FORECASTING NEW ZEALAND CORPORATE FAILURES 2001-2010: OPPORTUNITY LOST?

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ABSTRACT

Knowing whether an organization will fail is useful information for investors and other stakeholders. Looking to 36 New Zealand corporate failures (2001-2010), we find that anticipation of their demise was not clearly signalled in the public media. The question then emerges as to whether better forecasts of impending failure could have been derived from information that was publicly available at the time. The aim of this project is to identify the potential for having better anticipated these failures, and to consider implications of that found. Selecting thirteen indicators and three models from the literature, 25 failing and a matched 25 non-failing companies are compared using data up to three years prior to failure. Findings from ANOVA and Chi-Square tests reveal a majority of significant differences which grow closer to failure dates. We conclude that while using such information would have revealed indications of problems for individual companies, definitive assertions of impending failure would not have been justified. Nonetheless, corporate failure forecasts could have been of benefit to users, as long as such forecasts had been qualified as 'concerns'.

Long Abstract

Those interested in the success of a business may also turn their attention to the possibility of its demise; that is, that the organization is not a going concern. Yet unless there is intention by management to cease trading, the usual assumption is that the business will carry on. Knowing whether an organization will fail is useful however, to investors, creditors, employees, suppliers and other stakeholders. If they are aware of its likelihood, forecasts can be adjusted, credit acquired, investments curtailed or strategies changed.

Looking to the corporate failures of 2001-2010, this awareness did not appear to exist in sufficient measure. A review of New Zealand public media (1995-2010) shows that little was predicted about these companies' viability until the year of their liquidation. The question then emerges as to whether better predictions could have been made.

The aim of our project is to identify that potential for earlier discovery of going concern problems in New Zealand corporate 2001-2010, and to ask whether publicly-available information could have been used to signal going concern problems in these organizations. Based on our evaluation of models, ratios and indicators available to the public at the time, we assess whether the public good in this respect was served.

Financial information, financial ratios and the growing development of going concern models have long been available to assess the likelihood of company failure. We identify thirteen indicators and three models likely to show 'difference' between failing and non-failing companies. Thirty-six failed New Zealand companies (2001-2010) are identified, and of these 25 could be matched to non-failing companies and are tested for the three years prior to liquidation. Indicators, ratios and prediction models are calculated for all 150 financial statements, and differences are analysed to determine how well they could have anticipated failure.

Findings reveal some significant differences between failing and non-failing companies, which grow slightly in number closer to the date of failure. In particular, the dividend-paid, earnings-per-share, return-on-assets, current-ratio, net working capital, EBIT and equity ratio as well as the Kuruppu, Laswad, Oyelere (2003) model reveal differences. Return-on-equity and the Van Peursem Pratt (2002) model show marginally significant differences. All three years' data combined reveals stronger patterns than years assessed in isolation.

We conclude that while using such patterns would have had merit, it would have been difficult to assert confidently as to the future viability of individual organizations. So while there is some evidence of an efficient market for signalling corporate failure, there are conflicting messages as well. Nonetheless, the presence of multiple indicators of concern could have usefully signalled 'watchlists' in which further follow up would have been justified. That is, corporate failure forecasts could have been of benefit to users, as long as such assessments had been properly qualified as subjects of 'concern' rather than 'likelihoods of failure'. Future research could be directed toward testing newer models on upcoming data, or examining further as to how the media treats this information.

INTRODUCTION

Those interested in the success of a business may also turn their attention to the possibility of its demise; that is, that the organization is not a going concern. Yet unless there is intention by management to cease trading, the usual assumption is that the business will carry on. Knowing whether an organization will fail is useful however, to investors, creditors, employees, suppliers and other stakeholders. If they are aware of its likelihood, informed decisions can be made: forecasts can be adjusted, credit acquired, investments curtailed or strategies changed.

Yet, and despite this, it has been suggested that the individual investor's interests are not uppermost in the mind of analysts (e.g. Malmgran and Styls, 2010). This is reinforced from what has been observed in the market. In the U.S., six of the ten largest bankruptcies filed in the US corporate history, including Enron, WorldCom, and Global Crossing, received unqualified audit opinions on their last financial statements filed prior to bankruptcy (Nogler, 2008). External investors were awarded little or no advance warning.

A failure to highlight the potential for failure has had serious consequences for investors in some New Zealand companies well. In the short space of four years 16 finance companies failed, leading to a $3.45 Billion loss for public investors **(**NBR, 2011). In, for example, the Bridge Corp failure up to 18,000 mostly New Zealand investors felt the loss (Agency Fr, 2007). Costs for the failure of South Canterbury Finance, the largest to-date, have yet to be measured. These failures have cost its investors in the billions (Steeman, 2008**).** Unfortunately however, and as to be revealed further, little was predicted about these companies' viability until the year of their liquidation. The question then emerges as to whether those sources could have been used to anticipate and report these problems more widely and thus to have better served a public good.

BACKGROUND

While auditors provide sometimes influential opinions about a client's going concern (Blay, Geiger & North, 2011), there is little reason to rely solely on them to foreshadow failure. They have exhibited a weak track record. Recently, for example, client mitigating efforts have been

shown to be overly-influential in coming to those opinions (Bruynseels, Knechel & Willekens, 2011). According to Venuti (2004), only half of the audit reports for 202 of the 257 publicly-listed firms that filed for Chapter 11 bankruptcy in 2001 indicated the auditors' substantial doubt about the entity's ability to continue as a going concern. A similar situation occurred in New Zealand for accounts in 1987 to 1991, where more than a third of the 67 public companies did not include any explanatory paragraph or qualification in the auditor's reports (Pratt, 1992 as cited in Van Peursem & Pratt, 2002). Furthermore, most qualifications were made at or after the media had already reported the problems. Finally, as auditors only need to anticipate failure 12 months following the issue of the audit report, a long term view is not to be expected from that source.

Financial information, financial ratios and the growing development of statistical going concern models are available to assess such likelihoods however. These models were pioneered by Beaver in 1966 followed by the widely adopted multivariate discriminant analysis model of Altman in 1968 (Bellovary, Giacomino, & Akers, 2006). Individual ratios and logit models have been used as well. Such models have been shown to reveal some reasonably reliable going concern predictions (Keasy & Watson, 1991; Hall, 2002; Lifschutz & Jacobi, 2010).

Given this body of work and the potential to predict corporate failure, we are concerned as to why New Zealand company failures were not better anticipated in the public realm. New Zealand has a regulated market and public reporting regime, established regulatory authorities and financial advisors, and a respected reputation for ethical practices generally. Yet a review of New Zealand public media (1995-2010)[1] shows that little was predicted about these companies' likely viability until liquidation, or tax, proceedings began (e.g. see Slade, 2009). Reviews 'after the fact' were conducted (e.g. NBR, 2011; Steeman, 2008), as were broad economic forecasts (e.g. NZ Herald, 2008; The Press, 1997; NZ Herald, 2009), but neither individual company nor sector viability forecasts were made. That is, the New Zealand market does not appear to have been efficient in terms of recognising impending failure in advance.

[1] Newztext, Lexis Nexis, 1995-2010 inclusive, using keywords 'company failure forecast' and 'corporate failure forecast'.

We are interested as to whether such poor public disclosure is due to a lack of reliable indicators, or whether they are available but not sufficiently used or reported. The aim of our project is to identify the potential that existed for earlier discovery of going concern problems in New Zealand corporate and listed entities. Implications of our findings include the possibility that more or newer modelling may be needed should the tools that exist not be effective. Alternatively, perhaps, research should be directed toward finding out why existing knowledge is not being employed for the benefit of New Zealand public investors.

The paper proceeds as follows. Historical failure prediction models and indicators are identified and those seen to be relevant are selected for testing. The methods are then outlined by which failed New Zealand listed companies (2001-2010) and their matching non-failed companies are identified and by which information about them is extracted and used for analysis. Results reveal the predictive 'powers' of indicators available at the time, and then limitations of the study are revealed. Ultimately, by employing publicly available information and models, we are then able to conclude as to whether an informed analysis could have revealed problems up to three years prior to failure.

PRIOR RESEARCH

Identifying relevant indicators of failure is the first step of this process, and there is precedent from which to choose. An extensive literature on financial distress prediction models has emerged since the 1960s and some models have proved to be relatively successful. The earliest of these are based in the U.S., pioneered by Beaver's univariate model in 1966, followed by Altman's multivariate discriminant analysis (MDA) model in 1968. The research by Beaver and Altman became two of the most widely-cited models in subsequent studies (Constantinides, 2002).

Statistical models dominate these studies due to their empirically-proven reliability (Aziz & Dar, 2006). Beaver's (1966) results have provided evidence that ratio analysis can be useful for predicting failure for as long as five years prior to bankruptcy. Multiple Discriminant Analysis (MDA) is a commonly-used alternative (Sandin & Porporato, 2007; Altman, 1984). Studies such

as those by Altman (1968), Altman & McGough (1974), Taffler & Tisshaw (1977), Levitan & Knoblett (1985),Cormier, Magnan, & Morard, (1995), Kuruppu, Laswad & Oyelere (2003) have demonstrated some reasonable accuracy rates. For example, Altman's (1968) well known Z-score model has an overall predictive accuracy rate of 95% up to two years prior to actual failure. Taffler &Tisshaw (1977) claim that because such models are less subject to 'window dressing' by companies , they can be an early signal of going concern problems.

Logistic regression has also become popular. It was used in an early study by Ohlson (1980) and Zmijewski (1984) to predict corporate financial distress. It is now most widely-employed in the field (e.g. Dopuch et al., 1987; Koh, 1991; Cormier et al., 1995; Van Peursem & Pratt, 2002). Allen & Chung (1998) and Collins & Green (1982) found that there is no significant difference in the predictive accuracies between MDA and Logit/Probit techniques, and Aziz & Dar (2006) confirmed that MDA and Logit/Probit models had similar predictive powers and misclassification rates. More recent research has also included expert system models, theoretical models and hybrid systems (e.g. Charitou, Neophytou, & Charalambous, 2004; Cormier et al., 1995; Chung, Tan & Holdsworth, 2008) but these developments are in their early stages.

Model Selection

We anticipate that some models will be more effective predictors of New Zealand corporate failure than others. Most are based on U.S. companies and may not be relevant in New Zealand (e.g. see discussion in Aziz & Dar, 2006). Indeed studies in New Zealand have raised such concerns (Ferner & Hamilton, 1987) and some corporate prediction models for New Zealand do reveal differences from their overseas counterparts (Trow, 1981; Ling & Matthews, 1982; Tabb & Wong, 1983; Bradbury, 1985; and Ferner & Hamilton, 1987). New Zealand is a small market, dominated by a reasonably small manufacturing base (outside primary industry) and may require distinct constructs.

Some models have drawn on New Zealand data, such as those from Van Peursem and Pratt (2002), Kuruppu, Laswad and Oyelere (2003) and Chung, Tan, and Holdsworth (2008). Chung et al (2008) used a neural network technique to find distinctions in the New Zealand market. It is limited to a study of only 10 failed companies however, and was made public toward the end of

our period of study, and hence would not have been available for most of these companies' analyses.

Kuruppu, Laswad and Oyelere (2003) identified 12 significant estimators in a discriminant analysis. While they were able to estimate 92% of failed companies, their model suffered from a highly conservative Type II error selection correctly classifying only 36% of non-failures. That is, 64% of ongoing entities were classified as 'failing'. Nonetheless, it provides a recent New Zealand model. The Van Peursem and Pratt (2002) logit model was able to identify 92% of both failing and non-failing companies and their model was also found to be useful in analysing small, non-listed New Zealand entities (Van Peursem and Pratt, 2005), and it may also form a reasonable basis for forecasting.

Altman's (1968) model is also viewed with interest as it is one of the most widely-cited and employed in the corporate distress prediction literature (see Lifschutz & Jacobi, 2010). It brings and MDA model into the analysis and, furthermore, there is some evidence of its effectiveness 'downunder' (see Van Peursem & Pratt, 2006). As a result, we expect that analysts in the first decade of this century might have reasonably looked to the Altman (1968), the Kuruppu, Laswad and Oyelere (2003) model and to the Van Peursem and Pratt (2002) models for predictive power. Individual ratios found to be significant in overseas studies are also of interest.

Ratio selection

Some have questioned the strict mathematical requirements imposed by the models (Sandin & Porporato, 2007; Ohlson, 1980). For this reason, analysts could have also looked to ratios and other single indicators of performance. They are available and comprehensible to most readers.

Ratios measuring profitability, financial leverage and liquidity appear repeatedly in this literature. Profitability ratios including net income/total assets, earnings before interest and tax (EBIT)/total assets, sales/total assets, retained earnings/total assets, profit before tax/current liabilities, and return on assets have been successfully incorporated into models (Altman, 1968; Zmijewski, 1984; Altman & McGough, 1974; Altman, Haldeman, & Narayanan, 1977; Ferner & Hamilton, 1987; Koh, 1991; Taffler & Tisshaw, 1977). The earnings before interest and tax/total assets

ratio has the highest discriminating ability among the five ratios used in Altman's (1968) model. Of profitability ratios available generally, 'return on assets', 'profit margin' and 'earnings per share' seem to be commonly employed in this literature and are thus used here.

Others find financial leverage ratios to drive results (Levitan & Knoblett, 1985; Beaver, 1966; Altman & McGough, 1974). Firms that are experiencing financial difficulties tend to have problems in generating sufficient cash flows to meet their short-term debt obligations. Over-leveraging is seen to have been a problem in New Zealand (NBR, 2011) and so employing ratios to do with leverage would seem to be a reasonable step for local analysts to adopt. 'Debt to equity' 'equity' (equity to assets) 'return on equity' and 'interest coverage' ratios are thus tested.

Liquidity ratios are also significant to bankruptcy prediction (Beaver, 1966; Taffler & Tisshaw, 1977; Levitan & Knoblett, 1985; Altman, 1968; Kuruppu et al., 2003; Lenard, Alam, Booth & Madey, 2001). Working capital/total assets ratio is found to be the most common among the liquidity ratios used in Altman's and Beaver's studies (Altman, 1968; Beaver, 1966). Beaver (1966) also introduced the value of cash-flow models to the prediction literature, claiming that they "offer much promise for providing ratio analysis with a unified framework" (p.79). Individual financial variables used in this analysis derive therefore from this range of findings including 'net working capital' and the 'current ratio'.

From the efficient market literature, it is assumed that "financial market variables efficiently incorporate expectations, and should, therefore, be good 'lead indicators' of future events" (Keasey & Watson, 1991, p.96; also see Ohlson, 1980 and Beaver, 1968). Efforts have also been directed toward determining whether audit fees are related to solvency, though this is unconfirmed (Stanley, 2011). Looking to stock prices and related indicators were common in the latter decades of the 20th century however (e.g. Dopuch et al., 1987; Altman et al., 1977; Zavgren et al., 1988; Foster, 1986). 'Earnings per share' is applied here as it is likely to receive the attention of investment analysts. Furthermore, it is one test of market efficiency; that is, whether the market anticipates company failure.

Company accounting data are susceptible to manipulations, especially when a firm is having financial difficulties. That is, managers would be inclined to 'manage' known failure predictors to improve their apparent position. Qualitative variables may be less subject to such susceptibilities. Research by Lenard et al. (2001) and Cormier et al. (1995) for example have incorporated dividend payout, corporate governance quality, debt defaults, auditor characteristics and investment activities based on their predictive strength found in prior research (e.g. Lennox, 1999; LaSalle, Anandarajan, & Miller, 1996; Mutchler, Hopwood & McKeown, 1997). 'Dividend paid', 'Audit Qualification' and 'Audited by Big4' are nominal variables employed for this purpose and would be available in New Zealand public databases.

Ideally, we could have introduced yet further measures indicative of impending corporate failure. Corporate governance quality is implicated in some New Zealand failures (NBR, 2011), but quality is difficult to 'know'. In New Zealand, several former ministers and publicly-honoured directors have been implicated in a recent finance company failures (see Hawkins, 2012 on Lombard Finance). Information collated by the tax division (Inland Revenue or IRD) could have been a valuable indice as well, as the IRD was said to be the force behind some of the liquidations (Slade, 2009); but privacy laws may have prevented the most meaningful information coming out in time for investors to have been able to respond.

In the end, we employ 13 ratios which we believe were both available and comprehensible to most analysts, and which have a known history of success. This is in addition to the three models selected for reasons discussed in the previous section. It is suggested that, given these indicators, the interested analyst might have been able to highlight impending failure. Our expectation is that significant differences between failing and non-failing companies will emerge for all of these indicators one year prior, and up to three years prior, to their actual failure; differences that would have sent a clear message to analysts about the susceptibility of what were ultimately to become failing concerns.

METHOD

Failing New Zealand listed companies are classified as those which are in receivership, those which have liquidated or those which are in the process of liquidating. This criteria conforms with understandings of failing companies generally (e.g. Altman, 1968; Beaver, 1966; Chung et al., 2008; Kuruppu et al., 2003; Van Peursem & Pratt, 2002; Taffler & Tisshaw, 1977). We avoid therefore companies that are 'only' legally bankrupt or companies that have only delisted for reasons unknown (e.g. see Altman, 1968; Ferner & Hamilton, 1987). While including them would result in a larger frame (sample and population), they may not all have actually 'failed' in terms of having wound up and ceased trading. Thus only non-recovered entities last listed on the New Zealand Exchange (NZX) between 2001 and 2010 are classified as 'failing'.

The NZX Company Research and NZ Companies Office website offer the best publicly-available information on New Zealand listed companies and are therefore used. The sample of failed firms is taken from the list of delisted companies on the NZX Company Research database which does not include firms delisted due to restructuring, takeover or merger. The time period studied (2001 to 2010, inclusive) was chosen because it is relevant for the current business and economic conditions. It is recent, and represents a period of time over which significant failures occurred. Some (e.g. Altman, 1968; Chung et al., 2008) acknowledge that the choice of a long time period (in this case, ten years) may not be desirable due to changing industry trends, however as New Zealand's financial market is small, a longer period is needed to collect a reasonable sample. To respond to this concern, companies that delisted after mid-2008 are 'held out' of a second analysis, and comparisons are then conducted on the remaining matched pairs. This is done to determine effects of the economy slump that began in 2008, if any, on the predictive strength of ratios, models and nominal indicators.

The exact liquidation date for the delisted companies is sourced in the New Zealand Companies Office website, and is the date on which either the receiver or liquidator was first appointed. Financial statements for up to three years prior to their liquidation date are from the NZX Company Research or from the Companies Office database. A three year window was chosen as information prior to that for a number of the companies was of lesser quality or not available.

Non-failing New Zealand or, where there was no close match, Australian listed companies were matched to failing companies on industry, principal business activity and company size (operating revenue per annum) to control for these variables. The principal line of business as well as total asset size of each failed firm is that set of annual reports just prior to the date of failure. The original 36 failing companies are reduced to 25 due to the difficulty in matching compatible companies or due to questions about the reasons for their delisting.

The paired-sample design method is chosen to control for the potential for distinguishing characteristics of industry and size found in this literature (e.g. Beaver, 1966; Altman, 1968; Altman et al., 1977; Koh, 1991; Cormier et al., 1995; Chung et al., 2008). In this case, matching also reduces industry bias that could occur by over- or under-representation of one or more existing sectors. As New Zealand is a very small market, it does not allow for single-industry analysis. Using all major sizes and categories of New Zealand company – including the NZAX small market exchange -- does however allow us to obtain a New Zealand-representative sample.

Non-failed firms are selected and matched to failed companies stratified by industry, principal business activities and company size (i.e. total asset size). The industry categories used to match the companies are from the NZX Company Research classification, which make the pairing process more convenient as the non-failed firms were already grouped according to industry. The final list of failed and matched firms selected is listed in the Appendix. The three failure prediction models are applied to all 150 financial statements for all fifty companies over the three years. The Altman (1968) calculation is in Figure 1.

Figure 1. Altman's Z-score model.

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

where X_1 = Working capital/Total assets
X_2 = Retained Earnings/Total assets
X_3 = Earnings before interest and taxes/Total assets
X_4 = Market value equity/Book value of total debt
X_5 = Net Sales/Total assets

As apparent, failure prediction likelihood in the ALTMAN model is driven by a positive net sales relative to assets. In contrast, the the VAN PEURSEM-PRATT model demonstrates a stronger presence of imbalance between equity and debt (negative financial leverage) (Figure 2).

Figure 2. Van Peursem & Pratt's New Zealand company failure model.

1.2 – 6.8x(FL) + 2.1x (STA) + 0.1 x (ROA) + 0.1 x (TA)*

Where: FL = financial leverage
STA = Sales/ Total Assets
ROA = Return on assets
TA = Total Assets/100,000

* Coefficients 'rounded' for publication, Financial Leverage calculated from profit after tax divided by equity before preference shares

The Kuruppu, Laswad and Oyelere (2003) model, favouring earnings, income and asset contributions to prediction, is shown in Figure 3.

Figure 3: Kuruppu, Laswad and Oyelere (2003) failure prediction model

-2.786 +3.298(STA) -3.920(QAS) +.163(CACL) -2.671(TAAA) +5.030(NIA) +3.654(TLTA) -.119(NIS) +.023(WCA) +.005(SAR) -.002(SWC) -.425(NIL) +1.727(STA)

Where: STA= Total sales/ Total tangible assets
QAS= Quick assets/ total assets
CACL= Current assets/ Current liabilities
TAAA= Total assets/ average total assets
NIA = Net income/ average total assets
TLTA = Total liabilities/ total assets
NIS = Net income/ shareholders funds
WCA = Working capital/ total sales
SAR = Sales/ average accounts receivable
SWC = Sales/ average working capital
NIL = Net income/ total liabilities
STA = Shareholders funds/ total assets

The financial statements for first year prior to failure are essentially those filed in the last full year that financial statements were prepared. The second year before failure is defined as the fiscal year preceding the first reporting period prior to failure and the same definition goes for

the third year. The financial statements for non-failed companies is also collected for the same fiscal years as that of their assigned failed firms from the same databases. For example, if a company failed in 2006, the available financial statements prepared three years prior to failure would include the financial period ending in 2005, 2004 and 2003. The financial statements collected are organised and grouped accordingly. A combination of ANOVA (ratio data) and Chi Square (nominal data) tests are used to compare the effectiveness of each indicator applied to this current data.

RESULTS

Results are as to individual ratio measures of performance, nominal measures employed and the Altman (1968), Kuruppu, Laswad and Oyelere (2003) and Van Peursem-Pratt (2002) models. Descriptive statistics (excluding the two nominal variables) can be found in Table 1.

INSERT TABLE 1 ABOUT HERE

The significance of these differences can be found in Table 2.

INSERT TABLE 2 ABOUT HERE

Significant results (>95% confidence) are more prominent where all three years of data are used in combination. This is also the case for the two elements that approach significance (>90% confidence). As to individual ratios, only EARNINGS PER SHARE and ratio EARNINGS BEFORE INTEREST AND TAXES (EBIT) are significant on a year-by-year basis, and neither of the two, neither show a particular pattern over time. The EBIT is the only measure indicating differences in all three years. EARNINGS PER SHARE is also observed in individual years, but only in years 1 and 3. The CURRENT RATIO is marginally significant in year 2 only, and RETURN ON EQUITY is marginally significant in year 3 only. As to nominal measures, all those tested show significance (Table 3).

INSERT TABLE 3 ABOUT HERE

Thus nominal indicators are important in years preceding liquidation. DIVIDEND PAID, for example, is one of only two that show significance in all three years prior to failure; AUDIT FIRM shows significance the year prior to liquidation**.** AUDIT QUALIFICATION is both a significant indicator in the two most recent years prior to failure, and together with PROFIT MARGIN and EQUITY RATIO, are the only indicators that reveal patterns (not always significant) of growing problems over time.

We note however that, even in the final year prior to liquidation, less than half of the failing companies had any form of audit qualification or emphasis (of matter**)**[2]. So the 'audit opinion' is shown to be a weak indicator of impending failure in these cases.

Failure prediction models

The KURUPPU-OYELERE-LASWAD model showed significant differences when all years are combined and in year two, and the VAN PEURSEM-PRATT model approaches significance in the three-years combined category. From the ALTMAN (1968) model, companies are predicted to be bankrupt if $Z \leq 2.675$ and non-bankrupt if $Z > 2.675$. From Table 4 it is apparent that Altman's Z-score model correctly classified all failed companies except no. 8 and 23. The model only correctly classified three non-failed companies however revealing that conservative bias. Oddly, three bankrupt firms (company no. 8, 13 and 23) actually have higher Z-scores than their matched non-failed firms. Differences between failed and non-failed companies, using the Altman model, are not surprisingly therefore insignificant (Table 4).

INSERT TABLE 4 ABOUT HERE

The VAN PEURSEM-PRATT (2002) model measures likelihood on a ratio scale; the likelihood of failure is greater when the numbers are smaller (and negative). On the face of it, this model performs better than Altman's model as it has distinguished a greater number of failures (Table 5). This is confirmed in ANOVA scores (Table 2) which shows results approaching significance (90% confidence or greater) in the direction expected, but only when the three years as-a-whole are assessed, perhaps due to the precision achieved from the greater numbers.

[2] Eleven of the failing companies had a going concern qualification one year prior to failure, eight two years prior to failure and three three years prior to failure. Some non-failing companies also had qualifications.

INSERT TABLE 5 ABOUT HERE

The KURUPPU LASWAD OYELERE (2003) model performed well two years prior to failure (with significant differences, Table 2) and in combination, a finding apparently driven by the strong Year 2 results as neither Year 1 nor Year 3 approached significance (Table 6).

INSERT TABLE 6 ABOUT HERE

This is thus the strongest result of the three models tested. Whether 'managed' accounts interfered with these results is not known. We do test to see however whether the global financial crisis of 2008 had an effect.

Global crises effects

As the global financial crises of 2008 also affected New Zealand, we took measures to determine whether this extreme change in market conditions skewed or otherwise had an effect on the predictability of these events overall. The effects are illustrated in Table 7.

INSERT TABLE 7 ABOUT HERE

Only five of the 25 failed companies tested failed in the periods of time following mid-2008. Nonetheless, removing them reveals some small changes to our results. Firstly, the DEBT-EQUITY ratio becomes significant (or marginally significant, see Table 6) on removing these recent corporate failures. Also the EQUITY ratio's significance declined from having 'approached' significance (n=25) to non-significant (n=20). Finally, the strength of the findings with respect to the ROEQUITY and CURRENT RATIO was reduced on testing them with a smaller sample size. No changes, other than DEBT-EQUITY, were in unexpected directions however, and no other differences changed the nature of their significance to the model generally.

The increase in the predictive value of the DEBT-EQUITY ratio in the year prior to failure with n=20 is of note because it is more significant despite it being from a smaller sample (n=20). We also note that all five 'removed' companies (and their matching non-failing companies) are from

either the Investment or Property industries, sectors which appeared to both rely more heavily on debt than elsewhere. It is possible therefore that their contribution may have skewed the n=25 outcome. This leads us to suggest the possibility of 'industry' differences, which may be worthy of further exploration. Nonetheless, and with respect to the matter of concern here, the post-2008 situation does not appear to be one that would have interfered with an analysis of impending corporate failure.

LIMITATIONS

This investigation does not attempt to re-examine the accuracy or reliability of failure prediction models developed under different sets of data so no suggestion is made as to the superiority of one model over another. The relatively small size of our database, limited by the population from which it is drawn, may have had other and unidentified 'significant differences' that were not identified due to the reduced precision that a small sample provides.

Robertson and Mills (1991) point out that it is inappropriate to apply a model outside the industry from which it was derived. Our findings with respect to the Property and Investment industry, and their apparent influence on the DEBT-EQUITY relationships, indicate that industry distinctions may exist. Yet, without the population for a sound statistical comparison, those questions must be left up to other methods to determine.

Some final financial statements were not reported for a full twelve-month period, particularly where they failed mid-year, such as Blue Chip Financial Solutions (9 months) and VTL Group (14 months). The financial data of these few companies were extrapolated up (if more than six months) or down (if less) to obtain 12-month data equivalence. This assumed that it would have followed a similar pattern therefore if it had completed the year.

We do not know the effect of 'creative accounting' where manipulation of the accounts may have occurred and distorted the 'true and fair' nature of some of the figures. So for example, leadership of four of the failing companies in the finance sector data – South Canterbury finance, Blue Chip, Bridgecorp and Capital+ Merchant Finance – have all been charged with fraud

following the liquidation of the firms (e.g. see Nippert, 2012). Nonetheless, insofar as we are testing the strength of publicly-available information, this is not necessarily a disadvantage for our purposes but simply is part of that public information, however weak. The presence of 'managed' information may however have reduced the precision of the models or ratios, and may help explain some of the anomalies found.

DISCUSSION

The purpose of this project is to identify that potential for making an earlier public forecast of going concern problems in New Zealand corporate and listed entities that failed, 2001-2010. The aim is to understand whether better information about impending failure could have been provided to the public. The research proceeds by applying known ratios and models to information available to the public and as derived from their published annual reports. Twenty-five failing and twenty-five non-failing companies for all three years prior to failure are matched by industry, activity and size, analysed for going concern susceptibility and compared to determine whether failing companies would have presented a different picture than non-failing companies. The results suggest that there were significant differences that could have been identified. Whether such differences could, or should, have been 'discovered' by analysts at the time, and publicised, is the question to which we now turn.

Individual year data fails to present a distinct picture of these failing companies. At the level of the year-by-year analysis, only two ratios are found to be significant, both to do with 'earnings', EARNINGS PER SHARE and EBIT, two and three years prior to failure respectively. The only model to show significant difference is the KURUPPU LASWAD OYELERE model, and then only in the second year prior to failure and in combination. Given the individual indicator results, it appears that the accumulation of earnings over time is the measure most powerfully indicative of company failure in these 2001-2010 company failures. The dominance of 'assets' in the KURUPPU LASWAD OYELERE model however indicates its importance as well.

More significant results are found when more data, and over a longer period of time, is supplied; essentially when three years of data are combined. Using all 150 sets of financial statements

therefore, which consist of the 50 matched companies over the three years prior to failure and not distinguished by year, six significant differences emerge. These are: EARNINGS PER SHARE, RETURN ON ASSETS, CURRENT RATIO, NET WORKING CAPITAL, the KURUPPU LASWAD OYELERE model and EQUITY AND EBIT. Earnings figures, yet again, are a common element in many of the individual ratios found to be significant.

Furthermore, at the three-years-combined level, two more approach significance (>90%): RETURN ON EQUITY and the VAN PEURSEM-PRATT model. The latter relies heavily on a debt-to-equity ratio, and a closer look reveals the sort of situation it tended to tag as a 'failing company' situation. One example is Austral Pacific Energy Limited in which the total equity plunged from $12 million to -$3 million in the two years before failure, whereas total liabilities rose from $3.5 million to $66 million in three years.

In combination therefore seven (54%) ratios, including model outputs, showed significance and nine (69%) were at or approached significance when combining all three years. This picture distinguishing failing companies is improved yet further on considering the three nominal indicators, all of which are found to be significant. A failure to pay (DIVIDEND PAID) is associated with liquidation in each of the three years prior to failure. The use of a major firm (AUDIT FIRM) is also significant, but only closer to the date of failure. AUDIT QUALIFICATION is one of the most consistent predictors within two years of failure, perhaps due to the auditor's closeness to and expertise about the company taken as a whole. Overall therefore, and using combined data, 12 of 16 or 75% of measures used indicated significance differences between failing and non-failing companies. This would seem to go some way toward distinguishing entities most under stress. In those terms therefore, there appears to be some efficiency to the market of indicators of failure and, had analysts looked to and reported on them, the results might have signalled appropriate concerns.

There is nothing to indicate that such notice occurred however. From our review of the media at the time, it was not apparent that any of the New Zealand major publications signalled advanced and likely failure of individual companies. Forecasts focussed on macro-economic issues, and reviews – where done – were on a summary of past experiences: All too late or too vague for

investors to manage their situation. There is little evidence that existing models or ratios were brought together in a way that could have thus informed pubic forecasts of failure.

Nonetheless, even if such analysis had occurred prior to the global crisis, it has to be said that to have published individual business forecasts on that basis would have been risky. The signals are not unambiguous, there is some clouding of indicators. For example, we anticipated that indicators from the year prior-to-failure would be more revealing than those produced two-years prior. For the most part, this did not occur. We also expected indicators two years prior to failure to be more revealing than those three years prior to failure. Nor did this occur with any consistency. Except for the EQUITY RATIO (which approached significance in year 1) and the AUDIT QUALIFICATION finding, results were generally stable over time. The EARNINGS PER SHARE ratio signalled problems one- and three- years prior to failure, and the AUDIT QUALIFICATION signal was consistent. Nonetheless, there was no overwhelmingly-convincing pattern of failure.

Of the three models, two gave measurable indications of impending corporate failure. The KURUPPU-LASWAD-OYELERE model sent a strong signal, but only in year 2 and this was not at all reinforced from findings in years 1 and 3. The VAN PEURSEM-PRATT model sent a strong signal, but only in combining the data of all three years. The ALTMAN model demonstrated no significant difference between failing and non-failed firms. Furthermore, and given the conservative bias of such models -- the ALTMAN model here in particular -- indications of 'failure' may have been justifiably taken with some level of caution.

CONCLUSIONS

From these findings we come to conclude on several points. The first is related to the fact that most significant results tend to emerge when all three years of available data was combined. It would be presumptuous therefore to tag poor performance on the basis of one year's findings, or based on a pattern from one year to the next. Nor did the most recent statements unequivocally demonstrate the more dire situations these businesses were in. We do not know why this occurred, but it may be that financial statements were more likely to be distorted by desperate

managers in the last dying days of a business. For there to have been a clear indication of failure, then it seems that a pattern of events-in-total-and over-time needs to occur for an accurate picture to emerge. Furthermore, if an organization is not in the practice of distributing dividends -- such as would have occurred in partnerships, high growth or closely-held companies -- one of the strongest indicators of failure would have disappeared from the analysis entirely.

A greater level of consistency, and clearer patterns over time as problems grew, may have made it easier therefore to identify approaching fiscal disasters. That is while individual analysts, in using these indicators, may have found reasons for concern, the measures were not such that they would have found comfort in making public and potentially litigious forecasts about a company's future on their basis alone.

Nonetheless, the signals that emerged could have served a purpose. That the models proved to be conservative is relevant to this end, because such conservatism is an advantage from a users' analysis point of view. If analysis is used to identify 'concerns' as opposed to labelling actual 'failures', the ratios and models worked well. Findings may have justified a follow up on tagged accounts and while this would increase the investigation time and costs (given the likelihood of Type II errors), it would not have resulted in a high fail-to-identify likelihood (Type I error). Using these models in this way would have identified most companies in trouble, and a lot of continuing ones as well; but at least the likelihood of ignoring poor-performing companies would have been quite small.

We conclude therefore that while observing patterns in industry over time and using such patterns to evaluate particular organizations within it would have had merit, it would have been difficult to assert as to the future viability of these organizations solely on the basis of publicly-available financial information alone. There is some evidence of an efficient market for signalling corporate failure, signals must be followed up to uncover the full stories.

It would thus seem that the presence of multiple indicators of concern could have signalled risky situations. It is in this where progress could potentially be achieved in the future. It would seem that the presence of multiple or significant indicators of impending failure could have allowed

analysts to identify the most high-risk organizations, a 'watchlist' if you will. Owners could have placed pressure on managers, risk margins may have been more aptly incorporated into share prices. Where indicators raised concerns about declining revenues or rising debt, pressures to examine availability to capital, the reliability of customer and supply bases or its revenue forecasts could have been expanded. That is, corporate failure forecasts could have been created, and could have been of benefit to users, as long as they had been properly qualified as subjects of 'concern' rather than 'likelihoods of failure'.

As to implications for industry, it would seem that there is justification in suggesting that ratio and model analysis to identify failing companies is potentially informative. Applying it may not provide definitive answers of likely company failure, but would provide analysts with a reason to focus on organizations which show higher risks of forced liquidation.

FURTHER RESEARCH

It would be of value to develop ways in which follow up can be conducted on companies tagged as having potential going concern problems. Also developing or testing existing models against yet further data as time goes on, such as the Chung et al (2008) model, would help toward identifying their strength and adding to the base of information by which analysts can use publicly-available information.

It will also be useful to extend the prediction horizon by looking into financial statements earlier than the three year period in order to examine and identify when exactly the performance of firms begin to deteriorate, causing the firm to eventually go into liquidation or receivership.

Finally, a study of media discourse might reveal how or whether more subtle flags of concern were, or were not, raised about the problems of these failing companies. Such studies could help the media inform, and the investors 'interpret', their market and messages sent about it. Also, exploring the legal implications of such disclosure would be of interest to determine the frame to which such disclosures are limited.

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Appendix: Failing and Non-failing company descriptive information

Company name	Type[1]	Total asset size ($ 000)	Industry	Liquidation Date	Years Analysed
Blue Chip Financial Solutions Limited	F	109686	Finance & Other Services	14/9/2006	2005-2003
Dorchester Pacific Limited	N	390642	Finance & Other Services	-	2005-2003
Feltex Carpets Limited	F	276222	Textiles & Apparel	13/12/2006	2005-2003
Cavelier Corpation Limited	N	147827	Textiles & Apparel	-	2005-2003
Bridgecorp Limited	F	652287	Finance & Other Services	29/8/ 2007	2006-2004
Insured Group Limited	N	202276	Finance & Other Services	-	2006-2004
Austral Pacific Energy Limited	F	62732	Mining	12/1/2010	2007-2005
New Zealand Oil and Gas Limited	N	266599	Mining	-	2007-2005
Capital+Merchant Finance Limited	F	232137	Finance & Other Services	15/12/2009	2007-2005
New Zealand Finance Holdings Limited	N	198975	Finance & Other Services	-	2007-2005
E-Force Limited	F	3705	Forestry & Forest Products	20/3/2001	2000-1998
Fletcher Challenge Forests Limited	N	2561000	Forestry & Forest Products	-	2000-1998
FinMedia Limited	F	14496	Investment	28/10/2005	2004-2002
Rubicon Limited	N	247914	Investment	-	2004-2002
GDC Communications Limited	F	13652	Media & Telecommunications	12/10/2006	2004-2002
Telecom Corporation of New Zealand Limited	N	7500	Media & Telecommunications	-	2004-2002
ICP Biotechnology Limited	F	21447	Investment	12/6/2008	2007-2005
BLIS Technologies Limited	N	916	Investment	-	2007-2005
Manor Inns Group Limited	F	28287	Leisure & Tourism	22/2/2001	2000-1998
Millenium & Copthorne Hotels Plc	N	2649.1	Leisure & Tourism	-	2000-1998
Plus SMS Holdings Limited	F	11229	NZAX	11/6/2009	2008-2006
Zintel Group Limited	N	16012	NZAX	-	2008-2006
Property Leaders Australia & New Zealand Limited	F	30166	Property	24/8/2001	2001-1999
The National Property Trust	N	111092	Property	-	2001-1999
Property Leaders Australia Limited	F	20448	Property	24/8/2001	2001-1999
Property for Industry Limited	N	214768	Property	-	2001-1999

ProvencoCadmus Limited	F	162495	Intermediate & Durables	3/8/2009	2008-2006
Smartpay Limited	N	14526	Intermediate & Durables	-	2008-2006
Roller International Limited	F	1738	Leisure & Tourism	2/2/2001	1999-1997
Tourism Holdings Limited	N	172632	Leisure & Tourism	-	1999-1997
Seafresh New Zealand Limited	F	9577	Agriculture & Fishing	9/9/2002	2001-1999
Sanford Limited	N	486521	Agriculture & Fishing	-	2001-1999
Submarines Australasia Limited	F	6	Leisure & Tourism	16/7/2003	2004,2002,2001[2]
New Zealand Experience Limited	N	9060	Leisure & Tourism	-	2003-2001
OPI New Zealand Limited	F	362144	Investment	15/9/2009	2007-2005
Pyne Gould Corporation Limited	N	1444174	Finance & Other Services*	-	2007-2005
Botry-Zen Limited	F	2435	NZAX	23/12/2009	2009-2007
Pacific Edge Biotechnology Limited	N	896	Investment*	-	2009-2007
Cabletalk Group Limited	F	10895	Media & Telecommunications	18/2/2009	2008-2006
TeamTalk Limited	N	59331	Media & Telecommunications	-	2008-2006
Eastern Hi Fi Group Limited	F	6347	NZAX	14/1/2010	2008-2006
Renaissance Corporation Limited	N	46918	Consumer*	-	2008-2006
CL Realisation Limited	F	72285	Textiles & Apparel	4/8/2009	2007-2005
Hallenstein Glasson Holdings Limited	N	85263	Consumer*	-	2007-2005
BD NZ Limited	F	9683	Media & Telecommunications	29/3/2010	2008-2006
Sky Network Television Limited	N	1834656	Media & Telecommunications	-	2008-2006
Propertyfinance Group Limited	F	107449	NZAX	31/5/2010	2009-2007
Geneva Finance Limited	N	111513	NZAX	-	2009-2007
VTL Group Limited	F	33663	Consumer	5/11/2008	2007-2005
Fisher & Paykel Appliances Holdings Limited	N	1227990	Intermediate & Durables*	-	2007-2005

[1] F denotes failed company while N denotes non-failing company.
[2] Financial statements for period ending 2003 not available.
* Matched company is from a different industry as the failed company.

Table 1: Descriptive statistics for ratios

			Prof Margin	Earn Per Share	RO Assets	RO Equity	Curr Ratio	Net Wkg Cap	Debt/ Equity	Equity Ratio	Interest Cover	Altman Model	VP-Pratt Model	Kuruppu Laswad Oyelere	EBIT
1	Failed Company	Mean	-1.06	-.34	-.26	-.52	1.89	2801	4.11	15.91	-69.41	.85	-32.79	103.15	-1443.80
		Std. Dev	1.95	13.99	.40	1.64	3.12	46858	13.28	83.30	469.21	.96	88.61	439.56	30278.72
	NonFailed Company	Mean	-.30	12.92	.81	-.06	2.99	83651	2.17	46.10	-14.16	.89	-10.27	-38.85	32510.92
		Std. Dev	2.38	14.35	4.20	.55	4.66	260970	2.72	27.81	129.08	1.01	18.01	94.54	51175.59
2	Failed Company	Mean	-2.91	-.80	-.14	-.34	1.13	8088	5.98	32.89	173.00	.86	-39.00	3.42	4792.37
		Std. Dev	7.50	4.90	.32	1.09	.52	27200	15.75	34.19	2004.65	.95	110.76	45.05	17583.26
	NonFailed Company	Mean	-13.54	9.30	.70	-.28	5.66	72514	3.85	46.54	-29.72	.81	-25.10	-45.17	35090.01
		Std. Dev	63.87	38.39	3.90	1.17	13.67	227390	11.67	28.39	196.61	1.06	81.68	106.27	57683.79
3	Failed Company	Mean	-1.36	-1.87	-.11	-.03	2.04	14079	6.98	40.03	-2378.84	.90	-97.04	-8.85	3628.12
		Std. Dev	5.73	7.43	.29	.62	2.49	45656	14.87	30.18	11524.74	1.15	294.27	81.85	14069.97
	NonFailed Company	Mean	-.97	13.76	.77	.38	4.28	96423	1.83	56.10	-98.72	.95	-9.47	-43.88	29828.25
		Std. Dev	5.42	18.52	3.47	.85	8.01	270858	4.12	104.21	500.03	1.11	29.62	125.74	44061.27
Av.	Failed Company	Mean	-1.76	-.63	-.17	-.29	1.71	8379	5.62	30.20	-757.38	.87	-56.59	28.33	2366.69
		Std. Dev	5.55	9.93	.34	1.18	2.32	40347	14.44	54.91	6766.87	1.01	189.28	260.99	21520.18
	NonFailed Company	Mean	-4.94	11.99	.76	.01	4.31	84196	2.62	49.58	-47.53	.88	-15.01	-43.78	32476.39
		Std. Dev	37.04	25.69	3.82	.92	9.47	250496	7.27	63.69	316.86	1.05	51.35	105.973	50624.78

Table 2: ANOVA Results

	3 years combined (n=150)			1 year prior to failure			2 years prior to failure			3 years prior to fai3lure		
	F-Statistic	Sig.		F-Statistic	Sig.		F-Statistic	Sig.		F-Statistic	Sig.	
Profit Margin	0.526	0.469		1.500	0.227		0.683	0.413		0.032	0.859	
Earnings/share	15.948	0.000	**	10.949	0.002	**	1.701	0.198		12.707	0.001	**
Return on assets	4.425	0.037	**	1.220	0.209		1.147	0.290		1.593	0.213	
Return on equity	3.063	0.082	*	1.716	0.196		0.038	0.846		3.831	0.056	*
Current Ratio	5.320	0.022	**	0.920	0.341		2.745	0.104		1.737	0.194	
Net working capital	6.784	0.010	**	2.325	0.134		1.979	0.166		2.342	0.132	
Debt to equity	2.595	0.109		0.510	0.478		0.296	0.589		2.598	0.113	
Equity ratio	4.013	0.047	**	2.955	0.092	*	2.357	0.131		0.478	0.492	
Interest coverage	0.824	0.366		0.322	0.573		0.253	0.617		0.935	0.338	
Altman Model	0.007	0.934		0.018	0.895		0.025	0.876		0.024	0.877	
Van Peursem-Pratt Model	3.326	0.070	*	1.489	0.229		0.255	0.616		2.192	0.145	
Kuruppu et al Model	4.923	.028	**	2.494	.121		4.430	.041	**	1.363	.249	
EBIT	22.725	0.000	**	8.152	0.006	**	6.31	0.015	**	8.304	0.006	**

** Signficance (95%)

* Approaching significance (90%)

Table 3: Chi Square Results for nominal data

	3 years combined (n=150)			1 year prior to failure			2 years prior to failure			3 years prior to failure		
	Value	Pearson Chi-Square (2-side)		Value	Pearson Chi-Square (2-side)		Value	Pearson Chi-Square (2-side)		Value	Pearson Chi-Square (2-side)	
Dividend Paid	17.37	0.000	**	8.333	0.004	**	5.195	0.023	**	4.04	0.036	**
Audit Firm	13.83	0.003	**	8.314	0.04	**	5.419	0.144		3.739	0.154	
Audit Qualification/ EOM	10.92	.001	**	7.714	.005	**	5.242	.073	*	1.358	.244	

** Significant to 95%. Confidence *Significant to 90% confidence

Table 4 Descriptive Statistics: Altman's model score

Pair no.	Year before failure					
	1	2	3	1	2	3
	Failed			Non-failed		
1	0.592	0.518	1.048	0.226	0.211	0.210
2	1.093	1.271	1.226	1.419	1.548	1.691
3	0.170	0.177	0.172	0.140	-0.776	0.136
4	0.125	0.051	0.223	0.078	0.073	0.210
5	0.148	0.142	0.136	0.224	0.191	0.202
6	1.221	1.780	1.300	0.250	0.242	0.203
7	0.489	0.447	0.287	0.346	0.324	0.426
8	3.353	2.510	2.178	0.730	0.679	0.675
9	0.123	0.032	0.224	0.680	0.683	0.917
10	0.164	0.158	0.211	0.303	0.183	0.236
11	0.498	0.052	0.022	2.376	2.720	2.992
12	0.714	0.525	0.726	0.072	0.098	0.112
13	1.564	2.125	3.692	0.120	0.102	0.117
14	0.986	1.209	1.464	2.834	3.354	3.868
15	0.505	1.896	0.336	0.977	0.602	0.722
16	0.452	0.605	0.793	0.744	0.777	0.913
17	-0.054	0.021	0.025	1.088	0.764	0.849
18	0.129	0.094	0.087	0.144	0.210	0.339
19	0.191	0.211	0.043	0.606	0.216	0.387
20	0.662	0.486	0.548	0.520	0.443	0.681
21	1.522	1.657	1.367	4.048	3.305	3.561
22	1.672	1.633	1.733	2.401	2.438	2.533
23	3.790	3.497	4.505	0.373	0.361	0.314
24	0.083	0.137	0.026	0.358	0.293	0.236
25	0.770	0.253	0.284	1.162	1.228	1.178

Table 5 Descriptive statistics: Van Peursem & Pratt model score

Pair No.	Year before failure					
	1	2	3	1	2	3
	Failed			Non-failed		
1	-20.9	-22.6	-10.9	-62.3	-72.2	-73.0
2	-12.7	-9.4	-93.8	-5.0	-2.1	-1.1
3	-43.9	-41.2	-50.5	-53.9	11.5	-2.2
4	141.9	-12.6	-0.1	-1.7	0.0	1.1
5	-129.6	-130.9	-130.3	-57.1	-40.1	-33.2
6	-2.5	-12.2	-17.6	-1.1	-2.7	-3.0
7	1.0	-5.2	-0.7	1.4	1.4	1.2
8	-1.2	-1.8	-3.9	-14.3	-21.3	-34.1
9	25.9	22.5	20.5	-4.5	-0.9	0.9
10	-358.1	-65.3	-36.9	-2.7	-3.1	-2.2
11	-1.3	-2.7	-2.5	2.2	2.2	2.7
12	1.3	1.3	1.3	-4.9	-3.9	-2.9
13	1.4	1.4	1.3	-1.2	-2.7	-0.6
14	-11.9	-6.2	-6.3	-3.8	-2.9	46.7
15	-61.8	1.7	-4.4	-2.7	-6.4	-5.5
16	-4.9	-0.4	-0.7	1.7	2.0	2.4
17	1.2	-20.6	-0.3	2.6	0.2	0.4
18	-166.8	-126.7	-142.1	-33.9	-31.1	-34.4
19	-109.8	-6.4	-2.6	-15.8	-1.0	13.3
20	103.8	-5.1	-2.1	-9.5	-9.0	-0.9
21	-36.3	-0.6	-0.8	-5.2	-10.2	-8.9
22	-17.0	85.7	-12.0	4.0	4.1	4.3
23	3.7	-0.4	-7.8	-0.1	-0.5	-1.0
24	41.8	-524.8	-489.7	-31.5	-408.5	-109.5
25	11.6	-92.5	-154.2	-1.1	-0.2	0.3

Table 6 Descriptive statistics: Kuruppu, Laswad, Oyelere model

Pair No.	Year before failure					
	1	2	3	1	2	3
	Failed			Non-failed		
1	-32.3	-14.3	52.7	-52.5	-43.1	-29.3
2	-28.8	-41.0	-25.9	-14.7	-25.3	-21.7
3	-92.8	-111.3	-71.0	-38.6	125.7	9.0
4	90	30.6	.8	-22.2	-2.1	.3
5	-46.6	-28.1	-24.8	-21.9	-24.1	-9.7
6	8.6	3.1	7.9	-176.6	-175.6	-79.3
7	*	-1.1	-5.6	.6	-4.6	-10.1
8	11.2	-.9	17.4	-2.2	-2.6	-.9
9	66.0	19.4	17.1	39.7	32.8	16.5
10	158.3	8.8	-352.2	-.9	-.8	-.7
11	13.7	10.7	10.7	-4.5	-4.2	-4.9
12	-10.7	-2.3	-7.5	-40.2	-281	-25.6
13	-11.8	-3.9	-10.2	-8.1	-10.0	-357.8
14	68.5	-2.6	-11.3	10.1	3.4	2.7
15	3.4	-.9	-1.3	-44.0	-24.8	-32.3
16	37.4	103.6	-3.3	-27.6	-121.8	-127.6
17	165.4	165.4	167.3	-2.3	-26.2	-.3
18	-68.5	-31.6	-13.8	-2.6	-7.1	-22.3
19	13.0	16.2	15.1	30.7	4.9	66.6
20	3.0	-5.2	-7.5	-19.8	-12.6	-8.8
21	6.9	-.7	-1.3	-4.7	-9.9	-12.7
22	2.9	36.1	21.6	-27.1	-25.9	-21.3
23	.1	2.8	8.2	-445.1	-407.1	-481.8
24	29.2	-9.2	-14.9	-.2	8.36	2.8
25	2193.8	-47.7	1.0	-96.5	-95.8	-92.6

Table 7: Pre- and Post- 2008 comparison: Combined and one-year prior

	3 years combined (n=150)						1 year prior to failure					
	Combined (n=25)			Pre-2008 (n=20)			Combined (n=25)			Pre-2008 (n=20)		
	F-Statistic	Sig.		F-Statistic	Sig.		F-Statistic	Sig.		F-Statistic	Sig.	
Profit Margin	0.526	0.469		0.435	0.511		1.500	0.227		0.163	0.689	
Earnings per share	15.948	0.000	**	30.263	0.000		10.949	0.002	**	7.819	0.008	
Return on assets	4.425	0.037	**	4.479	0.036		1.220	0.209		1.483	0.231	
Return on equity	3.063	0.082	*	2.511	0.116	[1]	1.716	0.196		1.354	0.252	
Current Ratio	5.320	0.022	**	3.305	0.072	[1]	0.920	0.341		0.758	0.389	
Net working capital	6.784	0.010	**	6.397	0.013		2.325	0.134		2.332	0.135	
Debt to equity	2.595	0.109		4.176	0.043	[1]	0.510	0.478		3.448	0.071	[1]
Equity ratio	4.013	0.047	**	4.761	0.031		2.955	0.092	*	1.312	0.259	[1]
Interest coverage	0.824	0.366		1.24	0.268		0.322	0.573		0.929	0.341	
Altman Model[2]	0.007	0.934		0.17	0.681		0.018	0.895		0.163	0.689	
Van Peursem Pratt Model[2]	3.326	0.070	*	3.157	0.078		1.489	0.229		1.609	0.212	
Earnings before interest-tax	22.725	0.000	**	17.802	0.000		8.152	0.006	**	6.504	0.015	

[1] Changed significance of original finding [2] On model outcomes