Reliability of Asset Revaluations: The Impact of Appraiser Independence

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Abstract

In this paper we examine whether there are differences in the reliability of asset revaluations made by boards of directors versus independent (external) appraisers. We use a sample of recognized Australian asset revaluations. As a first step we examine the determinants of the choice between director-based revaluations and those undertaken by independent appraisers. We find that independent appraisers are more likely to be used for revaluations of land and buildings and directors are more likely for investments, plant and equipment and identifiable intangibles. We interpret this as evidence of firms harnessing directors' knowledge of asset specificities. We also find that firms with less independent boards are more likely to use independent appraisers. We interpret this as evidence of substitutability between governance mechanisms.

As for differences in reliability, we find that revaluations of plant and equipment that are made by independent appraisers are more reliable than those by directors. However, we are unable to detect a difference for other classes of non-current assets. We define reliability in terms of ex-post adjustments of recognized value increases. Reliability is determined by an examination of the extent to which upward revaluations are subsequently reversed.

Introduction

The current move towards greater internationalization of accounting standards has rekindled the debate over the recognition of current values. In particular, the International Accounting Standards Committee (IASC) re-issued *IAS 16 Property, Plant and Equipment* on 1 October, 1998, and the Financial Accounting Standards Board (FASB) has undertaken to assess the provisions of this standard as part of its review of international accounting standards. IAS 16 allows for upward revaluations of non-current assets, and requires disclosures identifying whether an independent appraiser was involved. Proponents of asset revaluations contend that by disallowing the recognition of upward revaluations, the US may be foregoing opportunities to increase the relevance of financial statements. However, US regulators have very strict views about the internationalization of accounting standards. Schroeder (1998) cites previous SEC chairman Arthur Levitt as saying "Any set of global accounting standards must satisfy a fundamental test – does it provide the necessary transparency, comparability and full disclosure?" The reliability of current value estimates is an important issue facing regulators assessing the merits of asset revaluations.

Asset revaluations have received considerable research interest recently (Easton, Eddey and Harris (1993), Barth and Clinch (1998) and Aboody, Barth and Kasznik (1999)). They represent a major departure from historical cost accounting, allowing the book value of non-current assets to be adjusted from historical cost to some other value (for example, fair or market value). Adjusting to a value below historical cost is not controversial, as recognizing impairments in the value of an asset is consistent with the conservative nature of accounting. However adjusting to a value above historical cost is the cause of substantial debate in current standard setting. Such

departures are questioned on the grounds of relevance and reliability. Advocates of revaluation cite increased relevance of financial reports, while opponents cite a loss of reliability (e.g., Easton, Eddey and Harris, 1993).

Concerns about reliability are particularly prevalent where directors of the revaluing firm rather than a qualified independent appraiser undertake the valuation. However, while it may be the case that revaluations undertaken by "insiders" lack the credibility imparted by an independent third party, managers may be better equipped to identify the benefits that will flow from continued use and subsequent disposal of certain assets. That is, "insiders" in some circumstances may provide more reliable revaluations given their specific knowledge of the assets' use. In this paper, we examine whether revaluations made by independent appraisers are more reliable than those made by directors for several distinct classes of non-current assets.

We have chosen Australia as the institutional setting to examine the reliability of asset revaluations, and the impact of appraiser independence on that reliability. Restatement to current values has been common practice in Australia for many years (Sharpe and Walker, 1975), with both independent and directors' revaluations being widely used.[1] AASB 1010 *Accounting for Revaluations of Non-Current Assets* governed accounting for asset revaluations between 1987 and 2000.[2] This accounting standard prescribes the accounting treatment for upward asset revaluations, and requires disclosure of specific information pertaining to the revaluation. In particular, recognized revaluation increments are booked to an asset revaluation reserve.[3] Subsequent reversals of recognized upward revaluations are treated as decrements to the asset

revaluation reserve, and are *required* when the carrying amount of an asset falls below its recoverable amount.[4]

We limit our analysis to upward revaluations as these represent the area of most concern to regulators and practitioners with the advent of international accounting standards. Asset write-downs are commonplace in the US and have been examined extensively (e.g., Rees, Gill and Gore, 1996). We focus solely on upward revaluations as there is scant evidence addressing the issue of reliability of these estimates. Our measure of reliability is conservative by design. That is, our focus is on upward bias rather than accuracy, as the concern from regulators and practitioners has stemmed from overstatement of asset values.

Previous research suggests that upward revaluations are relevant for the capital markets, and that they are associated with future operating performance (Easton, Eddey and Harris (1993), Barth and Clinch (1998), Harris and Muller (1998), Aboody, Barth and Kasznik (1999)). In particular, Barth and Clinch (1998) find that the market considers both director and independent revaluations to be value relevant. They suggest that the capital market values the private information of the directors, and that this outweighs potential manipulation by opportunistic directors. While Barth and Clinch find no difference in value relevance, their work is silent on the possibility of differential reliability across appraiser type. Indeed, most tests of value relevance are joint tests of relevance and reliability. In this paper we attempt to analyze the construct of reliability separately from relevance.

As a first stage to our analysis, we model the choice of appraiser type. We find that internally generated revaluation estimates are more likely for identifiable intangibles and plant and equipment than for land and buildings. Arguably, these asset classes have a higher degree of specificity. Firms appear to be utilizing the directors' knowledge of these specificities in generating estimates of recoverable amounts. We also find evidence that independent revaluations are less likely in the presence of an independent board. This finding is consistent with the results of Bushman et al. (2001) who find evidence that firms rationally substitute between costly governance mechanisms.

The second stage of our analysis involves examining differences in reliability across appraiser type. Our measure of reliability is motivated in part by Sloan's (1999) discussion of the approach used in Aboody, Barth and Kasznik (1999). Sloan argues that while the analysis of ex post realizations is potentially useful for evaluating the reliability of accounting estimates, "the ex post realizations that are used should correspond more closely to the attributes being estimated by management."[5] Aboody, Barth and Kasznik use future realizations of operating performance as an ex post measure of asset revaluation reliability. However, as Bernard (1993) indicates, estimates of current values of non-current assets are expected to be only weakly linked to operating cash flows. To identify ex post realizations that are closely related to the initial revaluation we examine subsequent reversals of upward revaluations. We examine the extent to which recognized revaluations are reversed over subsequent years by a write-down to the asset revaluation reserve. We propose that less reliable revaluations are reversed to a greater extent, reflecting an initial upward bias in the revaluation. We believe that this measure more accurately

captures the degree of correspondence between managers' estimates and the underlying attribute being measured.

A possible limitation of our measurement relates to the factors that determine the decision to write-down. AASB 1010 requires a non-current asset to be recorded at an amount that does not exceed its recoverable amount. However, managers have some discretion over the manner in which recoverable amount is calculated, thereby leaving considerable discretion relating to the timing and magnitude of write-downs in the hands of managers. Using US data, researchers have found evidence that management acts opportunistically in the year of the write-down to improve future years earnings (e.g, Rees, Gill and Gore, 1996). In Australia, Cotter, Stokes and Wyatt (1998) find that similar factors explain write-downs of assets taken to the income statement. However, these authors also find that the magnitude of write-downs debited to the asset revaluation reserve is not well explained by these management incentives. Therefore, while we acknowledge that our reliability measure is limited to the extent that write-downs are driven by management incentives, we expect that this problem is less severe for the types of write-downs that we capture; those to the asset revaluation reserve.

In our analysis of reliability across appraiser type, it is important to address issues of self-selection. A comparison of mean and median reliability measures suggest that independent revaluations are more reliable than directors' revaluations. However, we know from the first stage of our analysis that director-based revaluations are more common for asset classes with a higher degree of specificity. If revaluations of these asset classes are more susceptible to subsequent write-downs then a difference in reliability between director-based and independent

revaluations may be due to a self-selection bias. We thus condition appraiser independence on asset class.[6]

We find that independent revaluations of plant and equipment are more reliable than director-based revaluations. This result is robust to the inclusion of year indicator variables, included to capture potential macroeconomic effects on our measure of reliability. However, our results suggest that for land and buildings (where market prices are more readily available) and identifiable intangibles there is little difference in reliability between independent and director-based revaluations. Our results for plant and equipment are in contrast to those of Barth and Clinch (1998). However, their tests capture the joint effect of relevance and reliability, while our research design enables us to consider reliability in isolation. Our results are expected to be of interest to US regulators as they consider adoption of international standards, and the new requirements of SFAS 142; which implicitly allows a choice between internal and external appraisers for goodwill impairment tests.

The remainder of the paper is organized as follows. Section 2 examines the incentives of managers and independent appraisers in the asset revaluation process, and determines the expected impact of these incentives on asset revaluation reliability. Section 3 articulates the sample selection. Section 4 presents the empirical analysis, while section 5 concludes.

1. Hypothesis Development

With respect to upward asset revaluations, managers have a choice as to (1) whether to revalue or not and (2) who undertakes the revaluation. We only examine those firms that have made the

decision to recognize an asset revaluation. We are interested in the impact of the second choice (i.e. who carries out the revaluation) on the reliability of the revaluation. Given the recent concerns of regulators about overly aggressive accounting policy choices, our focus is on upward revaluations that are subsequently reversed, either in whole or in part. We maintain the assumption that firms have incentives to inflate the values of their assets. This assumption appears reasonable given that prior research into asset revaluations has found that they provide the firm with benefits such as increases in debt capacity, positive signals to equity markets, and reductions in political costs (e.g., Whittred and Chan, 1992; Brown, Izan and Loh, 1992; Easton, Eddey and Harris, 1993; Cotter and Zimmer, 1995). To the extent that opportunism causes upward bias in the amount of the revaluation increment, the reliability of the revaluation is reduced.

We define reliability in terms of upward bias. Given that we are interested in overly aggressive upward revaluations, the underlying construct that we desire to measure is *bias* and not accuracy. The distinction is subtle but important. If we were interested in both upward and downward revaluations then a measure of accuracy may have been preferred. However, we are interested in upward revaluations and the extent to which they are subsequently reversed. Our measure of reliability will thus have a flavor of conservatism by design because we argue that less optimistic revaluations are more reliable.

Differences between internal and external appraisers relate to both expertise and independence. However, while differences in appraiser expertise could cause differences in revaluation accuracy, these differences are not likely to explain why appraiser type might be related to

upward bias. Independent appraisers have expertise in estimating asset values. However, directors have the benefit of knowing exactly how assets are used within the business and presumably this gives them an edge in valuing assets. It is thus reasonable to expect both directors and independent appraisers to have expertise in valuing different types of assets. It is also reasonable to expect that firm's select the appraiser to take advantage of this differential expertise. In other words, firms may choose independent appraisers for asset classes that have less specific knowledge, since these asset classes are be easier for an outsider to value.[7]

We hypothesize that independent appraisers will provide less optimistic (more reliable) estimates of asset value than directors. This expectation rests on the "independence" of the external appraiser. Our maintained assumption is that firms have incentives to inflate asset values. To the extent that managers provide the estimates that directors ratify, director-based revaluations are likely to suffer from internal biases. It is true that directors face a labor market that carries with it reputation effects and their fiduciary duty to shareholders will also act as an incentive to provide reliable estimates. However, this is the case regardless of whether an independent appraiser is employed.[8] Having a valuation carried out by an independent appraiser adds an extra layer of monitoring to the valuation. This explanation is akin to that relating to the employment of independent auditors to monitor the accounts. While directors have reputation and litigation related incentives curtailing aggressive accounting choices, external auditors provide an additional layer of reliability to financial statements. DeFond and Subramanyam (1998) find evidence that brand name auditors are associated with more conservative accrual choices. Likewise, valuations that are carried out by an independent appraiser are expected to be more reliable (less aggressive) than director-based revaluations.

As indicated by Basu, Hwang and Jan (2000), potential litigation costs provide an incentive for independent auditors to favor conservatism. Similarly, we expect that these costs will induce independent appraisers to be less likely to endorse excessively optimistic revaluations. Independent appraisers have reputation and litigation concerns that would prompt them to make more reliable estimates – they do not want to be associated with asset revaluations that turn out to be too optimistic. Further, independent appraisers have deeper pockets than board members, making it less likely that they will provide optimistic asset revaluations. Our hypothesis stated in alternative form is:

H1: Independent appraiser-based asset revaluations are more reliable than director-based asset revaluations.

When deciding who will carry out the revaluation, managers have to decide whether it is worth the cost of employing an independent appraiser. For certain asset classes it is likely that the directors are at a comparative advantage in estimating an asset's recoverable amount given their knowledge of asset specificity. It is thus likely that the choice of appraiser type will vary across asset classes. Furthermore, it is also the case that certain types of assets are more difficult to value than others. For instance, placing a value on an identifiable intangible asset is likely to be more difficult than placing a value on a building. The value of a building is more readily ascertained from fairly liquid property markets. If firms select to use directors or an independent appraiser based on asset class, and reliability varies systematically across asset class, this may lead to attributing differences in reliability to appraiser type rather than to asset class. Our

research design will address this possibility by examining differences in reliability across appraiser type after conditioning on asset class.

Asset class is not likely to be the sole determinant of appraiser type. Related to our maintained assumption that directors' revaluations are more susceptible to opportunistic management bias, firms could be expected to choose director-based revaluations over independent appraisals when opportunistic incentives are driving the revaluation. However, if contracting parties recognize the potential for management bias in directors' revaluations, they will encourage or even require independent appraisals to reduce the extent of this bias. Indeed, Brown, Izan and Loh (1992) find that independent valuations are more prevalent where leverage is high and firms are closer to violating public debt covenants for their sample of Australian firms. Further, these authors point out that there are regulations in place requiring takeover targets to use independent appraisers. This evidence supports the proposition that director-based revaluations are perceived to be less reliable than those undertaken by an independent appraiser.

Finally, we expect some degree of substitution between costly governance mechanisms. This part of our analysis is somewhat exploratory in nature. We are interested in examining the extent to which various governance mechanisms act as substitutes/complements. We do not present formal hypotheses for this section. Rather, we discuss some alternative governance mechanisms that could be employed to ensure reliability of financial statements. Specifically, in the presence of an independent board we expect that the cost of employing an independent appraiser may not be justified given the additional degree of independence afforded by board composition. We also examine the role of auditor quality (big-6 v non big-6) in this decision. Auditors have an

obligation to ensure that asset values are not materially misstated in financial statements, and have incentives to minimize potential litigation and reputation costs associated with the review of overly optimistic asset revaluations. If brand name auditors are viewed as a substitute governance mechanism, then we expect firms with brand name auditors to make director-based revaluations. However, if auditors desire to share risk with independent appraisers then we expect a complementary relation. Clearly, hiring brand name auditors and electing outsiders to the board are only a subset of available governance mechanisms. Disclosure requirements in Australia for our period, however, make it difficult to obtain more refined measures of governance mechanisms.

2. Sample Selection

Asset revaluations are identified using data generously supplied by Easton, Eddey and Harris (1993) and Easton and Eddey (1997). Easton, Eddey and Harris' sample of 100 firms comprise essentially those Australian firms listed on Compustat's Global Vantage database for which full financial statement data are available from the Australian Graduate School of Management microfiche file for the 1981 to 1990 time period. Easton and Eddey (1997) used the EEH sample and extended the time period forward to 1993. We supplement this data with additional firm years from 1994 to 1999. We hand collect data from financial statement footnotes for each firm-year containing a revaluation during our 1981 to 1999 sample period.[9] This enables us to identify who performed the revaluation and which asset class was revalued.

Reversals of upward revaluations (subsequent write-downs to the asset revaluation reserve) are identified by examining subsequent annual reports to look for downward movements in the asset

revaluation reserve account. Financial statement footnotes for firm-years where such a reversal exists are examined to determine the asset class written down and by how much. Downward movements that involve transfers to another reserve (usually an asset realization or capital reserve) upon the sale of a previously revalued asset are not included as write-downs for our analysis. That is, when previously revalued assets are sold at or above book value, no write-down is recorded; and when previously revalued assets are sold for less than book value, only the 'loss' portion of any reversal is included as a write-down. Essentially, the portion of the reversal that relates to the loss on sale represents the amount of overvaluation.[10]

We separate revaluations into respective asset classes when a revaluation firm-year includes revaluations of assets in more than one asset class, and it is possible to identify individual asset classes. This was necessary due to our reliability measure being based on reversals within asset classes. Our initial sample comprises 483 firm-asset revaluations covering land and buildings, plant and equipment, investments, identifiable intangibles, minerals/forestry, and mixed. The "mixed" category relates to amounts we were unable to match with a specific asset class. For example, in 1992, CSR Limited recognized a revaluation increment on 'non-current assets' of $186.4 million. While the accounts show revaluations of several asset classes, it is impossible to accurately estimate the proportion of the overall increment relating to each asset class. Excluding these revaluations reduces our sample to 429 firm-asset-class revaluations.

Table 1 describes in detail how we arrive at the final sample of 225 firm-asset-class revaluations. We deleted revaluations related to (i) minerals and forestry (12 observations), and (ii) investments (107 observations, almost all director-based), since an asset-class level examination

of differential reliability across appraiser type was not possible for these two classes of non-current assets.

While the majority of revaluations can be readily classified as either independent or directors', others involve both types of appraiser. In particular, some firms disclose that they have obtained an independent valuation but have chosen to recognize the revaluation as a directors' revaluation. For example, James Hardie Industries Limited recognized a directors' revaluation of land and buildings in 1996. They disclose that "…independent valuations of the Economic Entity's land and buildings were made … The Directors have used these independent valuations as a guide in establishing their own valuations of these land and buildings … The valuations adopted by the Directors are not in excess of those given by the independent valuers." We exclude these revaluations from our analysis because we are interested in examining differential reliability between "pure" internal and external appraised estimates.[11, 12]

Other firms recognize revaluations that are part independent and part directors', with each relating to individual assets or groups of assets within a single asset class. For example, National Consolidated Ltd. revalued freehold land and buildings in 1995. Some of this revaluation was recorded as an independent revaluation while the remainder was recorded as a directors' revaluation. No further explanation is provided in the accounts. We are unable to effectively allocate revalued amounts to either director or independent appraiser. Hence, we exclude these revaluations from our analysis.

After excluding revaluations by directors based on independent revaluations and mixed revaluations, our final sample comprises 225 asset revaluations. Of these, 201 had three years of subsequent write-downs data available, while 174 had five years of subsequent write-downs data available. In later tests we only use the first observation per firm-asset-class to reduce the impact of statistical dependence on our results. For the "first-only" sample of 91 observations, we have 87 observations with three years of subsequent write-downs data available and 81 observations with five years of subsequent write-downs data available.

Table 2 gives a breakdown of upward asset revaluations by appraiser independence, year and asset class. In panels A and B we report all 483 firm asset revaluations. In panel C we report only the 225 revaluations that are used in subsequent tests, while in panel D we report only the 91 first firm-asset-class revaluations (our "first-only" sample). Panel A shows the distribution of revaluations across appraiser type by year. While fewer revaluations occur later in our sample period, there does not appear to be a systematic pattern between appraiser independence and the year of the revaluation (parametric and non-parametric tests do not reject the null of no association between appraiser independence and year of revaluation). Panels B, C and D tabulate upward revaluations by asset class and appraiser independence. Most revaluations of land and buildings are by independent appraisers, and the opposite is true for plant and equipment. As previously noted, almost all revaluations of investments are director-based. There appears to be self-selection of appraiser type across asset class.

3. Analysis

3.1 The choice of appraiser type

To model the choice of appraiser type we run the following regression,

$$APPRAISER_i = \beta_0 + \beta_1 INTANG_i + \beta_2 PLANT_i + \beta_3 DE_i + \beta_4 LOGTA_i + \beta_5 BIGAUD_i + \beta_6 BOARD_i + \beta_7 CEO_i + \varepsilon_I \quad (1)$$

The regression is written in linear form but the estimation is performed using a probit model. *APPRAISER* is an indicator variable equal to one for an independent revaluation, and zero for a director-based revaluation. *INTANG* (*PLANT*) is an indicator variable equal to one if the asset class is an identifiable intangible (plant and equipment) and zero otherwise. *DE* is the debt to equity ratio of the firm (a proxy for the debt contract related incentives to revalue), and *LOGTA* is the natural logarithm of total assets - our measure of firm size. *BIGAUD* is an indicator variable equal to one if the firm has a brand-name auditor and zero otherwise. *BOARD* equals one if the proportion of executives on the board is less than the sample median (33%), and zero otherwise. A value of 1 for *BOARD* indicates an outsider-dominated board, where an outsider is defined as a non-executive director. *CEO* is equal to one if the *CEO* is not the chairman of the board, and zero otherwise. A value of 1 for *CEO* indicates a degree of independence. Table 3 reports the results from this regression. Only the first observation for each firm-asset-class is included to limit the impact of statistical dependence on our results. We report two specifications of the model because we were not able to obtain the board independence variables for all firms. The first column examines the impact of asset type, firm size, leverage and auditor quality. The second column includes the board independence variables: *BOARD* and *CEO*.

The first column of table 3 reiterates the effect of asset type on the choice of appraiser. Independent appraisers are less likely to be employed for identifiable intangibles and plant and equipment than is the case for land and buildings. Interestingly, neither auditor quality, leverage

nor firm size are significant at conventional levels. The results reported in the second column allow us to determine if there is any substitution among costly governance mechanisms for the firms in our sample. For the *BOARD* variable there is a strong relation between board composition and appraiser independence. Firms with more outsiders on the board are less likely to incur the cost of hiring an independent appraiser. We interpret this as evidence consistent with firms substituting across costly governance mechanisms. The sign for the *CEO* variable is not consistent with rational substitution across costly governance mechanisms. It appears that when the CEO is not also the chair of the board firms choose independent appraisers. Said differently, when the CEO is the chair (usually a sign of weak governance, e.g., Baliga, Moyer and Rao, 1996) then the firm is more likely to use a director-based estimate of asset value.

3.2 Descriptive statistics for Revaluation Reliability

Our measure of revaluation reliability involves an examination of the extent to which upward asset revaluations are subsequently reversed by a write-down to the asset revaluation reserve. Descriptive statistics about upward and downward revaluations over the three (five) year period subsequent to the revaluation are reported in table 4 panel A (panel B). In this table we report whether the subsequent revaluations over the next three (five) years were net increases (*UP*), net decreases (*DOWN*) or no change (*NONE*). Differences in subsequent revaluation activity appear to be related to both asset class and appraiser type. Revaluations of land and buildings are most likely to be followed by further upward revaluations, while plant and equipment revaluations are often not adjusted by further revaluations up or down. The differences across appraiser type, however, are not statistically significant at conventional levels using parametric and non-parametric tests.

The measure we report in Table 4 gives an indication of the accuracy of upward revaluations. However, as discussed in section 2, we are concerned with bias rather than accuracy. In particular, we are interested in write-downs that reverse or partly reverse previous upward revaluations. The *DOWN* category shown in table 4 gives some indication of this bias. However, it is a crude measure of reliability as it does not consider the magnitude of subsequent write-downs relative the magnitude of the initial upward revaluation.

To obtain a more refined measure of the extent to which an asset revaluation is subsequently reversed we calculate a reliability index, *REL*. We calculate asset revaluation reliability over two intervals, from year t to year $t + \tau$, where $\tau = 3$ and 5. Thus, REL_{t+3} measures the reliability of upward asset revaluations by reference to subsequent write-downs over the following three years. $REL_{t+\tau}$ is equal to 1 if there is no subsequent write-down over the following τ years, 0 if the revaluation is totally reversed, and takes an intermediate value to reflect the extent to which the initial revaluation is reversed. Any additional revaluation increments to the relevant asset class that occur between the initial revaluation increment and the subsequent write-downs are considered when calculating this index. The reason for including these subsequent revaluation increments is that we cannot be sure whether the subsequent write-down relates to the initial revaluation or those that occur in between the initial revaluation and a subsequent write-down. Stated formally, $REL_{t+\tau}$ is calculated as:

$$REL_{t+\tau} = \frac{\text{initial revaluation increment - subsequent writedowns + any interim increments}}{\text{initial revaluation increment}}$$

For example, a recognized revaluation increment of $145,000 in 1991 that is followed by a decrement to the asset revaluation reserve of $45,000 (for the same class of assets) in 1995

would result in reliability measures of one and 0.69 respectively when three and five years subsequent to the revaluation are considered. If there were an additional increment of $25,000 in 1992, reliability would be measured as 0.86 for the five-year interval.

Our definition of reliability favors conservatism. Statement of Accounting Concepts 3 (SAC 3) stipulates that "*reliable information will without bias or undue error, faithfully represent [business transactions]*". Reliability is thus defined in terms of lack of bias. Our measure of reliability favors conservatism because we restrict the *REL* measure to be no greater than 1. While this is not consistent with SAC 3, it is in the spirit of the concerns of regulators and practitioners who are wary of optimistic valuations.

Table 5 provides descriptive statistics on our measure of reliability across the three asset classes we examine: land and buildings, plant and equipment and identifiable intangibles. It is clear from the distribution of both REL_{t+3} and REL_{t+5} that we have a censored variable of interest. There are many instances where the initial upward revaluation was not subsequently written down. This does not mean that there was not a subsequent revaluation, rather just that the subsequent revaluations were not downward.

These descriptive statistics indicate that our measure of reliability is greater for land and buildings than it is for either identifiable intangibles or plant and equipment. To the extent that identifiable intangibles and plant and equipment are more susceptible to subsequent write-downs, attributing any average difference in reliability to appraiser independence may be erroneous. It is important for our subsequent analysis to be conducted at the asset-class level. It is not just that

identifiable intangibles and plant and equipment are more difficult to value. Greater uncertainty about asset value will translate into less *accurate* estimates of firm value. It is less clear that greater uncertainty would necessarily lead to less reliable (more biased) estimates. But having said that, the results in table 5 suggest some difference in reliability as a function of asset type. In the following sections we control for this possibility and examine differences in reliability across appraiser type *within* asset classes.

3.3 Univariate tests of difference in reliability across appraiser type

Table 6 reports results for differences in our reliability measure across appraiser type. Panel A reports results using all available observations and panel B reports results for the "first-only" sample.

For both the full sample and the first-only sample there is no consistent evidence that independent valuations are more or less reliable for land and buildings (parametric and non-parametric tests are not different at conventional levels for either the full sample or the first-only sample). There is, however, reasonably consistent evidence that independent revaluations of plant and equipment are more reliable than director-based revaluations. Panel A reports that the mean value of REL_{t+3} for independent appraisers is 0.99. The corresponding value for director-based revaluations is 0.74. This difference can be interpreted as saying that director-based revaluations of plant and equipment are written-down by about 25% more than independent appraiser estimates. These differences are significant for both the full and first-only samples and for both the three and five year windows. The univariate results for the identifiable intangible asset class are insignificant.

3.4 Multivariate Results

The regression model used to test for associations between asset revaluation reliability and appraiser independence is specified as follows:

$$REL_{i,t+\tau} = \sum_{Y=81}^{94} \beta_{0Y} YR_{it} + \beta_1 APPRAISER_i + \beta_2 APPRAISER * INTANG_i + \beta_3 APPRAISER * PLANT_i + \beta_4 INTANG_i + \beta_5 PLANT_t + \varepsilon_{it} \quad (2)$$

We estimate equation (2) separately for asset revaluation reliability over two intervals, from year t to year $t + \tau$, where $\tau = 3$ and 5. YR_{it} is a time indicator variable that equals one if an observation is from fiscal year YR, and zero otherwise. These variables are included to control for the potential impact of poor macroeconomic conditions on our reliability measure. All other variables are as defined earlier. We interact *APPRAISER* with asset class indicator variables (*INTANG* and *PLANT*) in an attempt to pick up the effects of self-selection in our sample. We know that director-based revaluations are more likely for plant and equipment, and that revaluations of identifiable intangibles and plant and equipment are less reliable on average across the whole sample. Our analysis separates each asset class on the basis of appraiser independence.

As our measure of reliability is censored from above and below, estimation via OLS would lead to inconsistent estimates (Greene, 1997). We employ a Tobit specification which captures the lower and upper censoring of our dependent variable. The results are reported in table 7. Tests are conducted using two samples. The first sample includes the 201 (174) revaluations for which

we have three (five) years of subsequent write-down data. The second sample keeps only the first firm-asset-class observation to limit the impact of statistical dependence on our results.

Both *INTANG* and *PLANT* have consistently negative coefficients confirming the earlier results that revaluations of plant and equipment and identifiable intangibles are on average less reliable than those of land and buildings. Of more importance to our analysis are the coefficients on the interaction variables *APPRAISER*INTANG* and *APPRAISER*PLANT*. These coefficients pick up the difference in reliability across appraiser type *within* asset class. Consistent with the results in table 6, we find that independent revaluations of plant and equipment are more reliable. There is no such evidence for identifiable intangibles or land. We also report a joint test across all three *APPRAISER* variables. This test picks up an average difference in reliability across appraiser type irrespective of asset class. We are unable to reject the null suggesting that independent revaluations are on average no more reliable than director-based revaluations for *all* asset classes – the difference is only evident for the plant and equipment asset class.

Table 8 reports our final set of results. In this table we examine an alternative measure for reliability, *REL2*, which is calculated as follows:

$$REL2 = \frac{\text{initial revaluation increment - subsequent writedowns + all subsequent increments}}{\text{initial revaluation increment}}$$

Similar to our primary measure of reliability, *REL*, we measure *REL2* for both three and five years after the initial revaluation. The difference between *REL* and *REL2* is the treatment of subsequent revaluations. *REL* only includes subsequent upward revaluations if they occurred prior to a subsequent write-down. The aim of the *REL* variable is to identify overly optimistic revaluations, so we deliberately focused on subsequent write-downs when calculating *REL*.

However, it is also interesting to examine the average bias in the initial revaluation. This is captured in the second measure, *REL2*, as we include *all* subsequent revaluations within the three and five year windows. The results in table 8 suggest an upward bias in the initial revaluation of intangibles and plant and equipment (as evidenced by the negative coefficients over the five year window). However, there is only weak evidence of a difference in the average bias across appraiser type. The interaction terms for intangibles are significant (at the 5% level) for the first only regressions in both the three and five year windows. In summary the evidence in tables 7 and 8 suggest that while there is some evidence of greater reliability of independent revaluations of plant and equipment using *REL*, there is little evidence using the alternate measure, *REL2*.

In unreported sensitivity tests, we include auditor quality and board composition as we expect these variables to not only impact the choice of appraiser type but also impact reliability directly. However, neither auditor quality nor board independence are significantly associated with reliability.

One last note is in order for our testing of the impact of appraiser independence on the reliability of asset revaluations. We have attempted to capture the effect of self-selection by conditioning appraiser type on asset class. The reader may have a lingering cynicism that we have not done enough in this regard. Formally, the concern applies whenever an independent variable in a regression is the result of a choice. This raises the possibility of an endogenous relation between the dependent variable and the chosen independent variable. The residual term is no longer guaranteed to be orthogonal to the independent variables. This leads to inconsistent parameter

estimates. This is a well-known statistical phenomenon and the generally accepted solution is to conduct a two stage least squares estimation.

The success of two stage least squares estimation rests on finding an exogenous instrument that (i) explains the chosen independent variable, and (ii) is *unrelated* to the dependent variable. In our analysis, the factors that were successful in explaining the choice of appraiser type (our chosen independent variable) also have explanatory power for reliability (our dependent variable). From table 3, asset class had predictive power for the choice of appraiser type, and in table 7 these same variables explained reliability. The other variables that had been found as determinants of appraiser type in previous research, firm size and leverage, do not have much explanatory power for our sample. We are thus left without suitable instruments to conduct an effective two-stage analysis.

Finally, controlling for the endogeneity requires a "well fitting" model of the choice of appraiser type. We only have modest explanatory power for this first stage (table 3 reports pseudo R^2 of between 10-20%). Bound, Jaeger and Baker (1995) show that if the instruments are only weakly correlated with the endogenous explanatory variable, then even a weak correlation between the instruments and the error in the original equation can lead to considerable inconsistencies with two-stage estimation. Given the difficulty in finding suitable instruments with sufficient explanatory power we have decided against a two-stage analysis.

4. Conclusions

In this paper we examine whether revaluations of non-current assets are more reliable for independent appraisers than directors. Our results provide evidence that independent revaluations are not more reliable than directors' revaluations except for revaluations of plant and equipment. There appears to be no statistically significant difference in reliability for other asset classes. These results are robust to controlling for macroeconomic effects and potential biases from self-selection issues.

Our measure of reliability is determined by an analysis of subsequent write-downs of voluntary upward revaluations. While an analysis of subsequent reversals of asset revaluations provides a more direct test of the reliability than do the market returns and future performance tests used in prior research, our tests are not without limitations. Just as firms will choose if and when to upwardly revalue assets, they also have considerable discretion in relation to subsequent write-downs. Our measures of reliability are limited to the extent that managers' incentives determine the timing and extent of write-downs to the asset revaluation reserve.

The implication for U.S. standard setters is that allowing director-based revaluations rather than mandating the employment of independent appraisers will generally not compromise the reliability of reported asset values, except for asset classes where a market value is not readily available. One additional reason that the results of this paper should be of interest to a US audience is the new requirements in SFAS 142. Beginning in 2001, SFAS 142 allows goodwill to remain un-amortized subject to an impairment test. If a firm is able to show that the value of its goodwill has not decreased then there is no amortization requirement. As is, SFAS 142 does

not stipulate who is to perform the valuation for the impairment test. Discussions with audit partners at Ernst and Young reveal that depending on the complexity of the transactions that give rise to the goodwill, firms may hire an outsider to perform the impairment test. Thus, SFAS 142 contains an implicit choice to use either an internal or external appraiser. Furthermore, there has been a lot of contention about the potential conflicts that may arise if the same investment bank that supported the acquisition that created the goodwill is also performing the valuation for the impairment test. We believe that our results will offer something to the debate about appraiser independence for impairment tests under SFAS 142.

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Notes

[1] Australia provides a superior institutional setting than the U.K. for our study, since in the U.K. only fixed assets (and generally only property) are the subject of revaluations.

[2] Refer to Easton, Eddey and Harris (1993) for detailed discussion of the requirements of *AASB 1010*. Commencing in reporting periods beginning on or after July 2000, AASB 1010 has been replaced by AASB 1010 Recoverable Amount of Non-Current Assets, and AASB 1041 Revaluation of Non-Current Assets. Since our sample period ends in 1999, the version of AASB 1010 in effect during our sample period will be referred to for the remainder this paper.

[3] The rare exception is a revaluation that reverses a previous decrement that was booked against profit, in which case it is recognized as a gain.

[4] In Australia "recoverable amount" is the alternative notion of value to historical cost. *AASB 1010* defines "recoverable amount" as the net amount that is expected to be recovered through the cash inflows and outflows arising from an asset's continued use and subsequent disposal. The international standard *IAS16* require revaluation to "fair value", defined as the amount for which an asset could be exchanged between knowledgeable, willing parties in an arms' length transaction. This paper does not seek to identify which value should be preferred.

[5] An example of such a research design is provided in McNichols and Wilson's (1988) study of the provision for bad debts.

[6] An alternative to this approach is to attempt modeling an endogenous system capturing the choice of appraiser type. However, we are unable to identify a suitable instrument that (i) has sufficient explanatory power in the first stage and (ii) is unrelated to reliability.

[7] We come back to this issue of self-selection of appraiser type across asset classes later.

[8] For example, the Australian Securities and Investments Commission (ASIC) report of the investigation into Burns Philp & Company Limited (1998, p. 40) found that the directors failed to (a) ensure the validity of information provided to the appraiser and the reviewers, (b) check tradename valuations against net profit from tradename products for reasonableness, and (c) take account of all the assumptions in the valuation and review reports.

[9] These footnotes are obtained from the Connect4 Annual Report Collection where available and from the Australian Graduate School of Management microfiche file in other cases. Use of the Easton, Eddey and Harris data to identify revaluation firm-years enabled us to avoid hand collection and examination of financial statements for firm-years in which no revaluation was recognized.

[10] Consider firm XYZ that purchased assets in year *t* for $1000. In year *t+1* they revalue this asset up to $1100 (i.e., a $100 increment is placed in the asset revaluation reserve account). Then in year *t+2* this asset is sold for $1,060. Only the $40 is considered as a write-down for our analysis. The remaining $60 in the asset revaluation reserve account is typically transferred to an equity reserve account and is not included in our analysis. In unreported results, we also exclude the write-downs related to losses on sales of assets. We identify and exclude three such reversals from our 3-year reliability measures and seven that impact our 5-year measures. Our results are insensitive to these exclusions.

[11] It is also possible that some of our director-based revaluations may be based on consultation with independent appraisers. To the extent that certain types of firms make director-based revaluations after consultation with independent appraisers *and* they do not disclose this information then we may introduce a systematic bias into our tests. We expect this to introduce a conservative bias to our tests. If independent revaluations are more reliable then including some

director-based revaluations that are based on the more reliable independent revaluations will make it more difficult to reject the null of no difference in reliability across appraiser type.

[12] In unreported results we consider the reliability of these director based on independent revaluations. Most revaluations for these appraiser types are for land and buildings. We find that these revaluations are on average less reliable than either pure independent or pure director revaluations.

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Table 1
Sample Selection

	Full Sample	First-only Sample
Number of revaluations for which appraiser type reported (after splitting into asset classes)*	483	
Less, revaluations across asset classes for which it was not possible to accurately determine the amount of the revaluation increment for each asset class (mixed)	54	
	429	
Less, revaluations of mineral reserves or forestry assets	12	
	417	
Less, revaluations of investments	107	
	310	
Less, directors' revaluations based on independent revaluations and mixed revaluations (within an asset class)	85	
Final sample of directors and independent upward revaluations	225	91
Number of revaluations with three years of subsequent data	201	87
Number of revaluations with five years of subsequent data	174	81

*Revaluation firm-years where more than one asset class was revalued were separated into revaluations by asset class. This was necessary due to our reliability measure being based on reversals within asset classes. For example, Brambles Industries Ltd reported an upward revaluation of $41.2m in 1986. This comprised an independent revaluation of land and buildings for $9.4m and a directors' revaluation of investments for $31.8m. The reliability of each revaluation was assessed separately by reference to subsequent write-downs of land and buildings and investments respectively.

Table 2

Descriptive statistics of asset revaluations by appraiser independence, asset class and year in which revaluation was made.

Panel A: All Asset Revaluations - Distribution across years

		Appraiser Type			
	Total	**Independent**	**Directors'**	**Mixed**	**Directors' based on Independent**
1981	35	13	18	3	1
1982	33	10	14	5	4
1983	28	7	18	1	2
1984	31	11	11	4	5
1985	46	22	15	6	4
1986	34	11	18	1	4
1987	50	14	26	4	6
1988	48	18	19	7	4
1989	36	13	15	5	3
1990	27	9	9	2	7
1991	20	5	10	4	1
1992	19	5	8	1	5
1993	14	7	6	0	1
1994	13	5	3	3	2
1995	18	6	6	3	3
1996	5	2	1	1	1
1997	9	2	3	2	2
1998	8	6	0	1	1
1999	9	3	2	0	4
TOTAL	483	169	202	53	59

Panel B: All Asset Revaluations - Breakdown By Asset Class Revalued

		Appraiser Type			
	Total	**Independent**	**Directors'**	**Mixed**	**Directors' based on Independent**
Land &Buildings	237	126	38	37	36
Plant & Equip.	30	9	18	2	1
Investments	107	0	103	0	4
Ident. Intangibles	43	19	15	3	6
Minerals/Forestry	12	2	6	0	4
Mixed	54	13	22	11	8
TOTAL	483	169	202	53	59

Panel C: Final Sample - Breakdown by Asset Class Revalued

		Appraiser Type	
	Total	**Independent**	**Directors'**
Land & Buildings	164	126	38
Plant & Equip.	27	9	18
Ident. Intangibles	34	19	15
TOTAL	225	154	71

Panel D: First-only Sample - Breakdown by Asset Class Revalued

		Appraiser Type	
	Total	**Independent**	**Directors'**
Land & Buildings	57	40	17
Plant & Equip.	21	8	13
Ident. Intangibles	13	5	8
TOTAL	91	53	38

Revaluations comprising more than one asset class are separated into their respective classes.

A mixed revaluation is where both directors and independent appraisers are involved in the valuation process. For example, National Consolidated Ltd. revalued freehold land and buildings in 1995. Some of this revaluation was recorded as an independent revaluation while the remainder was recorded as a directors' revaluation. No further explanation is provided in the accounts.

A director's based on independent revaluation is where the revaluation is recorded in the accounts as a directors' revaluation but it is clear that this estimate was based on a previous independent appraiser's estimate or was made by directors after consultation with an independent appraiser. For example, James Hardie Industries Limited recognized a directors' revaluation of land and buildings in 1996. They disclose that "…independent valuations of the Economic Entity's land and buildings were made … The Directors have used these independent valuations as a guide in establishing their own valuations of these land and buildings … The valuations adopted by the Directors are not in excess of those given by the independent valuers."

The asset class "Mixed" reflects those revaluations relating to more than one class of assets where it was not feasible to attribute an accurate revaluation amount to each respective asset class. For example, in 1992, CSR Limited recognized a revaluation increment on 'non-current assets' of $186.4 million. While the accounts show revaluations of several asset classes, it is impossible to accurately estimate the proportion of the overall increment relating to each asset class.

Table 3

Probit regression results using the sample of 91 'first' revaluations of land and buildings, plant and equipment and identifiable intangibles for which all data is available

$$APPRAISER_i = \beta_0 + \beta_1 INTANG_i + \beta_2 PLANT_i + \beta_3 DE_i + \beta_4 LOGTA_i + \beta_5 BIGAUD_i + \beta_6 BOARD_i + \beta_7 CEO_i + \varepsilon_I \quad (1)$$

Variable	Prediction	Coef. (z-Stat.)	Coef. (z-Stat.)
Intercept		0.664 (0.503)	0.926 (0.495)
INTANG	-	-0.873 (-2.067)*	-0.693 (-1.413)
PLANT	-	-0.899 (-2.671)**	-0.960 (-2.440)**
DE	-	-0.136 (-1.149)	-0.220 (-0.924)
LOGTA	-	-0.004 (-0.041)	-0.106 (-0.765)
BIGAUD	+	0.193 (0.576)	0.273 (0.595)
BOARD	-	-	-0.882 (-2.354)**
CEO	-	-	1.496 (1.869)*
McFadden R^2		0.102	0.197
Log-likelihood		-53.77	-38.42
Chi-square		12.21	18.81
Probability		0.032	0.009
% Correctly classified		69.32	71.01
N		91	69

*significant at 5%, one-tailed, **significant at 1%, one-tailed

All independent variables are measured for each firm in the year of the upward revaluation. *APPRAISER* equals 1 for an independent revaluation, and 0 for a directors' revaluation. *INTANG* equals 1 if the asset class revalued is identifiable intangibles, zero otherwise. *PLANT* equals 1 if the asset class revalued is plant and equipment, zero otherwise. *DE* is the debt to equity ratio of the firm. *LOGTA* is the log of total assets. *BIGAUD* equals 1 if the firm has a Big 6 auditor and 0 otherwise. *BOARD* equals 1 if the proportion of executive directors is less than the median percentage for the sample (33%), zero if 33% or greater. *CEO* equals 1 if the CEO is not the Chairman of the board and 0 if the CEO is the Chairman of the board. This regression only uses one observation per firm-asset-class.

Table 4

Descriptive statistics for subsequent revaluations by asset class for sample of 201 (174) upward asset revaluations for which subsequent write-downs data is available for the next three (five) years.[a]

Panel A: Over three years subsequent to upward revaluation

	Independent	Directors'	Total
Land & Buildings			
DOWN	21	7	28
UP	78	20	98
NONE	13	8	21
	112	35	147
Plant & Equip.			
DOWN	1	4	5
UP	1	5	6
NONE	6	8	14
	8	17	25
Ident. Intangible			
DOWN	9	3	12
UP	7	6	13
NONE	1	3	4
	17	12	29

Panel B: Over five years subsequent to upward revaluation

	Independent	Directors'	Total
Land & Buildings			
DOWN	20	7	27
UP	71	21	92
NONE	6	3	9
	97	31	128
Plant & Equip.			
DOWN	1	4	5
UP	1	4	5
NONE	6	6	12
	8	14	22
Ident. Intangible			
DOWN	8	5	13
UP	5	4	9
NONE	1	1	2
	14	10	24

The above table reports the subsequent revaluation activity over the following three (five) years. If the total subsequent revaluation activity is positive then *UP*=1. If the total subsequent revaluation activity is negative then *DOWN*=1. If the total subsequent revaluation activity is neutral then *NONE*=1.

Table 5

Descriptive statistics for reliability by asset class for sample of 201 (174) upward asset revaluations for which subsequent write-downs data is available for the next three (five) years.[a]

Panel A: Full Sample

	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
Land & Build.							
REL_{t+3} *(n=147)*	0.878	0.283	0.000	0.963	1.000	1.000	1.000
REL_{t+5} *(n=128)*	0.852	0.302	0.000	0.882	1.000	1.000	1.000
Plant & Equip.							
REL_{t+3} *(n=25)*	0.818	0.329	0.000	0.745	1.000	1.000	1.000
REL_{t+5} *(n=22)*	0.816	0.345	0.000	0.761	1.000	1.000	1.000
Ident. Intang.							
REL_{t+3} *(n=29)*	0.619	0.455	0.000	0.000	0.948	1.000	1.000
REL_{t+5} *(n=24)*	0.452	0.429	0.000	0.000	0.440	0.947	1.000

Panel B: Sample of only first revaluation for each firm asset class

	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
Land & Build.							
REL_{t+3} *(n=56)*	0.934	0.205	0.000	1.000	1.000	1.000	1.000
REL_{t+5} *(n=53)*	0.921	0.215	0.000	0.987	1.000	1.000	1.000
Plant & Equip.							
REL_{t+3} *(n=20)*	0.828	0.362	0.000	0.898	1.000	1.000	1.000
REL_{t+5} *(n=19)*	0.815	0.369	0.000	0.864	1.000	1.000	1.000
Ident. Intang.							
REL_{t+3} *(n=11)*	0.849	0.341	0.000	0.983	1.000	1.000	1.000
REL_{t+5} *(n=9)*	0.516	0.449	0.000	0.000	0.470	0.990	1.000

$REL_{t+\tau}$ *(τ=3 or 5)* captures asset revaluation reliability. It is measured as one minus the proportion of asset revaluations subsequently reversed via a write-down to the asset revaluation reserve (including additional revaluation increments) over the next τ years.

For example, a recognized revaluation increment of $145,000 in 1991 that is followed by a decrement to the asset revaluation reserve of $45,000 (for the same class of assets) in 1995 would result in reliability measures of one and 0.69 respectively when three and five years subsequent to the revaluation are considered. If there were an additional increment of $25,000 in 1992, reliability would be measured as 0.86 for the five-year interval.

Table 6

Univariate analysis of differences in relative reliability for sample of 201 (174) independent and directors' upward asset revaluations for which subsequent write-downs data is available for the next three (five) years.

Panel A: Full Sample

	Independent	Directors'	Difference
Land & Buildings			
REL_{t+3}			
Mean	0.885	0.857	
(Std. Dev.)	(0.268)	(0.328)	
Number	112	35	
T-test			T = 0.499
Mann-Whitney Test			Z = 0.904
REL_{t+5}			
Mean	0.839	0.894	
(Std. Dev.)	(0.315)	(0.257)	
Number	97	31	
T-test			T = 0.880
Mann-Whitney Test			Z = 1.451
Plant & Equip.			
REL_{t+3}[b]			
Mean	0.992	0.735	
(Std. Dev.)	(0.002)	(0.374)	
Number	8	17	
T-test			T = 2.827**
Mann-Whitney Test			Z = 2.107*
REL_{t+5}[b]			
Mean	0.983	0.721	
(Std. Dev.)	(0.005)	(0.405)	
Number	8	14	
T-test			T = 2.393*
Mann-Whitney Test			Z = 1.863
Ident. Intangibles			
REL_{t+3}[b]			
Mean	0.563	0.700	
(Std. Dev.)	(0.493)	(0.402)	
Number	17	12	
T-test			T = 0.823
Mann-Whitney Test			Z = 0.630
REL_{t+5}[b]			
Mean	0.447	0.460	
(Std. Dev.)	(0.474)	(0.384)	
Number	14	10	
T-test			T = 0.073
Mann-Whitney Test			Z = 0.061

Panel B: Sample of only first revaluation for each firm asset class

	Independent	Directors'	Difference
Land & Buildings			
REL_{t+3}[b]			
Mean	0.923	0.959	
(Std. Dev.)	(0.227)	(0.138)	
Number	40	16	
T-test			T = 0.593
Mann-Whitney Test			Z = 0.986
REL_{t+5}[b]			
Mean	0.899	0.976	
(Std. Dev.)	(0.248)	(0.007)	
Number	38	15	
T-test			T = 1.731*
Mann-Whitney Test			Z = 1.478
Plant & Equip.			
REL_{t+3}[b]			
Mean	0.991	0.740	
(Std. Dev.)	(0.002)	(0.429)	
Number	7	13	
T-test			T = 2.107*
Mann-Whitney Test			Z = 1.322
REL_{t+5}[b]			
Mean	0.981	0.719	
(Std. Dev.)	(0.005)	(0.440)	
Number	7	12	
T-test			T = 2.038*
Mann-Whitney Test			Z = 1.335
Ident. Intangibles			
REL_{t+3}[b]			
Mean	0.997	0.725	
(Std. Dev.)	(0.001)	(0.439)	
Number	5	6	
T-test			T = 1.514
Mann-Whitney Test			Z = 1.057
REL_{t+5}[b]			
Mean	0.705	0.365	
(Std. Dev.)	(0.476)	(0.411)	
Number	4	5	
T-test			T = 1.154
Mann-Whitney Test			Z = 0.997

*significant at 5%, one-tailed, **significant at 1%, one-tailed

$REL_{t+\tau}$*(*τ*=3 or 5)* captures asset revaluation reliability. It is measured as one minus the proportion of asset revaluations subsequently reversed via a write-down to the asset revaluation reserve (including additional revaluation increments) over the next τ years.

Table 7

Multivariate analysis of differences in relative reliability for sample of 201 (174) independent and directors' upward asset revaluations for which subsequent write-downs data is available for the next three (five) years.

(Tobit regression coefficient estimates and z-Statistics).

$$REL_{i,t+\tau} = \sum_{Y=81}^{94} \beta_{0Y} YR_{it} + \beta_1 APPRAISER_i + \beta_2 APPRAISER * INTANG_i + \beta_3 APPRAISER * PLANT_i + \beta_4 INTANG_i + \beta_5 PLANT_t + \varepsilon_{it} \quad (2)$$

Variable	Pred	Full Sample		First Revaluation Only	
		REL_{t+3}	**REL_{t+5}**	**REL_{t+3}**	**REL_{t+5}**
APPRAISER	+	-0.150 (-0.696)	-0.272 (-1.584)	-0.382 (-0.900)	-0.433 (-1.288)
*APPRAISER*INTANG*	+	-0.102 (-0.253)	0.134 (0.394)	1.340 (1.611)	0.776 (1.292)
*APPRAISER*PLANT*	+	1.248 (2.235)*	1.287 (2.700)**	1.275 (1.699)*	1.588 (2.240)*
INTANG	-	-0.455 (-1.390)	-0.718 (-2.621)**	-1.008 (-1.694)*	-1.372 (-2.668)**
PLANT	-	-0.665 (-2.244)*	-0.471 (-1.884)*	-0.855 (-1.827)*	-0.792 (-2.064)*
Adjusted R^2		0.152	0.162	0.037	0.129
n		201	174	87	81
Left /right censored		22/127	24/87	6/65	8/52
H_0: $\beta_1 = \beta_2 = \beta_3 = 0$					
F-statistic		0.915	0.649	1.824	1.968

*significant at 5%, one-tailed, **significant at 1%, one-tailed

$REL_{t+\tau}$ (τ=3 or 5) captures asset revaluation reliability. It is measured as one minus the proportion of asset revaluations subsequently reversed via a write-down to the asset revaluation reserve (including additional revaluation increments) over the next τ years.

All independent variables are measured for each firm in the year of the upward revaluation. *APPRAISER* equals 1 for an independent revaluation, and 0 for a directors' revaluation. *INTANG* equals 1 if the asset class revalued is identifiable intangibles, zero otherwise. *PLANT* equals 1 if the asset class revalued is plant and equipment, zero otherwise.

Table 8

Multivariate analysis of differences in revaluation accuracy for sample of 201 (174) independent and directors' upward asset revaluations for which subsequent write-downs data is available for the next three (five) years.

(Regression coefficient estimates and test statistics).

$$REL2_{i,t+\tau} = \sum_{Y=81}^{94} \beta_{0Y} YR_{it} + \beta_1 APPRAISER_i + \beta_2 APPRAISER * INTANG_i + \beta_3 APPRAISER * PLANT_i + \beta_4 INTANG_i + \beta_5 PLANT_t + \varepsilon_{it}$$

Variable	Pred	Full Sample		First Revaluation Only	
		$REL2_{t+3}$	**$REL2_{t+5}$**	**$REL2_{t+3}$**	**$REL2_{t+5}$**
APPRAISER	+	0.356 (1.672)*	-0.093 (-0.286)	0.017 (0.069)	-0.503 (-1.233)
*APPRAISER*INTANG*	+	-0.591 (-1.272)	0.289 (0.432)	1.287 (2.094)*	1.576 (1.852)*
*APPRAISER*PLANT*	+	-0.308 (-0.635)	-0.098 (-0.142)	0.239 (0.546)	0.646 (1.001)
INTANG	-	0.126 (0.344)	-1.067 (-1.969)*	-0.376 (-0.884)	-1.932 (-2.933)**
PLANT	-	-0.501 (-1.605)	-0.948 (-1.994)*	-0.859 (-2.875)**	-1.541 (-3.163)**
Adjusted R^2		0.272	0.284	0.317	0.399
n		201	174	87	81

*significant at 5%, one-tailed, **significant at 1%, one-tailed

$REL2_{t+\tau}$ *(τ=3 or 5)* is our second measure of asset revaluation reliability. It is measured as the initial revaluation increment less all subsequent write-downs plus all subsequent increments over the next τ years. This variable is then deflated by the initial revaluation increment.

All independent variables are measured for each firm in the year of the upward revaluation. *APPRAISER* equals 1 for an independent revaluation, and 0 for a directors' revaluation. *INTANG* equals 1 if the asset class revalued is identifiable intangibles, zero otherwise. *PLANT* equals 1 if the asset class revalued is plant and equipment, zero otherwise.