and gas industry, however, Malone et al. (1993) report that there is no association between size and disclosure quality. In spite of this finding, we expect large firms to provide more transparent derivative information because they use derivatives extensively, there are economies of scale associated with disclosure and they may be subject to political and monitoring costs. This leads to our first research question:

RQ1: Do large firms in the extractive industries provide more transparent derivative disclosures in their financial statements than smaller firms?

3.2.2. High performance firms

The performance of firms has also been identified as a factor affecting disclosure quality. A profitable firm may provide more detailed information to communicate good news to investors in order to improve firm value (Ali et al., 2003) and to boost management compensation (Wallace et al., 1994). However, while Ali et al. (2003) provide evidence of a positive relationship between profitability and compliance level, Wallace and Naser (1995) identify a negative relationship between these variables. Therefore, our second research question is:

RQ2: Do high performance firms in the extractive industries provide more transparent

⁶ The industry statement was issued in March 1995 and requested firms to include derivatives information in their financial statements.

⁷ These studies have generally found that firm size, leverage and liquidity are associated with the use of derivatives.

derivative disclosures in their financial statements than lower performing firms?

3.2.3. Type of firm

A unique feature of Australian firms in the extractive industries, especially the mining industry, is that they are permitted by legislation to form a no-liability company. This is due to the uncertainty or speculative nature of the industry, especially in the exploration phase. In a no-liability company, shareholders are not legally liable to pay any calls, either while the company is a going concern or in its winding up (Ford, 1986). Therefore it is expected that disclosure transparency may differ between no-liability firms and limited liability firms. Further, no-liability firms tend to be smaller firms, and, because they tend not to have reached the production phase, they are also less likely to be profitable. As a result, they may be reluctant to provide transparent information due to: a) the high cost of accumulating detailed information, b) the fact that they may feel that the disclosure could endanger their competitive position (Singhvi and Desai, 1971), and c) they are not subject to political costs (Cooke, 1989). The above leads to the following research question:

RQ3: *Do no-liability companies in the extractive industries have less transparent derivative disclosures in their financial statements than limited liability firms?*

3.2.4. Auditor

Auditors play an important role in determining the transparency of information disclosed by their clients. Large audit firms tend to influence clients to provide high quality information so that their reputations are not diminished (Ali et al., 2003). However empirical studies provide mixed results. Singhvi and Desai (1971), Ahmed and Nicholls (1994), and Wallace and Naser (1995) find that auditor size is positively associated with disclosure level but no significant association is documented in Firth (1979), Malone et al. (1993), Wallace et al. (1994), and Ali et al. (2003). Hence, our fourth research question is:

RQ4: *Is the disclosure transparency of derivative information in the financial statements of firms in the extractive industries associated with the choice of auditor?*

4. Methodology

4.1. Sample selection and test period

Data for our study are sourced from the annual reports of all Australian listed companies in the extractive industries. These industries play a significant role in the Australian economy, where they generated exports worth more than \$30 billion in 2000 to 2001 (Department of Foreign Affairs and Trade, 2003a; 2003b). They represent approximately 25% of the listed companies on the Australian Stock Exchange (ASX). Approximately 27% of firms in the sample are no-liability firms. To be included in the sample, a

firm first must be listed on the ASX for the years from 1998 to 2001.

4.2. Research design

4.2.1. Transparency of derivative disclosures

A number of previous studies rely on corporate disclosure quality as measured by users such as the Financial Analysts Federation (Imhoff, 1992; Sengupta, 1998; Riahi-Belkaoui, 2001; Heflin, Shaw and Wild, 2001; Shaw, 2003), the Association for Investment Management Research (Lang and Lundholm, 1993; Lang et al., 2003; Lobo and Zhou, 2001; Bushee and Noe, 2000; Price, 1998) and the Center for International Financial Analysis and Research (Hope, 2003a and 2003b). However, these studies examine disclosure quality based on all the information disclosed in the annual report and other media. Other studies measure disclosure quality based on a self-constructed disclosure index. These include Cooke (1989, 1991 and 1992), Malone et al. (1993), Wallace (1988), Wallace et al. (1994), Botosan (1997), Tower, Hancock and Taplin (1999), Chalmers (2001), Taplin, Tower and Hancock (2002), and Ali et al. (2003). In these studies researchers employ either a weighted or a non-weighted index (Marston and Shrivs, 1991). A weighted index requires the conduct of a survey so that financial statement users can rate disclosure items listed by the researchers. The unweighted index is less subjective than the weighted index. In this case, researchers adopt a dichotomous procedure where a score of one is given for disclosed items, and zero otherwise. Therefore the index assumes that each item of disclosure is equally important (Cooke, 1991).

In this paper we develop an unweighted index for derivative disclosures to represent disclosure transparency based on the information in the financial statements and notes to the financial statements. Five categories of information are identified from AASB 1033. These are policy information, hedges of anticipated future transactions, risk information, net fair value information, and commodity contracts regarded as financial instruments. A score of one is given for each item based on the detailed information provided, both qualitative and quantitative, and a zero amount is allocated if firms failed to provide any information required. Table 1 documents the attributes of the disclosure index.

[INSERT TABLE 1 HERE]

To develop the index, we examine the notes to the financial statements. First, we examine the note containing the statement of accounting policies, where firms disclose the objectives for holding or issuing derivative financial instruments. In the event that firms fail to indicate their hedging behaviour in this note, we examine the note on financial instruments. We posit three possibilities with disclosures. The entities either: a) disclose that they hedge the risk internally or externally, b) disclose that they do not hedge, and c) disclose nothing about hedging. After

identifying the hedge behaviour of firms, we then capture information about hedge disclosures and net fair values of financial assets, financial liabilities and derivative financial instruments. This information is disclosed in the note on financial instruments.

To make each component of the score add equally to the total score, we divide the component score by the number of items in that component. Therefore each component contributes a score of one to the total score of five. The transparency of derivative disclosure is measured by dividing the total score for each firm by the total possible score for a firm. For example, if a firm provides all information listed in Table 1, the “disclosure transparency” of that firm is one (i.e., 5/5), and the firm is said to provide more transparent disclosures of derivative information. However, firms are not penalised if the information is not relevant to their situation i.e. the total score and total possible score are both reduced. The disclosure transparency is defined below:

$$TRANSPARENCY = \frac{\text{firm's actual disclosure score}}{\text{firm's total possible disclosure score}} \quad (1)$$

4.2.2. The association between the disclosure transparency of derivative information and firm characteristics

We examine the association between the disclosure transparency of derivative information and firm characteristics using the model specified in Equation 2. $TRANSPARENCY_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 PROFIT_{it} + \alpha_3 PE_{it} + \alpha_4 TYPE_{it} + \alpha_5 AUDIT_{it} + \alpha_6 MTB_{it} + \alpha_7 R\&D_{it} + \alpha_8 DTE_{it} + \epsilon_{it}$ (2)

Where:

$TRANSPARENCY$	= actual disclosure score/firm's total possible disclosure score
$SIZE$	= log of total assets
$PROFIT$	= earnings before tax/total assets
PE	= price/earnings before extraordinary items per share
$TYPE$	= 1 for no-liability company, 0 otherwise
$AUDIT$	= 1 for Big-5/6 auditor, 0 otherwise
MTB	= market value/net book value of tangible assets for the given class of equity
$R\&D$	= 1 for R&D firm, 0 otherwise.
DTE	= total liabilities divided by book value of common equity

We define $SIZE$ as the log of total assets. This is because the measure “total assets” is the least affected by market fluctuations in the oil and gas industry (Malone et al., 1993). Because of the variability in the level of total assets between firms, we follow prior

research and transform the size variable into its natural log in order to normalise the distribution.⁸ High performance is measured by two variables: profitability ($PROFIT$) and price-earnings ratio (PE). The former measures current performance while the latter provides a measure of the market's perception of the firm's expected future performance. Whether the firm is a no-liability firm or a limited liability firm is indicated by $TYPE$, while $AUDIT$ distinguishes between the use of a Big 5 (or Big 6) auditor and a smaller audit firm.

We also include three control variables that have been found in prior research to be associated with disclosure. We use two variables for growth opportunities. First, MTB measures the market value of the firm divided by the book value of tangible assets. This provides a measure of the market's perceptions of the value of the firm relative to assets-in-place, with a high value suggesting growth opportunities (Smith and Watts, 1992; Gaver and Gaver, 1993). Second, we use a dichotomous variable indicating whether or not the firm engages in research and development activities ($R\&D$). R&D activities are an indication that the firm is likely to grow in the future (Gaver and Gaver, 1993; Percy, 2000; Clinch, 1991).

The other control variable is leverage, which is represented by total liabilities to book value of common equity. Theory suggests that firms with high leverage are expected to reduce disclosure since the agency costs of debt are controlled through restrictive debt covenants rather than increased disclosure in financial reports (Jensen, 1986; Eng and Mak, 2003). However, prior studies such as Hossain and Adams (1995) and Ali et al. (2003) provide evidence that leverage is not significantly associated with disclosure. Further, Ahmed and Courtis (1999) indicate that leverage is positively related to disclosure levels. Specific to the oil and gas industry, Malone et al. (1993) indicate that firms with high debt-to-equity ratios disclose greater financial information than firms with low debt-to-equity ratios.

5. Results

5.1. Sample

As at the end of 2001, there were 354 firms involved in the extractive industries listed on the ASX. We were unable to obtain the annual reports for 89 firms and these were eliminated from our sample. The sample was further reduced to 137 firms by excluding: a) foreign listed firms, b) newly listed/delisted firms, c) mining servicing firms, d) firms in receivership and e) firms with missing data. Table 2 summarises the sample selection procedure.

[INSERT TABLE 2 HERE]

⁸ The largest firm is BHP Billiton Ltd. with total assets amounting \$37,082m, and the smallest firm is Kalrez Energy Ltd. with total assets amounting \$0.97m.

Table 3 presents details of the use of derivative instruments among the 137 firms, classified by type of firm. Only 65 firms indicate that they use derivative instruments during the period of study, and the majority of these are limited liability companies. The number of firms disclosing that they do not use derivatives increases from one (1998) to six (2001) for limited liability firms, but decreases from ten (1998) to eight (2001) for no-liability firms. The majority of firms making no disclosures are no-liability firms.

[INSERT TABLE 3 HERE]

5.2. Disclosure transparency

5.2.1. Firms' disclosure scores

Table 4 reports the number of firms classified according to the transparency of their derivative disclosures. Panel A reports the level of disclosure for the user sample (65 companies) for each year. The number of firms in the user sample providing more transparent information is indicated in column 7. In 1998 there are 11 firms disclosing 100% of derivative information. The number increases to 15 in 1999, but decreases to ten in 2000 and 2001. This decrease is offset by the increase in the number of firms providing 90% to 99% information.

[INSERT TABLE 4 HERE]

5.2.2. Disclosure components

As discussed in the previous section, each component of the disclosure index plays an important role in determining the transparency of derivative disclosures. Table 5 reports descriptive statistics for each disclosure component for the pooled sample (65 times 4 years). Panel A reports the statistics for all firms. The mean for each disclosure component (Panel A) indicates that firms disclose almost all information with regard to policy information (99.62%). However they withhold some information in relation to hedges of anticipated transactions (76.72%), risk information (81.09%), net fair value information (81.30%), and commodity contracts information (36.54%).

A comparison of Panel B and Panel C indicates that no-liability firms make fewer disclosures than limited liability firms. This may be because no-liability firms incur higher relative costs of accumulating detailed information about hedges of anticipated transactions, risk information, net fair value and commodity contracts information. Alternatively, increased disclosure could endanger their competitive position.

Further investigation of each component reveals that some firms fail to disclose detailed information about the expected timing of recognition of any deferred or unrecognized gain or loss as revenue or expense, the aggregate net fair value, and the carrying amount and net fair value of either the individual asset or appropriate grouping of individual assets. Even though it is argued that fair value is relevant for users

to assess the effect of derivative transactions (Rasch and Wilson, 1998), some firms appear to be unwilling to move to fair value accounting (Deloitte Touche Tohmatsu, 2000). We also find that firms do not disclose their reasons for not reducing the carrying amount to net fair value. As a consequence they do not provide any information about evidence for their belief that the carrying amount will be recovered.

[INSERT TABLE 5 HERE]

Table 6 reports the trend of derivative disclosures among user firms over the period of the study. Panel A indicates that policy information as required by paragraph 5.2 (a), (b) and paragraph 5.3 AASB 1033 is fully disclosed in all years except 1998. Further, there is a steady increase over the four year period in disclosure transparency of hedges of anticipated transactions and risk information.

[INSERT TABLE 6 HERE]

Of concern, Panel B shows that the mean score for net fair value information is decreasing for limited liability firms. However, there is no consistent pattern in the trend for no-liability firms. We find that firms continue to use their discretion in the disclosure of certain information, in particular, net fair value information, even though this is required by AASB 1033. Therefore, as in Chalmers and Godfrey (2000), this lack of disclosure may hinder the understandability, comparability, and consistency, and hence the transparency of derivative disclosures among firms in the extractive industries.

5.2.3. Disclosure transparency of derivative information and firm characteristics Standard regression

Table 7 reports the descriptive statistics and correlation matrix for the dependent and independent variables in the firm characteristics model. Panel A shows that, for the dependent variable, the average transparency score is 88.71% for the pooled sample. Examining each year reveals that average transparency increases from 86.29% in 1998 to 90.23% in 2001. This indicates that the level of derivative disclosures among firms in the extractive industries has increased for each year. The level of dispersion across the period of study appears to be reducing, as indicated by the standard deviation which has reduced from 0.1137 in 1998 to 0.0772 in 2001.

[INSERT TABLE 7 HERE]

Panel A shows that there is little variability in the means for size, profitability, leverage (debt-to-equity ratio) and research and development over the period of study. The means of the price-earnings ratio and market-to-book ratio are more variable, with positive means in two years and negative in two years. The proportion of limited liability firms increases over the period from 58% to 66% while in all years more than 80% of firms use a Big Six auditor. Panel B indicates that, while the size variable is correlated with a number of other variables, only two coefficients exceed 0.60. This suggests that multicollinearity is unlikely to be a problem.

Table 8 presents the results of the regression analysis of the association between disclosure transparency and firm characteristics.⁹ As predicted, firm size is positively related to disclosure transparency and is highly significant ($p < 0.001$). This indicates that large firms tend to provide more transparent information compared to small firms. Our finding is consistent with work undertaken by Singhvi and Desai (1971), Firth (1979), Cooke (1989, 1991), Wallace et al. (1994), Wallace and Naser (1995), Riahi-Belkaoui (2001) and Ali et al. (2003). This finding is probably due to lower information processing costs for large firms but it is also possible that higher political costs incurred by these firms encourage greater transparency. The coefficient estimates for profitability and price-earnings ratio are also positively significant ($p = 0.0391$ and $p = 0.0406$ respectively) but firm type and auditor are not significant. Two of the control variables, debt-to-equity ratio and market-to-book ratio, are significant ($p = 0.0212$ and $p = 0.0021$ respectively). However, contrary to our expectation, market-to-book ratio is negatively related to the transparency of derivative information. The coefficient estimate for research and development is not significant.¹⁰

[INSERT TABLE 8 HERE]

Time might influence the behaviour of all variables, and therefore might affect the above results. The preceding analysis assumes that each firm-year can be treated as an independent observation. However the degrees of freedom in calculating the significance levels are overstated if the independent variables fail to remove autocorrelation in the dependent variable (Lang and Lundholm, 1993). Therefore we repeat the regression analysis for each year and also using average data for the four years.¹¹ Results are reported in Table 9, which indicates that size is only significant in 2000 and 2001 at $p = 0.05$ and $p < 0.001$, respectively. Size is also significant at $p = 0.05$ when we use average data. We also find that profitability is significant at $p = 0.05$ in 2000 and at $p = 0.10$ for average data. The significance of profitability may be due to the reaction towards the re-issuance of AASB 1033 in 1999. Since firms with high profitability may be subject to political costs and monitoring costs, they may provide more transparent information, especially immediately after the issuance of accounting pronouncements. However none of the variables are significant in 1998 and 1999 suggesting that the results in Table 10 might be influenced by particular years (Lang and Lundholm, 1993).¹²

⁹ Since heteroscedasticity is present, we use White's Heteroscedasticity-Corrected Standard Errors (White, 1980) to estimate the model.

¹⁰ Our results are consistent when we estimate the model without the outliers.

¹¹ Similar approaches were performed in Lang and Lundholm (1993).

¹² Except for 1998, there is no heteroscedasticity present in year-by-year and average regression analysis.

[INSERT TABLE 9 HERE]

Ranked regression

We repeat the regression analysis using the ranked regression procedure as in Lang and Lundholm (1993), Wallace et al. (1994), Owusu-Ansah (1998) and Ali et al. (2003). The procedure is an alternative approach to other robust techniques, and a powerful method for analysing data with monotonic and non-linear relations (Iman and Conover, 1979; Lang and Lundholm, 1993; and Wallace et al., 1994). The rank transformation is a simple procedure where the continuous variables are replaced with their rank. Table 10 shows that the explanatory power of this model increases from 22.37% (Table 8) to 32.98%. Size, price-earnings ratio and debt-to-equity ratio are positively related to disclosure transparency and are highly significant at $p < 0.001$.¹³ However, market-to-book ratio and profitability are not significant.

[INSERT TABLE 10 HERE]

Table 11 shows the results of ranked regression for year-by-year and four-year average data. The table indicates that leverage (*RDTE*) is positively significant at $p < 0.05$ (1999, 2000, and 2001) and at $p < 0.10$ (1998 and average data). The price-earnings ratio is positively related to disclosure transparency at $p < 0.05$ for 1998 and at $p = 0.01$ for 2000 and for the average data. However R&D is negatively related to disclosure transparency at $p = 0.0631$ in 2001. Size is only significant in 2001 and for the average data.¹⁴

[INSERT TABLE 11 HERE]

6. Conclusion

In this study we examine the transparency of derivative disclosures of Australian firms in the extractive industries using 1998 to 2001 annual reports. The quality of financial reporting has become a major corporate governance issue in recent years and disclosure transparency is an important component of the quality of financial reporting. We measure disclosure transparency using an index developed from AASB 1033 *Presentation and Disclosure of Financial Instruments*. We then examine the relationship between disclosure transparency and firm characteristics, represented by size, performance, growth opportunities, auditor, type of extractive firm and leverage.

We find that the transparency of derivative disclosures among user firms has increased over the period of the study. However, companies in the extractive industries still use discretion in the disclosure of derivative information, especially in relation to net fair value. Our regression results

¹³ The results are based on the White's Heteroscedasticity-Consistent Standard Errors, and are consistent with the results of estimation without the outliers.

¹⁴ We re-estimate the model without the outliers, and the results are consistent with the full sample for 1999 and 2001.

relating to firm characteristics indicate that size, price-earnings ratio, and debt-to-equity ratio, and to a limited extent, market-to-book ratio, research and development and profitability, are associated with disclosure transparency.

Our results point to a lack of enforcement of accounting standards in Australia, consistent with the findings of Hope (2003a). This is of concern in view of Australia's move to adopt international accounting standards as global harmonization will only be achieved if countries rigorously enforce standards.

Our study has a number of limitations. First, the findings could be biased since our sample is based on those companies that responded to our request for annual reports or that were included in the Connect 4 Annual Report Collection Database. Second, our sample of firms using derivatives is relatively small and this may have limited the power of our statistical tests. Lack of variability in our independent variables such as type of auditor may also have led to insignificant findings. These limitations provide opportunities for future research to further explore the association between firm characteristics and the transparency of derivative disclosures. In addition, exploring these issues in other industries and in other jurisdictions are fruitful avenues for further research.

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Table 1. Components of derivative disclosure index

	Reference	Score
<i>Policy Information</i>		
<input type="checkbox"/> Accounting policies and method adopted	Para 5.2 (a)	1
<input type="checkbox"/> a) Extent and nature of the underlying financial instruments, b) including significant terms and conditions that may affect the amount, timing, and uncertainty of future cash flows.	Para 5.2 (b)	2*
<input type="checkbox"/> Objectives for holding or issuing derivative financial instruments	Para 5.3	1
Component score		4
<i>Hedge of Anticipated Transaction</i>		
<input type="checkbox"/> a) A description of the anticipated transaction, b) including the period of time until they are expected to occur.	Para 5.8 (a)	2*
<input type="checkbox"/> A description of the hedging instruments.	Para 5.8 (b)	1
<input type="checkbox"/> a) Amount of any deferred or unrecognized gain or loss and b) the expected timing of recognition as revenue or expense.	Para 5.8 (c)	2*
Component score		5
<i>Risk Information</i>		
<input type="checkbox"/> Contractual repricing or maturity dates for interest rate risk	Para 5.4 (a)	1
<input type="checkbox"/> Effective interest rates or weighted average	Para 5.4 (b)	1
<input type="checkbox"/> The maximum amount of credit risk exposure at reporting date	Para 5.5 (a)	1
Component score		3
<i>Net Fair Value Information</i>		
<input type="checkbox"/> a) The aggregate net fair value as at the reporting date, b) showing separately the aggregate net fair value of those financial assets or financial liabilities which are not readily traded on organized markets in standardized form.	Para 5.6 (a)	2*
<input type="checkbox"/> The method or methods adopted in determining net fair value.	Para 5.6 (b)	1
<input type="checkbox"/> Any significant assumptions made in determining net fair value.	Para 5.6 (c)	1
<input type="checkbox"/> The carrying amount and the net fair value of either the individual asset or appropriate groupings of those individual assets.	Para 5.7 (a)	1
<input type="checkbox"/> a) The reasons for not reducing the carrying amount, b) including the nature of the evidence that provides the basis for management's belief that the carrying amount will be recovered.	Para 5.7 (b)	2*
Component score		7
<i>Commodity Contracts Information</i>		
<input type="checkbox"/> Contract for commodity gold	Para 5.9 (a)	1
Component score		1

* A score of one is allocated for each item discloses in the notes to the financial statements.

Table 2. Summary of sample selection procedure

Selection Criteria	No of Firm
No of listed firms in the extractive industries	354
- Firms that did not respond and are not on Connect 4	89
- Foreign firms	19
- Newly listed/delisted firms	43
- Mining servicing/investment firms	6
- Domain / under receivership	2
- Missing information	46
- Missing share price data	12
Usable annual reports	137

Table 3. The use of derivative financial instruments for hedging purposes

Status	Limited Liability Firm				No Liability Firm				Total			
	1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001
User	38	40	43	43	27	25	22	22	65	65	65	65
Unknown	7	7	23	34	54	52	37	24	61	59	60	58
Non-user	1	1	5	6	10	12	7	8	11	13	12	14
Total	46	48	71	83	91	89	67	54	137	137	137	137

Table 4. Disclosure transparency of firms in the Australian extractive industries

Year	< 30%	30%-49%	50%-69%	70%-89%	90%-99%	100%
Panel A: User sample (n=65)						
1998	0	0	7	27	20	11
1999	0	0	4	25	21	15
2000	0	0	3	25	27	10
2001	0	0	1	23	31	10
Panel B: Limited Liability firms in user sample						
1998 (n=38)	0	0	1	13	14	10
1999 (n=40)	0	0	1	15	13	11
2000 (n=43)	0	0	2	14	19	8
2001 (n=43)	0	0	0	13	22	8
Panel C: No-liability firms in user sample						
1998 (n=27)	0	0	6	14	6	1
1999 (n=25)	0	0	3	10	8	4
2000 (n=22)	0	0	1	11	8	2
2001 (n=22)	0	0	1	10	9	2

Table 5. Descriptive statistics of disclosure components (pooled sample)

	Mean	Standard Deviation	Median	Minimum	Maximum
Panel A: User Sample (n=260)					
Policy Information	0.9962	0.0620	1.0000	0.0000	1.0000
Hedge of Anticipated Transaction	0.7672	0.3490	1.0000	0.0000	1.0000
Risk Information	0.8109	0.2840	1.0000	0.0000	1.0000
Net Fair Value Information	0.8130	0.1404	0.7500	0.5000	1.0000
Commodity Contracts Information	0.3654	0.4825	0.0000	0.0000	1.0000
Panel B: Limited liability firms in User Sample (n=168)					
Policy Information	1.0000	0.0000	1.0000	1.0000	1.0000
Hedge of Anticipated Transaction	0.8508	0.2539	1.0000	0.0000	1.0000
Risk Information	0.8571	0.2542	1.0000	0.0000	1.0000
Net Fair Value Information	0.8187	0.1388	0.7500	0.5000	1.0000
Commodity Contracts Information	0.4405	0.4979	0.0000	0.0000	1.0000
Panel C: No-liability firms in User Sample (n=92)					
Policy Information	0.9891	0.1043	1.0000	0.0000	1.0000
Hedge of Anticipated Transaction	0.6145	0.4380	0.8000	0.0000	1.0000
Risk Information	0.7264	0.3160	0.6667	0.0000	1.0000
Net Fair Value Information	0.8028	0.1435	0.7500	0.5000	1.0000
Commodity Contracts Information	0.2283	0.4220	0.0000	0.0000	1.0000

Table 6. Mean disclosure components of user firms for the period 1998 to 2001

	1998	1999	2000	2001
Panel A: User Sample (n=65)				
Policy Information	0.9846	1.0000	1.0000	1.0000
Hedges of Anticipated Transactions	0.6851	0.7272	0.7979	0.8585
Risk Information	0.7513	0.8077	0.8385	0.8462
Net Fair Value Information	0.8198	0.8152	0.8051	0.8121
Commodity Contracts Information	0.3692	0.3692	0.3538	0.3692
Panel B: Limited liability firms				
	(n=38)	(n=40)	(n=43)	(n=43)
Policy Information	1.0000	1.0000	1.0000	1.0000
Hedges of Anticipated Transactions	0.8531	0.8783	0.8512	0.8992
Risk Information	0.8421	0.8667	0.8605	0.8760
Net Fair Value Information	0.8515	0.8255	0.8109	0.8090
Commodity Contracts Information	0.5000	0.4750	0.4186	0.4186
Panel C: No-liability firms				
	(n=27)	(n=25)	(n=22)	(n=22)
Policy Information	0.9630	1.0000	1.0000	1.0000
Hedges of Anticipated Transactions	0.4444	0.4853	0.6939	0.7788
Risk Information	0.6235	0.7133	0.7955	0.7879
Net Fair Value Information	0.7751	0.7986	0.7938	0.8182
Commodity Contracts Information	0.1852	0.2000	0.2273	0.2727

Table 7. Descriptive statistics and correlation matrix: firm characteristics model

Panel A: Means (Standard deviations)					
Variable	1998 (n=65)	1999 (n=65)	2000 (n=65)	2001 (n=65)	Pooled (n=260)
TRANSPARENCY	0.8629(0.1137)	0.8905(0.09854)	0.8928(0.08691)	0.9023(0.0772)	0.8871(0.0956)
SIZE	18.3682(2.0473)	18.4466(1.9903)	18.5134(1.9649)	18.5639(1.9698)	18.4726 (1.9830)
PROFIT	-0.0616(0.2921)	-0.0392(0.2002)	-0.0965(0.6666)	-0.0325(0.2857)	-0.0574 (0.4020)
PE	-6.8185(104.9639)	48.0050(259.2588)	6.2190(65.5440)	-0.0247(36.8096)	11.8452 (145.5570)
TYPE	0.4154(0.4966)	0.3846(0.4903)	0.3385(0.4769)	0.3385(0.4769)	0.3692 (0.4835)
AUDIT	0.8154(0.3910)	0.8308(0.3779)	0.8615(0.3481)	0.8615(0.3481)	0.8423 (0.3652)
MTB	0.0537(16.2549)	-0.1815(19.8379)	4.0848(7.9907)	-	-1.5293 (50.1274)
R&D	0.3231(0.4966)	0.3231(0.4713)	0.3231(0.4713)	10.0741(96.6262)	0.3154 (0.4656)
DTE	0.3064(0.5106)	0.3156(0.5481)	0.2819(0.4263)	0.2923(0.4584)	0.2992 (0.4854)

Panel B: Correlation Matrix*									
	TRANSP	SIZE	PROFIT	PE	TYPE	AUDIT	MTB	R&D	DTE
TRANSPARENCY	1.0000								
SIZE	0.4696***	1.0000							
PROFIT	0.2178***	0.2820***	1.0000						
PE	0.1309**	0.1398**	0.0280	1.0000					
TYPE	-	-	-	-0.0712	1.0000				
AUDIT	0.2718***	0.6193***	0.2022***			1.0000			
MTB	0.1421**	0.3810***	0.2094***	0.1073*	-0.3906***	0.0609	1.0000		
R&D	-0.0415	-0.0062	-0.0116	-0.0027	0.0609	-0.0487	0.0688	1.0000	
DTE	0.2999***	0.6307***	0.1158*	0.1037*	-0.3306***	0.2937***	0.0017	0.2854***	1.0000

* Pearson correlations are adjusted automatically by SPSS when variables are dichotomous

Variable Definitions:

- TRANSPARENCY = firm's actual disclosure scores/firm's total possible disclosure scores
 SIZE = log of total assets
 PROFIT = earnings before tax/total assets
 PE = price/earnings before extraordinary items per share
 TYPE = 1 for no-liability company, 0 otherwise.
 AUDIT = 1 for Big-5/6 auditor, 0 otherwise
 MTB = market value/net book value of tangible assets for the given class of equity
 R&D = 1 for R&D firm, 0 otherwise.
 DTE = total liabilities divided by book value of common equity

Table 8. Results of regression analysis of the association between disclosure transparency and firm characteristics (n=260)

$$TRANSPARENCY_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 PROFIT_{it} + \alpha_3 PE_{it} + \alpha_4 TYPE_{it} + \alpha_5 AUDIT_{it} + \alpha_6 MTB_{it} + \alpha_7 R\&D_{it} + \alpha_8 DTE_{it} + \epsilon_{it}$$

Variable	Predicted Sign	Coefficient	Std. Error	t-Statistics	Prob
Constant	?	0.5602	0.0773	7.2431	0.0000
SIZE	+	0.0178	0.0043	4.1864	0.0000***
PROFIT	+	0.0267	0.0129	2.0742	0.0391**
PE	+	3.93E-05	1.91E-05	2.0587	0.0406**
TYPE	-	0.0016	0.0146	0.1080	0.9141
Audit	+/-	-0.0131	0.0188	-0.6956	0.4873
MTB	+	-8.25E-05	2.65E-05	-3.1070	0.0021***
R&D	+	0.0071	0.0136	0.5194	0.6039
DTE	+/-	0.0232	0.0100	2.3196	0.0212**

Adjusted R² = 0.2237 Durbin-Watson Statistics = 1.9801
 F statistics = 10.3266 p-value = 0.0000
 *** and ** indicate significance at p < 0.001 and p < 0.05 respectively.

Variable Definitions:

- TRANSPARENCY = firm's actual disclosure scores/firm's total possible disclosure scores
- SIZE = log of total assets
- PROFIT = earnings before tax/total assets
- PE = price/earnings before extraordinary items per share
- TYPE = 1 for no-liability company, 0 otherwise.
- AUDIT = 1 for Big-5/6 auditor, 0 otherwise
- MTB = market value/net book value of tangible assets for the given class of equity
- R&D = 1 for R&D firm, 0 otherwise.
- DTE = total liabilities divided by book value of common equity
- i = firm
- t = year

Table 9. The association between firm characteristics and disclosure transparency on a year-by-year basis and an average of four years' data (n=65)

$$TRANSPARENCY_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 PROFIT_{it} + \alpha_3 PE_{it} + \alpha_4 TYPE_{it} + \alpha_5 AUDIT_{it} + \alpha_6 MTB_{it} + \alpha_7 R\&D_{it} + \alpha_8 DTE_{it} + \epsilon_{it}$$

Variable	Sign	1998	1999	2000	2001	Average
Constant	?	0.5296(2.3080)	0.6187(2.9074)	0.5751(3.6711)	0.5054(3.2678)	0.5758(3.9533)
SIZE	+	0.0163(1.2444)	0.0147(1.2726)	0.0184(2.1056)**	0.0233(2.7021)***	0.0171(2.1197)**
PROFIT	+	0.0295(0.4844)	-0.0101(-0.1623)	0.0356(2.2524)**	0.0002(0.0055)	0.0831(1.9538)*
PE	+	6.29E-05(1.0282)	1.10E-05(0.2331)	0.0002(0.8821)	9.54E-06(0.0366)	2.13E-05(0.1720)
TYPE	-	-0.0141(-0.3410)	0.0090(0.2649)	0.0231(0.9020)	0.0018(0.0768)	0.0135(0.5870)
Audit	+/-	0.0275(0.67351)	-0.0308(-0.9013)	-0.0363(-1.1111)	-0.0346(-1.2031)	-0.0156(-0.5170)
MTB	+	-0.0004(-1.0282)	-5.26E-05(-0.0881)	-0.0013(-0.9775)	-4.17E-05(-0.4437)	5.68E-05(0.1619)
R&D	+	0.0258(0.7399)	0.0309(0.8974)	0.0051(0.1738)	-0.0318(-1.2162)	-0.0010(-0.0378)
DTE	+/-	0.0354(1.3490)	0.0380(1.5108)	0.0202(0.6243)	0.0089(0.3629)	0.0275(1.0640)
R ²		0.3637	0.2392	0.2936	0.2482	0.3372
Adjusted R ²		0.2728	0.1306	0.1927	0.1408	0.2425
F statistics		4.001	2.2014	2.9096	2.3109	3.5608
p-value		0.0008	0.0409	0.0087	0.0323	0.0021
Durbin-Watson Stat.		1.9916	2.1151	1.960	1.6886	1.9048

Note: Number in italic represents the t-value.
 ***, ** and * indicate significance at p < 0.01, p < 0.05, and p < 0.10 respectively.

Variable Definitions:

- TRANSPARENCY = firm's actual disclosure scores/firm's total possible disclosure scores
- SIZE = log of total assets
- PROFIT = earnings before tax/total assets
- PE = price/earnings before extraordinary items per share
- TYPE = 1 for no-liability company, 0 otherwise.
- AUDIT = 1 for Big-5/6 auditor, 0 otherwise
- MTB = market value/net book value of tangible assets for the given class of equity
- R&D = 1 for R&D firm, 0 otherwise.
- DTE = total liabilities divided by book value of common equity
- i = firm
- t = year

Table 10. Results of regression analysis of the association between disclosure transparency and firm characteristics: ranked transformation (n=260)

$$RTRANSPARENCY_{it} = \alpha_0 + \alpha_1 RSIZE_{it} + \alpha_2 RPROFIT_{it} + \alpha_3 RPE_{it} + \alpha_4 TYPE_{it} + \alpha_5 AUDIT_{it} + \alpha_6 RMTB_{it} + \alpha_7 R\&D_{it} + \alpha_8 RDTE_{it} + \epsilon_{it}$$

Variable	Predicted Sign	Coefficient	Std. Error	t-Statistics	Prob
Constant	?	28.3921	19.7543	1.4373	0.1519
RSIZE	+	0.3394	0.1007	3.3720	0.0009***
RPROFIT	+	0.0457	0.0672	0.6805	0.4968
RPE	+	0.2168	0.0625	3.4682	0.0006***
TYPE	-	16.2860	11.5022	1.4159	0.1580
Audit	+/-	12.4352	12.5933	-0.9874	0.3244
RMTB	+	-0.0584	0.0480	-1.2170	0.2248
R&D	+	-9.1751	10.5397	-0.8705	0.3848
RDTE	+/-	0.2953	0.0727	4.0610	0.0001***

Adjusted R² = 0.3298 Durbin-Watson Statistics = 2.0311
 F statistics = 16.9348 p-value = 0.0000
 *** indicates significance at p < 0.001.

Variable Definitions:

- RTRANSPARENCY = rank of disclosure transparency
- RSIZE = rank of total assets (in thousands)
- RPROFIT = rank of profitability
- RPE = rank of price/earnings ratio
- TYPE = 1 for no-liability company, 0 otherwise.
- AUDIT = 1 for Big-5/6 auditor, 0 otherwise
- RMTB = rank of market-to-book ratio
- R&D = 1 for R&D firm, 0 otherwise.
- RDTE = rank of total liabilities divided by book value of common equity
- i = firm
- t = year

Table 11. Results of regression analysis of the association between disclosure transparency and firm characteristics: ranked transformation on a year-by-year basis and an average of four years' data (n=65)

$$RTRANSPARENCY_{it} = \alpha_0 + \alpha_1 RSIZE_{it} + \alpha_2 RPROFIT_{it} + \alpha_3 RPE_{it} + \alpha_4 TYPE_{it} + \alpha_5 AUDIT_{it} + \alpha_6 RMTB_{it} + \alpha_7 R\&D_{it} + \alpha_8 RDTE_{it} + \epsilon_{it}$$

Variable	Sign	1998	1999	2000	2001	Average
Constant	?	-1.6311(-0.1513)	11.3338(1.0231)	-0.3126(-0.0327)	12.2362(1.3574)	-0.3448(-0.0401)
RSIZE	+	0.3489(1.5457)	0.3441(1.3742)	0.3082(1.4997)	0.5289(2.5131)**	0.4950(2.4063)**
RPROFIT	+	0.0651(0.5202)	0.0449(0.3207)	0.1007(0.7465)	-0.1327(-0.8845)	-0.1118(-0.8609)
RPE	+	0.2538(2.2119)**	0.1295(0.9058)	0.4025(3.1028)***	0.1262(0.9221)	0.3289(2.9072)***
TYPE	-	4.5127(0.6987)	7.3515(1.1111)	8.4531(1.5461)	-1.9163(-0.3543)	4.3767(0.8670)
Audit	+/-	4.3953(0.8124)	-8.4463(-1.3260)	0.2320(0.0358)	-6.6545(-0.9327)	-1.1674(-0.1891)
RMTB	+	-0.0546(-0.5281)	-0.0501(-0.4307)	-0.1632(-1.5469)	0.1154(1.0071)	0.0914(0.8493)
R&D	+	-1.7565(-0.3421)	1.2673(0.2052)	-5.0549(-0.8653)	-11.4372(-1.8960)*	-6.4618(-1.1869)
RDTE	+/-	0.2880(1.9988)*	0.3026(2.0738)**	0.3180(2.2104)**	0.2861(2.1446)**	0.2498(1.9579)*
Adjusted R ²		0.3988	0.2047	0.3248	0.2804	0.3831
F statistics		6.3065	3.0590	4.8482	4.1170	5.9673
p-value		0.0000	0.0063	0.0001	0.0006	0.0000
Durbin-Watson Stat.		2.0934	2.0785	1.8453	1.8655	2.0722

Note: Number in italic represents the t-value.
 ***, ** and * indicate significance at p < 0.01, p < 0.05, and p < 0.10 respectively.

Variable Definitions:

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- RSIZE = rank of total assets (in thousands)
- RPROFIT = rank of profitability
- RPE = rank of price/earnings ratio
- TYPE = 1 for no-liability company, 0 otherwise.
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- R&D = 1 for R&D firm, 0 otherwise.
- RDTE = rank of total liabilities divided by book value of common equity
- i = firm
- t = year