Accounting Horizons
Vol. 25, No. 1
2011
pp. 41–70

American Accounting Association
DOI: 10.2308/acch.2011.25.1.41

Does the Capitalization of Intangible Assets Increase the Predictability of Corporate Failure?

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SYNOPSIS: The value relevance of intangible assets is now well documented in the literature, leading to calls for standard setters to adopt more flexible reporting rules for these assets. In this study, I evaluate the merits of intangibles capitalization from a bankruptcy and default risk perspective, which has not been previously considered in the literature. The study is conducted in a unique reporting environment, where managers have had considerable discretion to capitalize a wide range of intangibles over an extended period. Three main results are reported. First, failing firms capitalize intangible assets more aggressively than non-failed firms over the 16-year sample period, but particularly over the five-year period leading up to firm failure. Second, drawing on the accounting choice literature, I find that managers' propensity to capitalize intangible assets has a strong statistical association with earnings management proxies, particularly among failing firms. Finally, voluntary capitalization of intangibles has strong discriminating and predictive power in a firm failure model, even after controlling for several other factors.

Keywords: intangibles; discretionary capitalization; firm failure; accounting choice.

Data Availability: Data are available from the public sources identified in the paper.

INTRODUCTION AND BACKGROUND

The value relevance of various classes of intangible assets is now well documented in a substantial literature (see e.g., Aboody and Lev 1998; Wyatt 2005; Lev et al. 2009). A major conclusion of this research is that omission of intangibles from the balance sheet is a serious deficiency, particularly as value for modern businesses is seen to come more from the intangible asset base (such as brands, distribution and supply chains, knowledge, human capital, and organization capital), than from physical or tangible assets (Penman 2009).

However, standard-setting authorities worldwide have a stated aim of developing accounting standards that meet the needs of a variety of users, including lenders and creditors. This study contributes to current debates on intangibles by evaluating the merits of intangibles capitalization from a bankruptcy and default risk standpoint (i.e., a lender's perspective), which has not been previously considered in this literature. Proponents of more conservative rules for intangibles are

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Submitted: January 2010
Accepted: June 2010
Published Online: March 2011
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concerned that intangibles are "soft" assets that are difficult to verify independently of the value of the firm. Capitalizing such assets is perceived to lead to an erosion in the quality of financial reporting, rendering financial statements more subjective, less informative, and potentially open to manipulation and even fraudulent misstatement (see e.g., Watts 2003, 2006).

The accounting choice and debt contracting literatures predict that managerial opportunism is a significant motivator for managers' voluntary adoption of accounting policy choices. If capitalization of intangibles in failing firms is primarily driven by managerial opportunism, a number of findings are anticipated in the results, including: (1) failing firms will capitalize intangibles more aggressively than non-failed firms over the sample period; (2) managers of failing firms will have incentives to capitalize intangibles, such as overstatement of earnings, the understatement of leverage, and avoiding the reporting of net income losses and/or net asset deficiencies in the financial statements; and (3) voluntary capitalization of intangible assets will increase the predictability of corporate failure (as capitalization is expected to be motivated primarily by financial statement misrepresentation).

The results reported in this study are largely consistent with the stated hypotheses. First, failing firms voluntarily capitalize intangible assets more aggressively than non-failed firms over the 16-year sample period. Moreover, the rate of voluntary capitalization increases sharply over a five-year period leading up to firm failure. Second, voluntary capitalization of intangibles appears to be strongly associated with earnings management proxies, and related interaction effects, particularly among failing firms. Finally, based on a sample of 9,750 firm years taken over a 16-year period, the results indicate that the voluntary capitalization of intangibles is a strong predictor of corporate failure, even after controlling for factors such as leverage, discretionary accruals (excluding accruals associated with intangibles), excess value, firm size, age of the firm, industry background, macroeconomic factors (such as recessions and stock market collapses), and other financial performance indicators.

The findings of this study are potentially relevant to standard setters, government regulators, practitioners, analysts, and academics in a number of ways. For instance, the unique experimental setting of this study provides some insight into what international standard setters could expect if conservative rules for intangibles are abandoned, i.e., potentially a significantly higher incidence of earnings management and financial misstatement, particularly when firms are under the duress of financial distress. Further, the bankruptcy and default risk findings of this study contrast with recent suggestions in the literature that more flexible reporting rules for intangibles will actually improve the quality of the balance sheet and investors' information set (see e.g., Wyatt 2005). The findings also contribute to previous accounting choice studies that examine the earnings management practices of failing firms and firms subject to regulatory sanctions (see e.g., Lee et al. 1996; Rosner 2003). Previous research models total accruals and discretionary accruals as proxies for earnings management. Given the importance attributed to intangible assets in the literature, this study treats intangibles as a distinct asset class that is modeled separately from other forms of discretionary accruals. This study also extends previous accounting choice literature by quantifying the impacts of intangibles capitalization, discretionary accruals, and a range of other explanatory variables on the predictability of corporate failure.

Prior to the introduction of International Financial Reporting Standards (IFRS) in 2005, Australian standard setters permitted a high degree of flexibility in how companies reported intangible assets. Recognition of intangible assets, particularly various types of *identifiable* intangible assets has been widespread in Australia, at least up until the formal introduction of IFRSs.[1] As part of

[1] The Australian reporting environment contrasts with the regulatory environment in the United States, where virtually all intangible assets are expensed (see e.g., Aboody and Lev 1998).

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Australia's mandatory shift to IFRSs, IAS 38, *Intangible Assets*, was adopted by the Australian Accounting Standards Board (AASB) as AASB 138, *Intangible Assets*, with an application date of January 1, 2005. AASB 138 resulted in the introduction of more conservative rules for intangible asset recognition, including more detailed specification of definition and recognition criteria for intangibles.[2] The introduction of AASB 138 in Australia reflected concerns by standard setters (particularly from members of the IASB) that intangibles represent "soft" assets that can potentially be exploited by managers who can act opportunistically by capitalizing intangible assets. Similar concerns have been expressed internationally.[3]

A number of empirical studies have emerged in the literature, many of which find evidence supporting the value relevance of different types of intangible assets (see Wyatt 2008 for a detailed review of relevant literature). However, not all academics have been persuaded by this research. For instance, Watts (2003, 2006) argues that estimating the rents arising from goodwill and other types of intangibles requires valuation of the firm (or part of the firm), and that valuation is frequently not verifiable (see also Ramanna 2008; Skinner 2008; Penman 2009). Furthermore, Kallapur and Kwan (2004) observe significant levels of bias or error in the recognition of brand assets among firms with high levels of contracting incentive; however, for firms with low levels of contracting incentives, recognition of brand assets appears to be reliable.

Holthausen and Watts (2001, 25) conclude that FASB statements about the functions and users of financial reporting "do not suggest any primacy for equity valuation." In particular, lenders and creditors are typically more interested in valuing a firm's debt and default/bankruptcy risk than in equity valuation. From a liquidation perspective, the realizable value of intangible assets is expected to be negligible, as the value of these assets is inextricably tied to the going concern prospects of the firm. While Holthausen and Watts (2001) defend conservative intangibles recognition rules from a debt contracting and credit risk perspective, there is currently little or no research available that provides evidence on the capitalization practices of failing firms; the motives for such practices; or whether capitalization of intangibles has any explanatory and predictive power in a bankruptcy/default risk setting. The remainder of this study is organized as follows. The second section discusses prior literature and hypothesis development. The third section outlines the research methodology. The fourth section discusses the empirical results, while the fifth section provides concluding comments.

PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

The theoretical development of this paper comes from the accounting choice and debt contracting literatures. Several empirical studies document that failing and troubled companies have a higher propensity to engage in earnings management practices to mask underlying performance issues (see e.g., Schwartz 1982; Lilien et al. 1988; Sweeney 1991; Koch 1991; Sweeney 1994; DeFond and Jiambalvo 1994; Rosner 2003; Lee et al. 1996).[4] The debt contracting literature also has relevance to the proposition that intangible asset capitalizations can be exploited opportunis-

[2] Among other requirements, AASB 138, paragraphs 48, 57, and 75: (1) prohibit the capitalization of internally generated intangible assets; (2) requires that after initial recognition, an intangible asset can only be revalued to fair value if there is an "active market" for the asset; (3) imposes more restrictive capitalization requirements for research and development costs than was previously required by Accounting Standards; and (4) required the provisions of AASB 138 to be applied retrospectively. Intangibles that were recognized in the balance sheet prior to the introduction of AASB 138, but did not qualify for recognition under the provisions of this Standard, were required to be written down to cost or unrecognized altogether, as in the case of internally generated intangible assets.

[3] For instance, Sir David Tweedie, the current chairman of the IASB, has described the intangible reporting practices of Australian firms (in the pre-IFRS era) as "deplorable" (Buffini 2003a).

[4] In another study, DeAngelo et al. (1994, 115) examine accounting choices in firms that reduced dividend payments. Their evidence indicates that managers' accounting choices primarily reflect acknowledgment of their firms' financial

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tically by managers in failing firms. For instance, Dechow et al. (1996, 30) conclude that the most important motivations for earnings manipulation are the "desire to raise external financing at low cost and to avoid debt covenant restrictions" (see also Christie 1990; Sweeney 1994).

The current study contributes to previous accounting choice literature, which has measured earnings management through proxies such as total accruals and discretionary accruals. A sizeable literature contends that intangibles are a unique and important asset class warranting separate disclosure in the financial statements (see e.g., Lev et al. 2009). Hence, I test the explanatory and predictive power of intangibles capitalization on firm failure separately from other forms of discretionary accruals.[5] Further, the paper tests various managerial incentives to misrepresent the financial statements, which can potentially explain the association between intangibles capitalization and increased predictability of firm failure. Drawing on the accounting choice and debt contracting literatures, I predict that managerial opportunism is the primary motivator for the voluntary capitalization of intangible assets in failing firms. This proposition leads to three specific hypotheses for testing:

H1: Failing firms will capitalize voluntary intangible assets more aggressively than non-failed firms over the sample period.

H2: Managers of failing firms have earnings management incentives to voluntarily capitalize intangibles assets.

H3: Voluntary capitalization of intangible assets among failing firms will increase the predictability of corporate failure.

METHODOLOGY

Sample Selection

This study models firm failure in a binary outcome setting of failure and non-failure. The failed firm sample includes three major forms of bankruptcy proceeding available under the legislative provisions of the Australian Corporations Act (ASIC 2001): (1) voluntary administration (first introduced in Australia in June 1993 under the Corporate Law Reform Act 1992); (2) liquidation; and (3) receivership. Failed firms also include delisted firms that show evidence of defaulting on loans or other legally enforceable contracts, such as payment terms with creditors. Distressed firms that are delisted from the Australian Stock Exchange (ASX) for failing to pay annual listing fees are also included in the sample of defaulting companies. Non-failed firms include all firms not classified as failed, but exclude firms that (1) were privatized over the sample period; (2) were subject to a distressed merger or takeover; and (3) were subject to a compulsory acquisition over the sample period. A sample of non-failed and failed firms is collected between the years 1989 and 2004. Where practicable, up to five annual reporting periods of data are collected for all companies in the failed and non-failed groups. Consistent with prior literature, where a firm is identified as failed, the company is coded as failed for *all* previous years that annual report data have been collected for that firm. The sample is divided up into an estimation sample (comprising all observations between 1989–2002) and a validation sample (comprising all observations between 2003–2004). Only the estimation sample is used for model estimation, while the validation sample is used to test predictive accuracy (i.e., no observations in the validation

troubles, rather than attempts to mitigate covenant violations or to portray the firm as less troubled. However, they also find evidence of income-decreasing accounting choices insofar as a majority of sampled firms engage in noncash write-offs in the dividend reduction year that are reasonably attributable to managers' accounting discretion.

[5] This is achieved by removing the effects of intangibles recognition from the estimation of discretionary accruals in the modified Jones model (Dechow et al. 1995).

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sample are used for model estimation). To avoid problems associated with back casting, first identified by Ohlson (1980), data are collected for each firm prior to the announcement of failure to the market. Failure announcement dates are determined from the Australian Stock Exchange's Signal G releases.[6] In all cases, failed firms had been suspended from the ASX *prior* to the announcement of failure to the market.[7] The sampling methodology produced a final useable sample of 8,894 non-failed firm years and 856 failed firm years.[8] The sample of non-failed firms is drawn over the same time-period range as failed firms, and the proportion of failed to non-failed firms sampled is comparable across each of the years the data are collected (see Table 1).[9]

Data Sources

The firm failure sample is extracted from Huntley's Delisted Company Database (Huntley's Financial Services Pty. Ltd. 1999) and the Thomson Reuter's Inactive Database, which, together, forms a comprehensive list of failed companies between the years 1989 and 2004. It also includes a comprehensive list of companies that are delisted for other reasons, such as failure to pay annual ASX listing fees. Economic data are obtained from the Australian Bureau of Statistics. The bankruptcy announcement or default date is identified using Signal G, a company announcements database maintained by the Australian Stock Exchange pursuant to Continuous Disclosure regulations of the Australian Corporations Act (ASIC 2001).

Research Design

The study examines H1 by documenting trends in the intangibles capitalization practices of failing firms, leading up to firm failure. Aggressive capitalization practices in failing firms, particularly in the immediate years leading up to failure, are anticipated if managers are acting opportunistically.[10] However, the results for H1 provide no quantifiable evidence of the impact of intangibles capitalization on the predictability of corporate failure, nor potential managerial incentives for such practices. Hypothesis 2 is tested by investigating the incentives managers of failing firms might have to manage earnings and misstate the balance sheet through intangibles capitalization. Managers of failing firms could have incentives to capitalize intangibles for several rea-

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[6] Signal G disclosures are regulated by the ASX Listing Rule 3.1 (ASX 2009), which identifies the types of information that Australian companies must disclose to the market on a timely basis, such as the appointment of a receiver or liquidator, or loan defaults.

[7] The ASX's company announcement office screens all company releases before release to the market to determine, among other things, whether a firm's securities should be suspended before the announcement is made, in order to allow sufficient time for the market to "digest" the news. Company announcements involving voluntary administration or liquidation are invariably preceded by suspension of the firm's securities from trading (in most cases, the securities of failed firms in our sample never resumed trading following the failure announcement).

[8] A total of 411 firm years are removed from the non-failed firm sample due to firms privatizing, and a further 405 firm years are removed as a result firms being engaged in a distressed merger and/or takeover activity. Compulsory acquisitions resulted in the removal of 1,489 firm years from the sample.

[9] Other methodological points are as follows. Only publicly listed firms on the ASX are included in the estimation and holdout samples. Additional screening is applied to ensure that no failed firms identified in the estimation sample are also included in the holdout sample. Consistent with previous literature (see e.g., Ohlson 1980; Jones and Hensher 2004), no firm is deleted simply because it is newly or recently listed, and some firms in both our samples only had one or two years of financial reports. If a firm produced its annual report after the announcement of failure, then its published financial report of the previous reporting period is used. In the estimation sample, the average lead time between the date of the previous annual report and the announcement of failure was approximately 11.12 months (and 10.8 months for validation sample), which is broadly consistent with the lead time reported in other studies (Ohlson 1980; Jones and Hensher 2004).

[10] An implication of Holthausen and Watts (2001) is that, in the absence of managerial opportunism, capitalization of intangibles in failing firms, on average, is not expected to increase significantly in the immediate periods leading up to firm failure. As a firm becomes increasingly distressed and approaches bankruptcy or default, the future economic benefits embodied in intangible assets are expected to become increasingly uncertain, as the value of these assets depends, at least in part, on the going concern prospects of the firm.

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TABLE 1

Means and Standard Deviations (in parentheses) and t-values of Voluntary Intangibles Capitalization to Total Assets between Failed and Non-Failed Firms and Industry Groups over the Sample Period 1989–2004

		Mean Ratio of Voluntary Intangibles Capitalization to Total Assets			
ASX Sector Code		**Non-Failed**	**Failed**	**t-value**	**Percent of Sample**
81–83	Alcohol and Tobacco (Brewer/Vintner/Tobacco)	3.64 (17.35)	14.12 (34.21)	−2.92*	1.70
71–74	Building Materials (Cement/Bricks, Pipes, Tiles/Timber and Board)	3.39 (6.04)	0.11 (.23)	1.21	2.20
101	Chemicals (Chemicals/Fertilizers)	2.53 (5.05)	—	—	0.72
61	Developers and Contractors (Building, Contractors)	6.35 (14.80)	0.45 (1.40)		4.09
231	Diversified Industrials (Diversified Industrial)	7.25 (12.75)	2.05 (5.44)	2.38*	2.75
31–33	Diversified Resources (Oil, Steel, Mining/Mining, Smelting)	0.36 (0.87)	—	—	0.87
41–46	Energy (Oil/Gas Producer/Explorer/Investment/Gas Distribution/Coal/Uranium)	4.65 (16.12)	10.52 (24.41)	−1.50	6.24
111–115	Engineering (Heavy Engineering/Machinery Manufacturer/Engineering Contractor/Light Engineering)	7.36 (15.88)	5.59 (13.30)	0.77	2.70
91–96	Food and Household (Food/Flour Miller, Baker/Soft Drink and Confect/Household Goods)	11.28 (15.16)	3.24 (4.97)	3.01*	3.32
11–15	Gold (Gold Producer/Explorer/Mining/Gold and Copper)	6.03 (16.58)	6.22 (13.29)	−0.09	16.10
211–215	Health Care and Biotechnology (Pharmacy/Biotechnology/Health and Medical/Health and Related Products)	11.18 (17.27)	26.26 (26.63)	−7.81*	6.40
52	Infrastructure and Utilities (Infrastructure, Utilities)	12.92 (15.60)	21.64 (32.30)	−2.21*	1.62

(continued on next page)

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TABLE 1 (continued)

ASX Sector Code		Mean Ratio of Voluntary Intangibles Capitalization to Total Assets: Non-Failed	Failed	t-value	Percent of Sample
151–155	Media (Diversified Media/Publishers/Television/Advertising, Marketing)	33.36 (28.53)	26.34 (23.35)	2.12*	3.98
221–228	Miscellaneous Industrials (Miscellaneous Industrials/Miscellaneous Services/Mining Services/Automotive and Related Services/Computer and Office Services/Internet/High Technology)	10.81 (16.50)	25.68 (28.34)	−9.56*	17.99
21–27	Other Metals (Diversified Mining/Base Metals/Mineral Sands/Bauxite/ Diamonds/Mineral Explorer)	3.29 (8.39)	3.16 (7.53)	0.11	10.44
122–126	Paper and Packaging (Forest Products, Trade/Paper and Merchant/ Can Manufacturer/Plastic Bottles)	0.99 (5.29)	36.35 (−)	−6.56*	0.89
147	Property Trusts (Property Trust)	1.37 (6.39)	0.017 (0.05)	0.671	4.50
131–137	Retail (Retail, Wholesale Retailer/Retail Investments/ Wholesaler Retail)	8.35 (11.10)	5.53 (6.86)	1.71	3.90
182–184	Telecommunications (Cables/Equip, Services/Other)	10.60 (16.86)	17.46 (23.53)	−2.51*	4.57
241, 243	Tourism and Leisure (Casinos, Gaming/Leisure Activities)	14.21 (18.75)	12.03 (19.02)	0.612	3.38
141–144	Transport (Transport/International Transport/Other Services/Security)	4.49 (10.35)	0.06 (0.116)	0.736	1.20

*Denotes statistical significance at a critical value < = .05.

t-values relate to the statistical differences in the group means of failed and non-failed firms.

The mean value for the voluntary intangibles capitalization to total assets ratio for all failed firms in the sample is 18.21 percent. The mean value of this ratio for all non-failed firms is 11.01 percent. The difference in the group means is statistically significant (t = 4.41). This table provides a cross section of the means and standard deviations (in parentheses) and t-values of voluntary intangibles capitalization to total assets between failed and non-failed firms and industry groups over the sample period 1989–2004. Also shown are the percentages of the sample represented by different industry sectors.

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sons. First, failing firms with executive compensation plans in place could be motivated to capitalize intangibles as part of an earnings management strategy.[11] Second, managers of failing firms could have incentives to capitalize intangibles to avoid or reduce reported net income *losses*, which can potentially signal to the market that the firm is in a deteriorating state of health. Third, failing firms could have incentives to capitalize intangibles to reduce the leverage ratio (debt to assets). Highly leveraged firms that are expected to be close to their debt covenant restrictions (or have breached these covenants) could be motivated to reduce their leverage ratios. Capitalizing intangibles will reduce leverage if capitalization involves no cash outlay or only partial cash outlays (which might occur for intangible asset revaluations or where internally generated intangible assets are recognized in the balance sheet). A further motivation for managers of failing firms to capitalize intangibles is to reduce or avoid reporting net asset deficiencies altogether (negative equity), which, again, can signal to the market the firm is in a deteriorating state of financial health. Avoiding net asset deficiencies assumes that capitalization does not involve a cash outlay or that the cash outlay is less than the capitalized asset amount reported in the balance sheet. In terms of testing managers' incentives to capitalize intangibles, it is also relevant to examine discretionary accruals (excluding intangibles). Are failing firms that show a propensity to manage other forms of discretionary accruals also likely to be capitalizing intangibles? If so, this finding could establish a pattern of earnings management in failing firms that is also surfacing with the discretionary capitalization of intangible assets.

A firm's incentive to voluntarily capitalize intangibles is tested using a binary logit model, where the whole sample is divided into those firms that capitalize intangibles and those firms that do not (treated as the dependent variable). More formally, the logit model to test H2 is specified as follows:

$$y_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 NI\_LOSS_{it} + \beta_3 NA\_DEF_{it} + \beta_4 LEVD_{it} + \beta_5 DISACC_{it} + \beta_6 FFD_{it} + \beta_7 FFD * DISACC_{it} + \beta_8 AGE_{it} + \beta_9 LOG\_TA_{it} + \mu_{it}. \quad (1)$$

This model predicts that firm *i* is more likely to voluntarily capitalize intangibles in time *t*, when firm *i*: (1) has an executive compensation plan in place (*COMP*); (2) reports a net income loss (*NI_LOSS*); (3) reports a net asset deficiency (*NA_DEF*); (4) has high leverage (*LEVD*); (5) has higher levels of discretionary accruals (*DISACC*); (6) is a failed firm (*FFD*); and (7) is a failed firm *with* high discretionary accruals (an interaction effect; *FFD* ∗ *DISACC*). The model controls for the age (*AGE*) and size (*LOG_TA*) of the firm. All explanatory variables identified in Equation (1) above are defined in the Appendix and discussed further in the next section.

Hypothesis 3 is tested by developing a multivariate firm failure model that includes intangibles capitalization as a predictor variable. While evidence for H3 indicates a strong statistical association between intangibles capitalization and the predictability of corporate failure, these findings do not establish a causal link between capitalization and firm failure. An accounting policy choice alone cannot *cause* a firm to fail; however, it may be symptomatic of more deep-seated financial problems within a troubled, or failing, firm. The issue then arises whether managers have specific incentives to capitalize intangibles and whether these incentives are associated

[11] Analysis of the financial statements of the failed firm sample indicates that around 55 percent of the failed firm sample showed some evidence of having an executive compensation plan in place prior to failure. Furthermore, consistent with previous research, a surprisingly large number of capitalizing firms appear to have deferred amortization of intangibles assets to future periods, which is also an income-increasing strategy. Companies deferring amortization of intangibles assets to future periods is documented elsewhere (see Wines and Ferguson 1993 for pre-1989 evidence of amortization deferral practices of Australian companies); and the 1999 surveillance review of the Australian Securities and Investment Commission (ASIC 1999), which reported that a significant number of Australian companies were failing to amortize reported intangible assets.

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with misrepresentation of the financial statements. To test the impact of voluntary intangibles capitalization on the predictability of firm failure, a binary logit model is estimated using several explanatory and control variables (discussed further below), including the fitted or predicted values (i.e., the logit probabilities) of the incentives model in H2 above. Inclusion of this variable in the firm failure model provides a test of whether managers' incentives to capitalize intangibles have any predictive value on corporate failure. The dependant variable to test H3 is a dichotomous variable coded 1 if firm i is observed to fail in time t, and 0 otherwise. Two logit models are estimated to test H3. Model 1 uses *voluntary* intangibles capitalization as a predictor variable (including the interaction effects), while Model 2 uses *total* intangibles capitalization as a predictor variable. Estimating two models will reveal the incremental explanatory and predictive power of discretionary intangibles capitalization on firm failure, relative to a model that incorporates the impacts of both voluntary and mandatory capitalization. The logit models to test H3 are specified in Equation (2) and Equation (3) as follows:

$$\begin{aligned} y_{it} = {} & \beta_0 + \beta_1 VINT_{it} + \beta_2 DISACC_{it} + \beta_3 DISACCD * VINT_{it} + \beta_4 LEV_{it} + \beta_5 LEVD * VINT_{it} \\ & + \beta_6 PREDICT\_IC_{it} + \beta_7 EXVAL_{it} + \beta_8 NETOPTA_{it} + \beta_9 WCTA_{it} + \beta_{10} RETA_{it} \\ & + \beta_{11} NEW\_ECON_{it} + \beta_{12} TECH\_CR_{it} + \beta_{13} RECESS_{it} + \beta_{14} AGE_{it} + \beta_{15} LOG\_TA_{it} + \mu_{it}, \end{aligned} \tag{2}$$

$$\begin{aligned} y_{it} = {} & \beta_0 + \beta_1 TINT_{it} + \beta_2 DISACC_{it} + \beta_3 DISACCD * TINT_{it} + \beta_4 LEV_{it} + \beta_5 LEVD * TINT_{it} \\ & + \beta_6 PREDICT\_IC_{it} + \beta_7 EXVAL_{it} + \beta_8 NETOPTA_{it} + \beta_9 WCTA_{it} + \beta_{10} RETA_{it} \\ & + \beta_{11} NEW\_ECON_{it} + \beta_{12} TECH\_CR_{it} + \beta_{13} RECESS_{it} + \beta_{14} AGE_{it} + \beta_{15} LOG\_TA_{it} + \mu_{it}. \end{aligned} \tag{3}$$

The model specified in Equation (2) above predicts that firm i is more likely to fail in time t, when firm i: (1) voluntarily capitalizes intangible assets (*VINT*); (2) has higher levels of discretionary accruals (*DISACC*); (3) has a positive interaction effect between higher levels of accruals and higher voluntarily capitalization levels (*DISACCD* ∗ *VINT*); (4) has higher leverage (*LEV*); (5) has a positive interaction effect between higher leverage and higher levels of intangibles capitalization (*LEVD* ∗ *VINT*); (6) has greater incentives to voluntarily capitalize intangibles, as predicted by the incentives model in Equation (1) above (*PREDICT_IC*); (7) has lower excess value (*EXVAL*); and (8) has lower levels of operating cash flows (*NETOPTA*), working capital (*WCTA*), and retained earnings (*RETA*). A number of control variables are included in this model, such as the size (*LOG_TA*), age (*AGE*), and industry background of the firm (*NEW_ECON*); and controls for specific economic events and conditions, such as the technology crash in 2001 (*TECH_CR*) and periods of economic recession over the sample period (*RECESS*). The model in Equation (3) is identical to Equation (2), but the *VINT* variable has been replaced by *TINT* (the total capitalization of intangible assets). All explanatory variables identified in Equation (2) and Equation (3) above are discussed in the next section and defined in the Appendix.

The findings for H2 and H3 provide an indirect test of rival explanations for the results reported in this study. For instance, it could be argued that firms with significant investments in intangibles are *inherently* more risky (in the sense that some firms will inevitably fail), but these assets are capitalized because they have high expected returns. It could be argued that firms that use more aggressive capitalization practices are more likely to fail, possibly because they have chosen to undertake risky, but positive, NPV projects. In this sense, managers may not be acting opportunistically, as the hypotheses predict. The aggressiveness of intangibles capitalization could be capturing the inherent riskiness of the investments, because riskier projects have to earn a

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higher expected return to compensate for the greater risk. The capitalization of intangibles could be increasing as firms approach bankruptcy or default (as is shown in H1) because managers take on even more risky projects ("doubling down on their bets"). This alternative explanation would be more plausible if the intangibles capitalization of failing firms is directly associated with cash outlays, i.e., firms have to spend comparable amounts of cash to acquire (and recognize) intangible assets in the balance sheet. However, cash expenditure on intangibles was not found to be the case for several failing firms in the sample. Some asset capitalizations appear to be associated with intangible asset *revaluations* and/or recognition of internally generated intangibles. Further, if this argument is the dominant explanation for the findings, the results for H2 and H3 are not expected to yield any persuasive or conclusive evidence on the earnings management practices of failing firms that engage in intangibles capitalization.

Variable Selection and Measurement

Variables are selected on the basis of their significance in previous literature (particularly bankruptcy literature and the accounting choice and debt contracting literatures) and also in terms of their anticipated behavioral association with the intangible asset capitalization variable.

Intangible Asset Capitalization

I test the impact of (1) voluntary intangible assets divided by total assets, and (2) total intangible assets divided by total assets. Voluntary intangible assets are those assets that are not subject to any specific accounting standards; hence, managers have the most discretion in the reporting of these assets. Intangible assets that are not subject to specific Accounting Standards over the sample period mainly include: (1) identifiable intangible assets and (2) internally generated intangible assets. Purchased goodwill and research and development costs are subject to specific Accounting Standards over the sample period; and, hence, managers are expected to have less discretion in the reporting of these asset classes.[12] The major categories of identifiable intangible assets reported in the annual reports (and related notes to the accounts) of Australian companies (in the pre-IFRS period) include: patents; trademarks; brands (33.24 percent); licenses (14.23 percent); and capitalized mining evaluation and exploration costs under certain conditions (17.37 percent).[13] Other intangibles are less commonly reported, such as copyrights (1.47 percent); intellectual property (3.71 percent); royalties (2.9 percent); franchises (0.76 percent); media mast-

[12] I find that around 67 percent of the total intangible asset figure reported by failing firms over the 16-year sample period relates to voluntary intangible assets (mainly identifiable intangible assets). The absence of acquired goodwill in this total is expected, as failing firms, on average, tend to have relatively small market capitalizations and relatively poor financial performance. Hence, these firms are usually not involved in takeover or merger activities that would give rise to acquired goodwill. With the non-failed firm sample, the majority of the reported intangible asset figure (around 53 percent) is represented by acquired goodwill.

[13] Under certain conditions, capitalized evaluation and exploration (E&E) expenditures are treated as discretionary intangibles in the sample. Capitalization of E&E expenditure was discretionary under AASB 1022, paragraph 0.11, *Accounting for the Extractive Industries*, which was in force over the sample period (1989–2004). However, AASB 1022 was silent on whether E&E expenditure should be classified in the balance sheet as intangible or tangible. Australia's current standard on extractive industries, AASB 6, paragraph 15, *Exploration for and Evaluation of Mineral Resources*, reflected the previous IAS treatment for E&E over the sample period, and states: "An entity shall classify exploration and evaluation assets as tangible or intangible according to the nature of the assets acquired and apply the classification consistently." While some resource companies classified E&E expenditures as intangibles, capitalized E&E expenditures in resource companies are conceptually no different from R&D for industrial entities. E&E expenditure was treated as intangible if the capitalized E&E expenditure in the balance sheet was not clearly evidenced by *cash* expenditure in the cash flow statement (E&E expenditure is normally classified separately in the investing section of the cash flow statement). To arrive at the discretionary intangible asset amount, the cash expenditure on E&E is subtracted from the capitalized amount of E&E expenditure reported in the balance sheet. It is the view held in this paper that such discrepancies could only be classified as discretionary intangibles.

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heads (2.1 percent); proprietary technology (0.57 percent); and technology rights (1.125 percent). Consistent with Wyatt (2005), formation and issue costs (14.23 percent) are not included in the intangibles capitalization variable.

Leverage

The leverage ratio is measured as total debt divided by total assets, *less* voluntary intangible assets (this adjustment is to avoid confounding the treatment and control variables). This variable is central to the debt contracting and accounting choice literatures. Given prior bankruptcy literature, a positive relationship is expected between higher leverage and firm failure (Altman 2001). Following the accounting choice and debt contracting literatures, voluntary intangible asset capitalization is expected to be increasing with leverage in failing firms.[14] This relationship is tested directly, in the models specified above, through the impact of leverage on firm failure and the interaction of high/low leverage with voluntary capitalization.

Earnings Management Proxy

The use of accruals by managers to manage earnings has been reported in numerous studies (see, e.g., Dechow et al. 1995, 1996; DeFond and Jiambalvo 1994; Holthausen et al. 1995; Jones 1991; Kang and Sivaramakrishnan 1995). Several studies document the effects of accruals manipulation in circumstances such as fraud, SEC sanction, and firm failures. As total accruals is a "noisy" measure of earnings management, I use discretionary accruals as measured by the modified Jones model (see Dechow et al. 1995, 199). For the purposes of this study, discretionary accruals *exclude* the impact of accruals associated with intangibles capitalization to avoid confounding the explanatory and dependent variables (particularly for H2). Modeling these variables separately allows the study to compare the relative strength and contribution of intangibles capitalization and other discretionary accruals on the predictability of firm failure, including potential interaction effects among these and other explanatory variables.[15]

In addition to earnings management proxies, I examine a number of variables indicating potential incentives for managers to misstate the financial statements through capitalization of intangibles, including: (1) a compensation plan dummy variable, coded 1 if sampled firm *i* shows evidence of having an executive compensation plan in place in time *t*, and 0 otherwise; (2) a net income loss dummy, coded 1 if sampled firm *i* shows evidence that the capitalization of intangibles resulted in the firm reducing or avoiding the reporting of net income losses in time *t*, and 0 otherwise; and (3) a net asset deficiency dummy, coded 1 if sampled firm *i* shows evidence that the capitalization of intangibles resulted in the firm reducing or avoiding the reporting of net asset deficiencies *and* where the capitalization of intangibles does not involve a cash outlay (or only involves a partial cash outlay) in time *t*, and 0 otherwise.

Leverage and Discretionary Accruals Interaction Effects

I also test certain interaction effects, including interactions between leverage and discretionary accruals and the voluntary intangibles capitalization variable. In particular, I examine (1) interactions between high/low leverage and voluntary intangibles capitalization, and (2) interactions between high/low discretionary accruals and voluntary intangibles capitalization.

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[14] Increasing leverage is expected to occur where capitalization of intangibles does not involve cash consequences to the firm, e.g., asset revaluations and recognition of internally generated intangible assets.

[15] For instance, through interaction effects, I test whether failing firms with high discretionary accruals (exclusive of intangibles) increases the statistical impact of intangibles capitalization on firm failure. This test provides an indication whether firms engaging in more aggressive earnings management (through discretionary accruals) are also likely to be managing earnings through capitalization of intangibles.

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Financial and Market Variables

I include a number of financial variables that previous literature predicts will have an association with bankruptcy and financial distress (see e.g., Ohlson 1980; Zmijewski 1984; Casey and Bartczak 1985; Altman 2001; Jones and Hensher 2004, 2009). Some frequently tested variables include (1) operating cash flow divided by total assets, which is a measure of a firm's cash-generating power from ongoing operations; (2) working capital divided by total assets, a measure of working capital adequacy; and (3) retained earnings divided by total assets, a measure of past accumulated earnings. Given prior literature (see e.g., Altman 2001; Jones and Hensher 2004, 2009), these variables are all expected to be negatively correlated with firm failure (i.e., lower values of these ratios are expected to increase the probability of firm failure). I test one market-based variable, excess value, which has empirical relevance in the context of previous intangibles research (Wyatt 2005). Excess value is measured as the market value of equity *less* the book value of equity, *less* intangible assets (this measure is proposed in Thomadakis [1977], and later applied in Connolly et al. [1986] and Wyatt [2005]). Excess value, being based on market value is suggested by Thomadakis (1977, 179) to be a "forward looking index of profitability." According to Wyatt (2005), managers' motivation to report intangible assets arises, at least in part, from the "rent-seeking" behavior of companies.[16] Following this logic, a firm's ability to appropriate economic rents from its intangible asset investments is expected to be associated with the choice to record intangible assets.[17]

Several control variables are examined from previous literature including: (1) the recession dummy variable, a macroeconomic indicator designed to capture the impact of economic recessions over the sample period (see e.g., Kane et al. 1996). Recession is defined, according to Australian Bureau of Statistics guidelines, as at least two consecutive quarters of GDP contraction; (2) a new economy sector dummy, to control for the relatively high incidence of firm failures in this sector over the sample period (Jones and Hensher 2004); (3) a technology crash dummy, which captures the collapse of the Australian technology sector in 2001; (4) age of the firm, coded 1 if a firm was newly established within a certain period of time (from one to five years), and 0 otherwise; and (5) a firm size variable, defined as the natural log of total assets. Both the age and size of the firm have been shown to be strong predictors of corporate failure in previous research (see Altman 2001).

EMPIRICAL RESULTS

Results for Hypothesis 1

Hypothesis 1 predicts that failing firms will capitalize voluntary intangible assets more aggressively than non-failed firms over the sample period. Table 1 provides a breakdown of the intangible assets to total assets ratio across industry sectors over the sample period. Statistically significant differences between failed and non-failed firms across industry sectors are indicated with asterisks.

Table 1 indicates that intangibles capitalization is noticeably higher among failing firms in industries such as telecommunications (17.46 percent versus 10.60 percent for non-failed firms); health care and biotechnology (26.26 percent versus 11.18 percent for non-failed firms; miscellaneous industries, which include Internet and high-technology firms (25.68 percent versus 10.81

[16] According to Wyatt (2005, 973), rent-seeking is the investment of the firm's high-quality resources to create short-term monopolies over the firm's innovations (e.g., a legal monopoly in the form of a patent).

[17] Under this hypothesis, managers report intangible assets because they are expected to have value and generate profits in the future. A finding that excess value and voluntary capitalization are negatively associated for failing firms (i.e., low excess value is associated with high levels of intangibles capitalization) is argued here to be more consistent with managerial opportunism than with alternative explanations for capitalization, such as profit-maximizing behavior.

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percent for non-failed firms); energy firms (10.52 percent versus 4.65 percent for non-failed firms); infrastructure and utility (21.64 percent versus 12.92 percent for non-failed firms); alcohol and tobacco (14.12 percent versus 3.64 percent for non-failed firms); and paper and packaging (36.35 percent versus 0.99 percent for non-failed firms).[18] However, in three industry groups (media, diversified industrials, and food and household) the levels of voluntary capitalization to total assets are found to be statistically higher for the non-failed group. For the media sector, the results reported in Table 1 can largely be explained by the flexibility of the pre-IFRS Australian Accounting Standard on intangibles that permitted several large media companies (which are represented in the non-failed group) to capitalize significant amounts in the balance sheet for licenses, mastheads, and other related intangibles (see Jones and Higgins 2006). Table 1 indicates that media companies reported quite high levels of intangibles capitalization, relative to all other sectors in the sample (26.34 percent of total assets for failed firms and 33.36 percent for non-failed firms). For the diversified industrials and food and household sectors, a number of larger companies in the non-failed group, in both sectors, capitalized significant amounts for brand names and trademarks over the sample period. However, it should be noted that the capitalization rates in both of these sectors is still quite low, relative to the rest of the sample (2.05 percent versus 7.25 percent, respectively, for the failed and non-failed groups in the diversified industrial sector; and 3.24 percent versus 11.28 percent, respectively, for the failed and non-failed groups for the food and household sector).

The findings also suggest that the rate of voluntary capitalization among failing firms increases sharply in the years leading up to failure. Figure 1 graphs the voluntary intangibles to total assets ratio for failed firms over a five-year period leading up to the failure event (event year = 0). The control group of non-failed firms indicates a fairly constant, albeit slightly increasing, rate of voluntary capitalization over the same five-year period. In contrast, the failed firm sample shows a sharply escalating rate of voluntary capitalization, peaking at close to 25 percent in the year leading up to failure. Further tests indicated that the mean ratio reported in Figure 1 is not driven by a declining numerator (which could inflate the ratio of intangibles to total assets).[19]

The results in Figures 2–5 show that nearly all key financial and market variables are sharply deteriorating for the failed firm sample over the five-year period leading up to failure. The most dramatic deteriorations in financial performance immediately leading up to firm failure are for the working capital to total assets ratio, the retained earnings to total asset ratio, and the excess value variable.

While Figures 2–5 suggest that financial performance indicators and capitalization of intangibles have a strong and negatively correlated relationship in the five-year period leading up to firm failure, these relationships are tested more formally in H3.

Results for Hypothesis 2

Hypothesis 2 predicts that managers of failing firms have earnings management incentives to voluntarily capitalize intangibles assets. The logit results for the model specified in Equation (1) above are reported in Table 2.

Table 2, Panel A, provides the parameter estimates and marginal effects, while Panel B provides the model-fit statistics. The estimated model exhibits a very good overall goodness of fit with a Pseudo R^2 of 0.61. The overall results reported in Table 2 provide evidence that voluntary capitalization of intangibles among failing firms is associated with incentives to manage

[18] However, in the case of paper and packaging, there appears to be only one firm failure over the sample period.
[19] In fact, the data indicate that the average (raw) intangibles capitalization amount has nearly tripled over the sample period.

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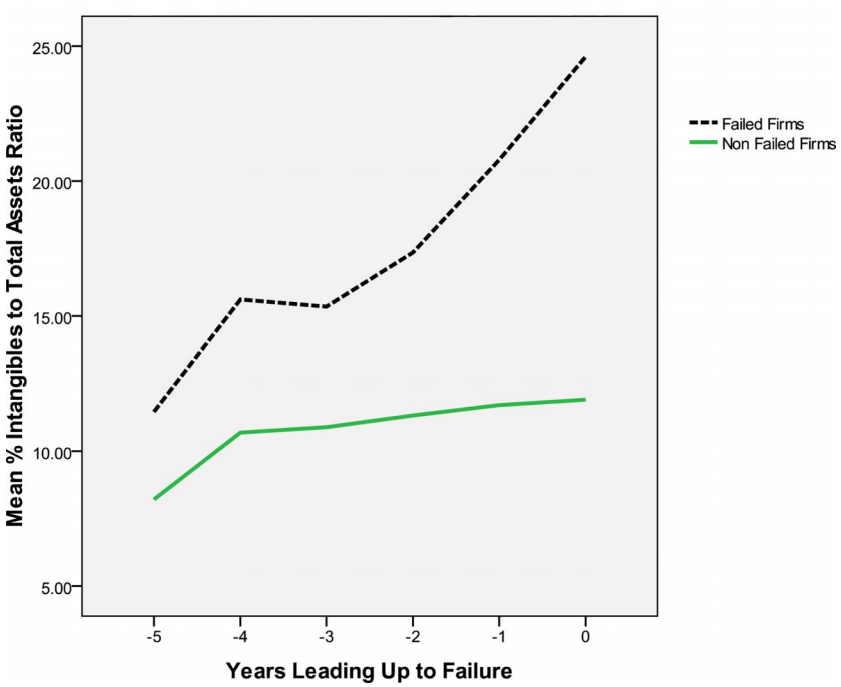
FIGURE 1
Intangibles to Total Assets Ratio (%) Leading Up to Firm Failure



earnings.[20] While the sign of the parameters and marginal effects are as expected, some of the variables in Table 2 are not statistically significant, including the (1) compensation plan, and (2) net asset deficiencies variables. The "high leverage" variable is tending toward significance with a t-value of 1.77. However, the net income losses and discretionary accruals variables are highly significant, along with the firm failure dummy and the interaction of the firm failure dummy variable with discretionary accruals. The firm failure dummy variable has a highly significant parameter estimate (t = 8.45) indicating that failing firms have a higher propensity to voluntarily capitalize intangibles, relative to non-failed firms. The interaction of the firm failure dummy and the discretionary accruals variable also has a significant parameter estimate (t = 5.12). This finding indicates that failing firms with higher levels of discretionary accruals increase the statistical probability of voluntary intangibles capitalization. The net income losses variable is also significant (t = 4.56) and has a significant marginal effect. The results suggest that earnings management incentives, particularly among failing firms, are a potentially important predictor of voluntary intangibles capitalization. Table 2 indicates that the firm failure dummy, net income losses, discretionary accruals, age of the firm, and the firm size variables have the largest marginal effects in the model. Note that the predicted values for the incentives model reported in Table 2 are

[20] The Pearson correlation coefficients are generally very low for all explanatory variables in Table 2, with most correlations less than 10 percent, and the highest correlation being 17 percent.

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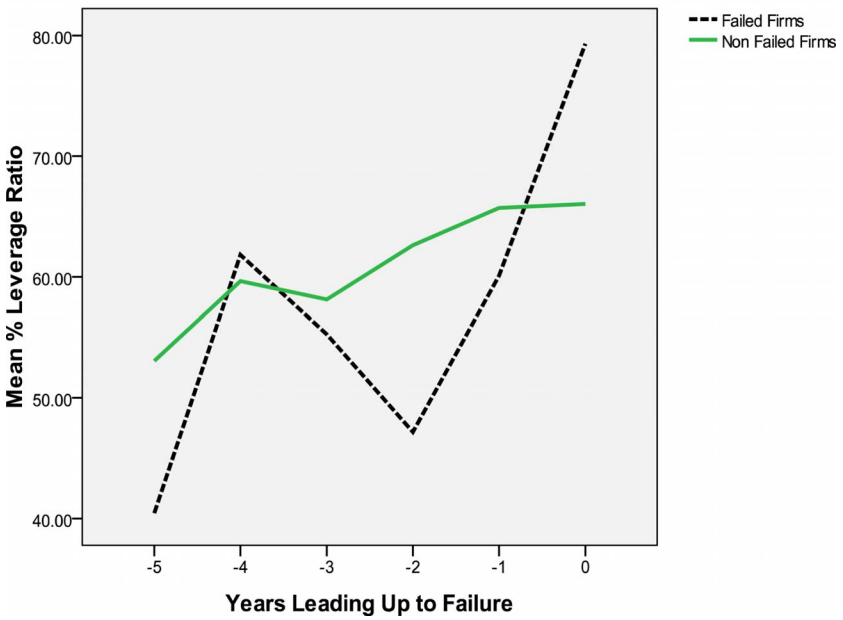
FIGURE 2
Leverage Ratio (%) Leading Up to Firm Failure



used as an explanatory variable in the model tested in H3 below. This variable will establish whether a model that predicts managers' incentives to voluntarily capitalize intangibles has any explanatory and predictive value in a firm failure model.

Results for Hypothesis 3

Hypothesis 3 predicts that voluntary capitalization of intangible assets among failing firms will increase the predictability of corporate failure. Table 3, Panel A, displays parameter estimates and marginal effects specified in Equation (2) and Equation (3) above, while Panel B provides the model-fit statistics for each model.

The estimated models in Table 3 exhibit a very good overall goodness of fit with a Pseudo R^2 of 0.51 for Model 1 and a Pseudo R^2 of 0.43 for Model 2. For Model 1, the log-likelihood has reduced from a zero-parameter model of −1167.89 to −107.11. For Model 2, the model-fit statistics are not quite as strong as Model 1, but are nevertheless highly significant. While it is necessary to interpret parameter estimates jointly with the marginal effects, the results suggest that higher levels of voluntary intangibles capitalization has a strong statistical impact on firm failure, even after controlling for factors such as leverage, discretionary accruals (exclusive of intangibles), excess value, macroeconomic factors, age and size of the firm, and other financial variables.[21] Interpreting the parameter estimates for Model 1 in Table 3, it can be seen that the

[21] The Pearson correlation coefficients are also very low for the explanatory variables reported in Table 3, with most correlations less than 10 percent. However, the *PREDICT_IC* and *VINT* variables for Model 1 have the highest correlation of around 27 percent. This issue is discussed further below.

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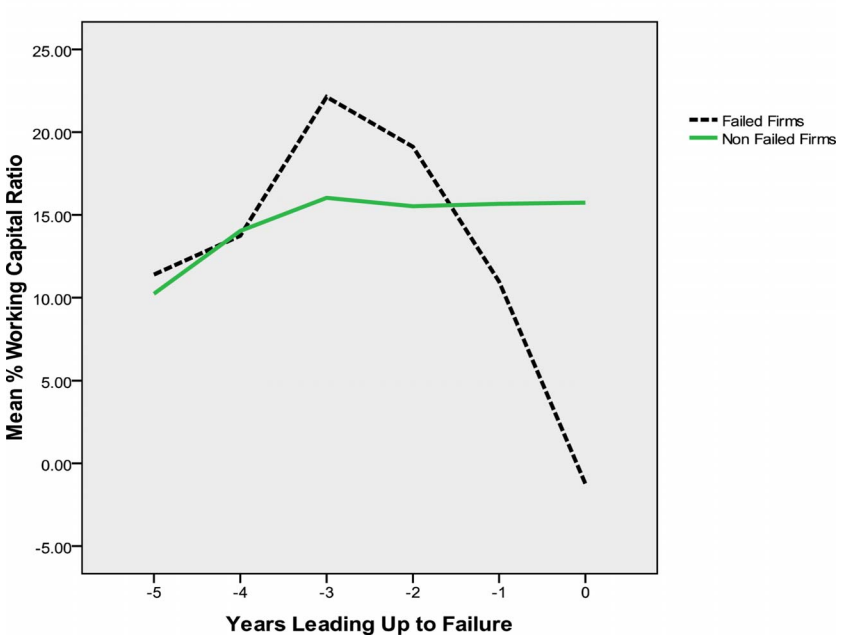
FIGURE 3
Working Capital Ratio (%) Leading Up to Firm Failure



level of voluntary intangibles capitalization is positively and significantly associated with firm failure (t = 4.49). However, the parameter estimate and marginal effect for this variable is weaker overall for Model 2, but still statistically significant (t = 2.21). When Model 1 is re-estimated without the voluntary capitalization variable (and interaction effects), the Pseudo R^2 of the model drops markedly by 11 percent, indicating that the voluntary intangibles capitalization has quite strong explanatory value in the model. When the *total* capitalization variable and interaction effects are removed from Model 2, the Pseudo R^2 of the model only drops by around 5 percent. This result suggests that voluntary capitalization has a stronger overall statistical impact on the probability of failure, relative to the total capitalization variable.

Many of the explanatory variables reported in Table 3 appear to have logical and consistent signs. For instance, leverage has a positive parameter estimate, indicating that higher leverage is positively associated with firm failure, although the t-value is only marginally significant for Model 1 (t = 1.79) and not significant for Model 2 (t = 1.39). However, the marginal effect of the leverage variable is significant in Model 1, which indicates that a unit change in this variable has a statistically significant impact on the probability of failure. The leverage variable is not significant for Model 2. For Model 1, the working capital to total assets variable has a negative and significant parameter estimate and marginal effect, indicating that lower levels of this ratio are positively associated with firm failure (t = −3.11). This finding is also true for Model 2, although the t-value is, again, slightly weaker (t = −1.89). A similar observation is found for the cash flow to total assets, and retained earnings to total assets variables. For Model 1, both variables have significant negative parameter estimates and marginal effects, indicating that lower values of these variables are associated with a higher probability of firm failure. However, the effects of financial

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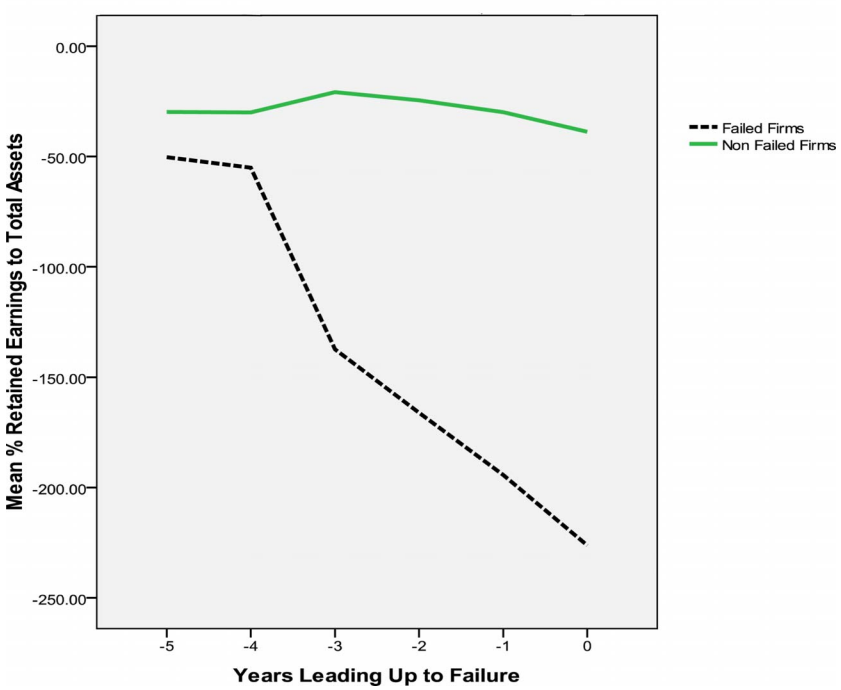
FIGURE 4
Retained Earnings to Total Assets (%) Leading Up to Firm Failure



variables, such as retained earnings to total assets, is less significant overall in Model 2 (the t-value is −1.21 for the retained earnings to total assets variable, and the marginal effect is also insignificant). For Model 1, the "excess value" parameter estimate and marginal effect is negative and significant, indicating that lower excess value is associated with firm failure (t = −2.81). However, the excess value parameter estimate and marginal effect are not significant for Model 2. This variable also has an opposite sign to the intangibles capitalization variable in the logit model. This finding is seemingly inconsistent with the notion that capitalization of intangibles is primarily motivated by managers seeking to "better" report on their economically valuable intangible investments to stakeholders (cf. Wyatt 2005). If "better" financial reporting of these assets is the key motivator for capitalization, the sign and significance of the excess value parameter would indicate that the market is not pricing in the expected future profitability and value that managers of failing firms are assigning to these assets in the balance sheet.

Other results reported in Table 3 are more suggestive of potential motivations for intangibles capitalization (which are tested under H2). For instance, the interaction of high-leverage firms, with the voluntary capitalization variable in Model 1, is also significant and positive (t = 2.49).[22] That is, higher leverage increases the statistical impact of voluntary capitalization on firm failure. This finding appears to indicate that voluntary intangibles capitalization is motivated by managers to reduce *high* levels of leverage. However, there is also a more subtle implication of this result.

[22] High-leverage firms are coded 1 if a firm is in the top quintile of the sample, and 0 if in the bottom quintile.

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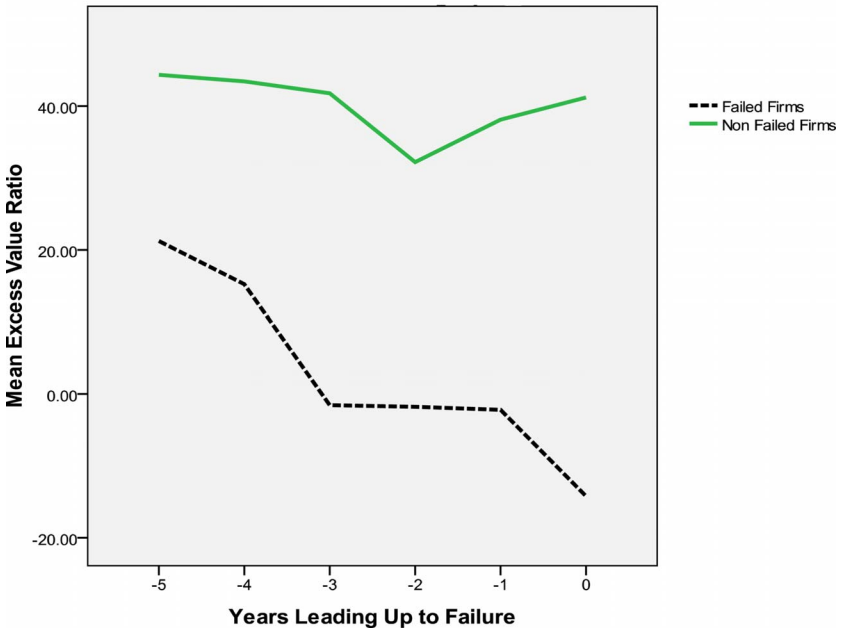
FIGURE 5
Excess Value Leading Up to Firm Failure



While high leverage appears to increase the statistical likelihood of capitalization itself, it also amplifies the probability of firm failure, suggesting that voluntary intangibles capitalization could be an attempt by managers to mask deeper underlying performance issues of the firm (such as escalating financial distress arising from high leverage).

The results for Model 1 in Table 3 also show that the interaction of discretionary accruals (exclusive of intangibles), with the voluntary capitalization variable, is significant and positive (t = 2.88). That is, higher discretionary accruals increase the statistical impact of voluntary capitalization on firm failure. This result indicates that firms that are managing earnings more aggressively (through discretionary accruals other than intangibles) are more likely to be using the capitalization of intangibles to manipulate income upwards. As the effect of the interaction is to increase the probability of failure, this result again suggests that intangibles capitalization is potentially being used by managers to mask deeper underlying performance issues with the firm (such as escalating financial distress arising from poor underlying profitability). Model 2 results show that the interaction of leverage with total capitalization, and the interaction of discretionary accruals with total capitalization, is less significant than for Model 1. Neither t-values for the interaction variables are statistically significant in Model 2. Finally, the variable, *PREDICT_IC*, which is the fitted or predicted values of the incentives model reported in Table 2, is statistically significant (t = 3.32) for Model 1 (but not Model 2), suggesting that managers' incentives to voluntarily capitalize intangibles have a strong statistical impact on the probability of firm failure. An issue to consider with the interpretation of Model 1 is potential endogeneity introduced by the *PREDICT_IC* variable. In discrete choice models, endogeneity is often referred to as the correlation between the errors and observed variables in the model, since model misspecification gener-

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TABLE 2

Parameter Estimates, t-values (in parentheses), Marginal Effects, and Model-Fit Statistics of the Estimated Logit Model to Predict Voluntary Capitalization of Intangibles

Panel A: Explanatory Variables

$$y_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 NI\_LOSS_{it} + \beta_3 NA\_DEF_{it} + \beta_4 LEVD_{it} + \beta_5 DISACC_{it} + \beta_6 FFD_{it} + \beta_7 FFD * DISACC_{it} + \beta_8 AGE_{it} + \beta_9 LOG\_TA_{it} + \mu_{it}$$

	Parameter Estimates (t-values)	Marginal Effects	Expected Sign of Parameter Estimates and Marginal Effects
Constant	−0.94 (−4.33)		
COMP (Compensation plan dummy)	0.0213 (1.41)	0.0091	(+)
NI_LOSS (Net income losses dummy)	0.423 (4.56)*	0.073*	(+)
NA_DEF (Net asset deficiency dummy)	−0.071 (−0.99)	0.012	(+)
LEVD (High leverage dummy)	0.091 (1.77)	0.009	(+)
DISACC (Discretionary accruals excluding intangibles)	0.167 (4.21)*	0.061*	(+)
FFD (Firm failure dummy)	0.091 (8.45)*	1.21*	(+)
FFD ∗ *DISACC* (Interaction of firm failure dummy with discretionary accruals)	0.037 (5.12)*	NA	(+)
AGE (Age of firm dummy)	0.23 (5.56)*	0.057*	(+/−)
LOG_TA (Log of total assets)	−0.32 (−3.98)*	−0.231*	(+/−)

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Panel B: Log-Likelihood Statistics

Log-likelihood at zero	−1,172
Log-likelihood at convergence	−451.36
χ^2	1,443
Pseudo R^2	0.61

Total Firm Failure Sample = 8,056 firm years

*Denotes statistical significance at a critical value < = .05.

Voluntary capitalization is the dependent variable coded 1 if a firm voluntarily capitalizes intangibles, and 0 otherwise. A positive (negative) marginal effect increases (decreases) the probability that a failing firm will capitalize intangible assets. Marginal effects show the increases (decreases) on outcome probabilities when explanatory variables are varied by one unit. The marginal effect for a particular explanatory variable is calculated by taking the derivative (slope) of the probability function while holding all other explanatory variables constant (at their means).

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TABLE 3

Parameter Estimates, t-values (in parentheses), Marginal Effects, and Model-Fit Statistics for the Estimated Logit Models to Predict Corporate Failure

$$y_{it} = \beta_0 + \beta_1 VINT_{it} + \beta_2 DISACC_{it} + \beta_3 DISACCD * VINT_{it} + \beta_4 LEV_{it} + \beta_5 LEVD * VINT_{it} + \beta_6 PREDICT\_IC_{it} + \beta_7 EXVAL_{it} + \beta_8 NETOPTA_{it} + \beta_9 WCTA_{it} + \beta_{10} RETA_{it} + \beta_{11} NEW\_ECON_{it} + \beta_{12} TECH\_CR_{it} + \beta_{13} RECESS_{it} + \beta_{14} AGE_{it} + \beta_{15} LOG\_TA_{it} + \mu_{it}$$

$$y_{it} = \beta_0 + \beta_1 TINT_{it} + \beta_2 DISACC_{it} + \beta_3 DISACCD * TINT_{it} + \beta_4 LEV_{it} + \beta_5 LEVD * TINT_{it} + \beta_6 PREDICT\_IC_{it} + \beta_7 EXVAL_{it} + \beta_8 NETOPTA_{it} + \beta_9 WCTA_{it} + \beta_{10} RETA_{it} + \beta_{11} NEW\_ECON_{it} + \beta_{12} TECH\_CR_{it} + \beta_{13} RECESS_{it} + \beta_{14} AGE_{it} + \beta_{15} LOG\_TA_{it} + \mu_{it}$$

Panel A: Explanatory Variables

	Model 1 Voluntary Capitalization as Explanatory Variable		Model 2 Total Capitalization as Explanatory Variable		Expected Sign of Parameters and Marginal Effects
	Parameter Estimates (t-values)	Marginal Effects	Parameter Estimates (t-values)	Marginal Effects	
Constant	−0.251 (−5.66)		−0.321 (−6.45)		
Intangibles capitalization to total assets (*VINT* for Model 1 and *TINT* for Model 2)	0.032 (4.49)*	0.071*	0.012 (2.21)*	0.063*	(+)
DISACC (Discretionary accruals)	0.0423 (4.33)*	0.086*	0.012 (2.79)*	0.011*	(+)
Interaction of discretionary accruals dummy variable and intangibles asset capitalization (*DISACCD* * *VINT* for Model 1 and *DISACCD* * *TINT* for Model 2)	0.0257 (2.88)*	NA	0.012 (1.76)	NA	(+)
LEV (Leverage)	0.011 (1.79)	0.025*	0.001 (1.39)	0.0051	(+)

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Panel A: Explanatory Variables

	Model 1 Voluntary Capitalization as Explanatory Variable		Model 2 Total Capitalization as Explanatory Variable		Expected Sign of Parameters and Marginal Effects
	Parameter Estimates (t-values)	Marginal Effects	Parameter Estimates (t-values)	Marginal Effects	
Interaction of leverage dummy variable and intangibles asset capitalization	0.0219	NA	0.009	NA	(+)
	(2.49)*		(0.67)		
(*LEVD* ∗ *VINT* for Model 1 and *LEVD* ∗ *TINT* for Model 2)					
PREDICT_IC (Fitted values of incentives to capitalize intangibles from H2)	0.067	NA	0.007	NA	(+)
	(3.32)*		(1.11)		
EXVAL (Excess value)	−0.016	−0.042*	−0.009	−0.0112	(−)
	(−2.81)*		(−1.59)		
NETOPTA (Net operating cash flow to total assets)	−0.0277	−0.034*	−0.0375	−0.058*	(−)
	(−3.51)*		(−4.96)*		
WCTA (Working capital to total assets)	−0.053	−0.037*	−0.062	−0.054*	(−)
	(−3.11)*		(−1.89)*		
RETA (Retained earnings to total assets)	−0.046	−0.061*	−0.001	−0.001	(−)
	(−2.99)*		(−1.21)		
NEW_ECON (New economy dummy)	0.029	0.021*	0.021	0.022*	(+)
	(2.45)*		(2.98)*		
TECH_CR (Technology crash dummy)	0.04	0.042*	0.045	0.051*	(+)
	(1.67)		(1.69)		
RECESS (Recession dummy)	0.002	0.002	0.0015	0.0031	(+)
	(0.86)		(0.71)		
AGE (Age of firm dummy)	0.0489	0.076*	0.051	0.071*	(+)
	(3.01)*		(2.91)*		
LOG_TA (Log of total assets)	−0.0266	−0.086*	−0.0351	−0.074*	(−)
	(−2.45)*		(−3.69)*		

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Panel B: Log-Likelihood Statistics

	Model 1	Model 2
Log-likelihood at zero	−1,167.89	−1,167.89
Log-likelihood at convergence	−107.11	−171.21
χ^2	2,119.78	1,993.36
Pseudo R^2	0.51	0.43
Total Estimation Sample = 8,056 firm years		

*Denotes statistical significance at a critical value < = .05.

The dependent variable is coded 1 if a firm is observed to fail in time *t*, and 0 otherwise. Model 1 uses *voluntary* intangibles capitalization as a predictor variable (including for the interaction variables). Model 2 uses *total* intangibles capitalization as a predictor variable (including for the interaction variables). Marginal effects show the increases (decreases) on outcome probabilities when explanatory variables are varied by one unit. The marginal effect for a particular explanatory variable is calculated by taking the derivative (slope) of the probability function while holding all other explanatory variables constant (at their means).

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ally results in violation of the identical and independently distributed error (IID) condition (see Jones and Hensher 2009). However, unlike OLS regression models, there are no formal statistical tests of endogeneity available for discrete choice models. To investigate potential endogeneity in Model 1, I apply some standard instrumental variable approaches applicable specifically to discrete choice models, including logit (see e.g., Berry 1994; Berry et al. 1995).[23] Overall, I do not find any compelling statistical evidence from these approaches that the *PREDICT_IC* variable is endogenous, or if endogeneity is present, it adversely impacts on the overall statistical coherence of the model.[24]

Out-of-Sample Predictions

Having evaluated the model-fit statistics, parameter estimates, and marginal effects, out-of-sample predictions are now examined. Predictive accuracy is arguably the acid test of any probability model. While variables might have strong explanatory value (in terms of their parameter estimates and marginal effects), weak forecasting accuracy diminishes confidence in the model's overall statistical power and behavioral coherence out-of-sample. Model 1 reported in Table 3 is found to have very good Type I and II predictive accuracy on a holdout sample. A Type I error is where the model predicts a firm to be safe (i.e., non-failed), but it is observed to fail. A Type II error is where the model predicts a firm to fail, but it is observed to be safe or non-failed (see Altman 2001). Using pooled data (2003 and 2004), Model 1 is found to be 83.46 percent accurate in predicting failed firms, but also has quite strong Type II forecasting accuracy (78.43 percent). Model 1 results are 80.17 percent accurate in predicting failed firms one reporting period prior to failure, and are 76.32 percent accurate in predicting non-failure. Three reporting periods from failure Model 1 are only marginally less accurate, at 78.02 percent, in predicting failure, and 75.19-percent accurate in predicting non-failure. The voluntary capitalization of intangibles variable (and interaction variables) appears to have strong predictive value overall. When Model 1, reported in Table 3, is re-estimated without the voluntary capitalization of intangibles variable (and interaction variables), the holdout predictions worsened quite substantially (Type II error rates worsened by around 8 percent, and Type I error rates worsened by around 4 percent). Model 2 produced weaker parameter estimates and marginal effects than Model 1, which also manifested in the out-of-sample predictive performance results. On average, Model 2 produced out-of-sample error rates around 5–6 percent higher than for Model 1. What is more telling is that when Model 2, reported in Table 3, is re-estimated without the total capitalization of intangibles variable (and interaction variables), the holdout predictions did not change substantially (Type II error rates worsened by around 2 percent, and Type I error rates worsened by around 1 percent). Again, this finding suggests that the voluntary capitalization variable is contributing more to overall predictive accuracy.

CONCLUSIONS

I find evidence that opportunistic managers can exploit permissive accounting practices for their own ends, particularly when under the duress of financial distress. For instance, failing firms

[23] Their strategy moves the endogeneity out of nonlinear discrete choice models into linear regressions, allowing standard instrumental variables methods to be used. This approach is particularly attractive because the distribution of errors around their (zero) conditional means is not required to be known or estimated.

[24] As the *PREDICT_IC* variable represents the fitted values (i.e., the probabilities) from the model specified in Equation (1), it is not surprising that this variable is correlated with the *VINT* variable reported in Model 1 (Equation (2)) above. While the correlation between these variables is not particularly strong (the Pearson coefficient is around 27 percent), Model 1 is re-estimated without the *VINT* independent variable (and interaction effects) to determine if potential collinearity issues are impacting on the model. The sign and significance of the *PREDICT_IC* (and other explanatory variables) is found to be largely unaffected by the removal of the *VINT* variable from the model.

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capitalize intangibles more aggressively than non-failed firms, particularly in the five-year period leading up to firm failure. Managers' discretionary capitalization of intangible assets is also found to have strong discriminating and predictive power in a firm failure setting. It is noteworthy that the *total* intangible asset variable (which includes voluntary and mandatory intangibles capitalization) is also significant in the overall analysis, but the parameter estimates, marginal effects, and out-of-sample predictive success are generally not as strong as the voluntary capitalization variable, suggesting that it is managers' discretionary capacity to capitalize that has more behavioral relevance in predicting failure.

More formal tests of managerial incentives to misstate the financial statements potentially explain the association between voluntary intangibles capitalization and the increased predictability of firm failure. These incentives are found to be most directly associated with earnings management.

I conclude that calls for a liberated approach to intangible asset reporting should be viewed with at least some circumspection. Apart from the extensive value relevance literature, the case for more liberal reporting practices needs to be tempered with stronger and more balanced research evidence that takes into consideration the information and decision-making needs of other major user groups, such as lenders and creditors, and the different roles and functions of the financial statements contemplated by standard setters.

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APPENDIX
DEFINITION OF VARIABLES AND EXPECTED SIGN OF PARAMETERS FOR HYPOTHESES (H2 AND H3)

Expected Sign of Parameter Estimates and Marginal Effects on Capitalization of Intangibles for H2 and Failure Outcome for H3	Variable Description	Variable Acronym	Definition
+ (H3)	Voluntary Intangibles Capitalization	*VINT*	Total voluntary intangibles asset capitalization divided by total assets. Voluntary intangibles are assets not subject to the mandatory requirements of specific Accounting Standards and include identifiable intangible assets and internally generated intangible assets.
+ (H3)	Total Intangibles Capitalization	*TINT*	Total intangibles assets (voluntary + mandatory) to total assets.
+ (H2, H3)	Leverage	*LEV*	Total debt to total assets (less assets that are voluntarily capitalized as intangibles).
+ (H2, H3)	Leverage Dummy Variable	*LEVD*	High-leverage firms are coded 1 if a firm is in the top quintile of the sample, and 0 if in the bottom quintile.
+ (H2, H3)	Discretionary Accruals	*DISACC*	Discretionary accruals are estimated according to the modified Jones model, as outlined in Dechow et al. (1995). Discretionary accruals are adjusted to exclude the impact of intangibles to avoid confounding the dependent and independent variables. This adjustment is achieved by expensing all previously capitalized intangibles involving cash outlays when calculating the total accruals component of the modified Jones model, and removing intangible assets from the total asset amounts used in the estimation of the nondiscretionary accrual component of the modified Jones model. For intangibles not involving cash outlays (such as revaluations and recognition of internally generated assets) these assets (and related equity components) are excluded from the calculation of discretionary accruals outlined in the modified Jones model.
+ (H2, H3)	Discretionary Accruals Dummy	*DISACCD*	High discretionary accruals firms are coded 1 if a firm is in the top quintile of the sample, and 0 if in the bottom quintile.

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Expected Sign of Parameter Estimates and Marginal Effects on Capitalization of Intangibles for H2 and Failure Outcome for H3	Variable Description	Variable Acronym	Definition
−(H3)	Net Operating Cash Flow to Total Assets	*NETOPTA*	Operating cash flow is the direct measure of cash flow reported under AASB 1026, *Statement of Cash Flows*, since 1992 (AASB 1992). Prior to 1992, the direct measure was not available and is therefore estimated using the approach outline in Lee et al. (1996, 765): $CFO_t = NI_t + DAE_t + E_t + G_t + T_t + (CL_t - CL_{t-1}) - (CA_t - CA_{t-1})$, where CFO_t is operating cash flow in year t; *NI* is earnings before extraordinary items; *DAE* is depreciation and amortization expense; *E* is equity in earnings; *G* is gain (or loss) from sale of long-term assets; *T* is deferred taxes; *CL* is current liabilities (less short-term debt); and *CA* is current assets (less cash and equivalents).
+ (H3)	*PREDICT_IC*	*PREDICT_IC*	Fitted or predicted values (i.e., the logit probabilities) of incentives to voluntarily capitalize intangible assets (i.e., the predicted values of model estimated in Table 2).
−(H3)	Working Capital to Total Assets	*WCTA*	Working capital (current assets less current liabilities) divided by total assets.
−(H3)	Retained Earnings to Total Assets	*RETA*	Retained earnings divided by total assets.
−(H3)	Excess Value	*EXVAL*	Excess value, a forward-looking index of profitability defined as the market value of equity less the book value of equity, less total intangible assets, divided by the market value of equity.
+ (H2)	Compensation Plan	*COMP*	A dummy variable coded 1 if a sampled firm shows evidence of an executive compensation plan in place in time *t*, and 0 otherwise.
+ (H2)	Net Income Losses	*NI_LOSS*	A dummy variable coded 1 if a sampled firm shows evidence that the capitalization of intangibles resulted in the firm reducing or avoiding the reporting of net income losses in time *t*, and 0 otherwise.
+ (H2)	Net Asset Deficiencies	*NA_DEF*	A dummy variable coded 1 if a sampled firm shows evidence that the capitalization of intangibles resulted in the firm reducing or avoiding the reporting of net asset deficiencies in time *t* and where the capitalization of intangibles does not involve a cash outlay (or only involves a partial cash outlay), and 0 otherwise.
+ (H2)	*FFD * DISACC*	*FFD * DISACC*	Interaction of the firm failure dummy variable and discretionary accruals (where Failure = 1 and Non-failure = 0).

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Expected Sign of Parameter Estimates and Marginal Effects on Capitalization of Intangibles for H2 and Failure Outcome for H3	Variable Description	Variable Acronym	Definition
Industry Classification			
+ (H2)	New Economy Sector	*NEW_ECON*	A new economy firm is coded 1 if a firm belongs to any of the following industries: (1) high technology, (2) telecommunications, (3) health care and biotechnology, and (4) Internet firms.
Size Variable			
+/−(H2)−(H3)	Log of Total Assets	*LOG_TA*	Natural log of total assets.
Age Variable			
−/+ (H2) + (H3)	Age of Firm	*AGE*	A dummy variable coded 1 if a firm was newly established within a certain period of time (from one to five years); coded 1 indicating the number of years established, and 0 otherwise.
State Variables			
+ (H3)	Technology Crash Dummy	*TECH_CR*	A control variable coded 1 = 2001; 0 otherwise.
+ (H3)	Recession Dummy	*RECESS*	A dummy variable coded 1 if there is a recession year over the sample period, and 0 otherwise.
Interaction Variables			
+ (H3)	Interaction of Leverage Dummy and Voluntary Intangibles Asset Capitalization	*LEVD * VINT*	Interaction of high/low leverage with the voluntary intangibles capitalization variable. High (low) leverage is defined as top (bottom) quintile of the sample.
+ (H3)	Interaction of Discretionary Accruals Dummy and Voluntary Intangibles Asset Capitalization	*DISACCD * VINT*	Interaction of high/low discretionary accruals (exclusive of intangibles) with the voluntary intangibles capitalization variable. High (low) discretionary accruals are defined as top (bottom) quintile of sample.

A positive sign indicates the marginal effect either (1) increases the probability of firm failure for H3 (and *vice versa*) or (2) increases the probability that firms will capitalize intangible assets for H2 (and *vice versa*).

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