MD&A Disclosure and the Firm's Ability to Continue as a Going Concern

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Abstract

This paper explores the role of textual disclosures in the MD&A section of a firm's SEC 10K filing to predict a firm's ability to continue as a going concern. Using a sample of firms that filed for bankruptcy over the period 1995-2011 and a matched set of control firms we find that both management's opinion about going concern stated in the MD&A and the linguistic tone of the MD&A together provide significant explanatory power in predicting whether a firm will cease as a going concern. Moreover, the predictive ability of MD&A disclosure is incremental to financial ratios, auditor going concern opinion, and market based variables. The striking feature of our findings is that the information in MD&A disclosures is more useful in predicting bankruptcy relative to financial ratios three years prior to bankruptcy. This suggests that MD&A disclosures are more timely than financial ratios and hence, a leading indicator of going concern problems. Our findings have important implications for current standard setter deliberations on whether to mandate qualitative disclosures about management's assessment of the firm's ability to continue as a going concern.

MD&A Disclosure and the Firm's Ability to Continue as a Going Concern

1. Introduction

In January 2012, the Financial Accounting Standards Board decided by a narrow margin of 4-3 not to require management to perform an assessment of the entity's ability to continue as a going concern. By May 2012, the FASB reconsidered this requirement and most recently in November 2012, the board planned to continue its deliberations and meetings with various regulators such as the SEC, AICPA and PCAOB before deciding whether to include this requirement under US GAAP (Tysiac 2012b). Proponents of this requirement contend that more information is needed from management to inform investors and creditors of impending firm failure, particularly given the spate of recent bankruptcies that have occurred seemingly without warning from either the management or the firm's auditors. Opponents contend, among other reasons, that managers already disclose sufficient information in their MD&A voluntarily. As such, their view is that regulation would be an unnecessary imposition. The purpose of this paper is to directly inform this debate by assessing whether, to what extent, and when do existing disclosures in a firm's MD&A inform about a firm's ability to continue as a going concern.

We use a matched pair sample and conditional logistic regression models to assess the ability of current year MD&A textual features to discriminate between (control) firms that continue as a going concern and (treatment) firms that subsequently file for bankruptcy. We examine two textual features of the MD&A: (1) the explicit mention by management of the possibility that the firm may not be able to continue as a going concern, and (2) the overall linguistic tone of the MD&A. Our estimation reveals that firms which explicitly mention the potential inability to continue as a going concern, as well as those using more (less) negative (positive) words in the MD&A, are more likely to cease as a going concern. In terms of

economic significance, these three determinants alone yield an area under the ROC (receiver operating characteristic) curve (AUC) of 85%.[1] As 50% represents chance levels and 100% represents perfect ability to discriminate, the evidence is consistent with existing MD&A disclosures providing substantial predictive ability to determine if a firm will continue as a going concern.

After controlling for other information from the financial statements such as financial ratios and the presence of an auditor's going concern opinion, we find that positive and negative words continue to have predictive ability and the model's overall diagnostic accuracy improves to 91%, an improvement of 6% over the MD&A only model. The incremental predictive ability of linguistic content is robust to the inclusion of market variables as well as alternative empirical specifications. That linguistic content in the MD&A is an incremental predictor of bankruptcy supports the FASB's position that mandating disclosures of going concern assessment would help improve bankruptcy prediction.

Naturally, our results alone are insufficient to conclude whether mandatory disclosure is appropriate, because such a determination will require a careful cost benefit analysis. Our analysis, however, offers the following additional insights to inform this cost benefit discussion. Among our treatment sample firms that ultimately cease to continue as a going concern, in only 38% of the cases managers discuss the possibility of ceasing as a going concern. This seemingly low percentage is potentially consistent with the view that managers could do more to inform markets about a firm's uncertainty related to continuing as a going concern. However, the current voluntary disclosure frequencies by management regarding the ability to continue as a going concern are slightly below what auditors currently provide and already outpace what we observe under the mandatory disclosure regime in Canada. In particular, auditors of our

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[1] This in-sample result of 85% is virtually identical to that using out of sample estimation procedures.

treatment firms issued a going concern opinion in only 43.5% of the cases. A recent study by the Staff on the Ontario Securities Commission using a sample of firms that ceased operations in Canada (OSC STAFF NOTICE 52-719 Going Concern Disclosure Review), where going concern disclosures are currently *mandatory*, only 27% had specific going concern disclosure in their MD&A prior to bankruptcy.

It is worth noting that while managers may not provide information regarding going concern when it is warranted, we also find that in 8% of the control sample (where firms continue to remain a going concern), managers discuss going concern problems. This suggests that even managers face inherent difficulties in predicting bankruptcy. When examining the time series predictive ability of the financial variables and MD&A disclosures we find intriguing results. Despite the inherent difficulty that always surrounds the prediction of uncertain future events we find that the relative ability of voluntary textual MD&A disclosures over financial variables to predict bankruptcy improves as the prediction horizon increases. That is, the predictive accuracy of a model including only voluntary textual MD&A disclosure (financial statement ratios) is 85% (90%) in the year prior to bankruptcy. Three years prior to bankruptcy, not surprisingly the predictive ability of voluntary MD&A disclosure (financial statement ratios) decreases to 73% (66%). What is intriguing, however, is that the MD&A disclosures become more predictive relative to financial ratios. While financial ratios are incrementally better predictors of bankruptcy closer to the date of bankruptcy, management opinions and linguistic tone provide relatively more information content three years prior to bankruptcy. This suggests that textual MD&A disclosures are leading indicators of bankruptcy with an overall diagnostic accuracy of 73%. This finding continues to hold when we evaluate the incremental predictive ability of MD&A relative to other predictors.

Although our evidence does not directly speak to whether mandating going concern disclosures by management would improve the predictive power of MD&A disclosure, at a minimum our findings suggest that the voluntary MD&A disclosures in firms' financial statements provide important insights over financial ratios in assessing a firm's ability to continue as a going concern.

In addition to providing important and timely insights into the current regulatory debate, this study more generally adds to the literature on the informativeness of the MD&A (Brown and Tucker, 2011; Feldman et al. 2010; Cole and Jones 2005), to the bankruptcy prediction literature (Altman 1968; Ohlson 1980; Zmijewski 1984; Shumway 2001; Beaver et al. 2005; Beaver et al. 2012), and to the literature studying the boundaries of the auditor with respect to going concern assessments (Carson et al. 2012). The study also adds to the growing literature on the importance of qualitative disclosure using automated linguistic techniques (Tetlock 2007; Tetlock et al. 2008; Li 2010) and in particular fills the void noted by Li (2011) that linguistic analysis may be useful for bankruptcy prediction.[2]

2. Going Concern Disclosure Debate and Related Literature

2.1 The Controversy

In May 2007, the Financial Accounting Standards Board decided to add a project to its agenda to address an entity's assessment of its ability to continue as a going concern and the adoption of a liquidation basis of accounting with a view to converge the reporting requirements with International Accounting Standards 1 (IAS 1). Although the responsibility of providing a going concern judgment currently resides with the auditor, several members of the FASB view

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[2] We are aware of one study (Cecchini et al., 2010) that has previously explored textual analysis to discriminate bankrupt from non-bankrupt firms. However, this paper uses a smaller sample of manufacturing firms from a shorter time period (1994-1999) and employs a complex vector space model that incorporates word sense disambiguation through lexical referral system (WordNet) to document discriminatory ability of the text contained in MD&A disclosures. Moreover, Cecchini et al. (2010) do not consider the differential timeliness of MD&A disclosures nor do they control for auditor opinion and market based variables in their empirical models.

that management is in the best position to provide a formal view on the going concern issue (Bloomberg BNA, October 2012). In October 2008, the FASB issued an exposure draft titled "Going concern" that mandated disclosures when there is substantial doubt about an entity's ability to continue as a going concern. The Board believes that this requirement is particularly useful to investors for better evaluating the financial statements when they are prepared on a going concern basis in the presence of serious concerns about the entity's ability to continue as a going concern. In January 2012, the FASB board decided by a narrow vote (4-3) to discontinue the development of a requirement for management to perform a going concern assessment (Whitehouse, 2012a). Board members cited both the difficulty in identifying the threshold past which substantial doubt surrounding the ability to continue as a going concern exists and also enforcement costs in explaining the voting outcome. The board also felt that disclosures about risks and uncertainties would be more valuable to financial statement users rather than an explicit going concern opinion (Tysiac, 2012a).

Opponents of a going concern disclosure mandate cite that the current disclosure requirements under SOP 94-6 already provide necessary and valuable information about risk and uncertainties that could affect a firm's current or near term functioning of the reporting entity. In particular, they claim that existing disclosures in the MD&A should speak to the going concern question (Whitehouse, 2012b; Bloomberg BNA, October 2012). Notwithstanding existing MD&A disclosures, the FASB acknowledged that there may be more for management to say, and in a May 2012 board meeting, decided to revisit the going concern requirements. At the same time, the PCAOB is planning on expanding the going concern evaluation requirements for auditors who are required to provide a going concern audit opinion "when there is a substantial doubt about the company's ability to continue as a going concern for a reasonable period of time"

(PCAOB standard AU 341). The fluctuating nature of FASB's decision to consider mandating

going concern requirement over the last five years serves to underscore the controversial nature

of this topic.

The renewed interest from regulators about providing early warning signals to investors

through management disclosures raises two important research questions. First, do existing

going concern disclosures voluntarily provided by management assist in the prediction that a

firm will cease as a going concern? Second, even in the absence of explicit disclosures of going

concern problems, do the existing textual disclosures in the firm's financial reports provide

useful information about the likelihood that a firm will cease as a going concern? We believe

that answering these questions will help inform the debate on the usefulness of expanding the

going concern disclosures.

2.2 Related Literature

Whether a firm has ceased as a going concern is typically assessed by examining the

incidence of bankruptcy. Since the seminal work of Altman (1968) that documented the role of

financial statement variables for predicting bankruptcy, there has been a large literature in both

accounting and finance on bankruptcy prediction (See Beaver et al. 2010 for a summary).

Shumway (2001) expanded the financial statement predictors by including market variables.

Using a hazard rate model, he shows that market variables are relevant beyond financial

variables in assessing the likelihood of bankruptcy.

Recent research by Beaver et al. (2005) and Beaver et al. (2012) document a time-series

decline in the explanatory power of financial ratios to predict bankruptcy. Beaver et al. (2012)

show that this trend is attributable in part due to the decline in quality of financial numbers either

due to intervention by managers (managerial discretion) or due to the inability of financial

numbers to reflect economics (e.g. unrecognized intangible assets). Given this trend it is useful to explore whether and when information beyond financial variables, in particular, textual disclosures in the MD&A of the annual report, assist in the bankruptcy prediction task.

Researchers have examined several variables in addition to basic financial ratios such as industry affiliation (Chava and Jarrow 2004) and R&D intensity (Franzen et al. 2007). In general, these papers find that the additional variables have incremental explanatory power for predicting bankruptcy. However, commercial metrics such as Moody's KMV measure of default add very little to improve bankruptcy prediction (Campbell et al. 2008). Cecchini et al. (2010) use a complex vector space model to parse the textual content in MD&A disclosures to predict bankruptcy and fraud outcomes over the period 1994-1999.[3] The authors show that the textual disclosures provide significantly greater relative and incremental predictive ability than the Altman Z-score. However, the paper is silent on whether the predictive ability of textual variables would be different had the components of Altman Z-score been used instead of the summary measure (Shumway 2001). Moreover, the paper does not consider the role of management going concern opinion, auditor going concern opinion and market based variables nor does it consider the timeliness of textual disclosures relative to financial variables.

Of direct interest to this study, are two papers that have examined managerial going concern statements in regimes where such statements are mandatory. First, a study by the Staff on the Ontario Securities Commission that focused on Canadian firms that ceased operations (OSC 2010), finds that only 27% had specific going concern disclosure in their MD&A prior to bankruptcy. Despite mandatory requirements to make going concern assessments it is apparent

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[3] Their algorithm incorporates word sense disambiguation that takes into account the context of a sentence and uses the WordNet program to create a "concept score" to identify classifiers of bankrupt and non-bankrupt firms. They then use Support Vector Machine classification method to identify concepts (or phrases) that ultimately differentiate between bankrupt and non-bankrupt firms. The phrases for bankrupt firms include *inter alia* "Gross margin decline", "Company record charge" and "Result gross profit" which are likely to be correlated with the individual components of the Altman Z score.

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that the proportion of Canadian firms that report going concern uncertainties is quite small. However, this study does not speak to whether these disclosures are useful in bankruptcy prediction. Second, Uang, Citron, Sudarsanam and Taffler (2006) examine directors' going concern reports for UK firms. In the UK, the regulatory requirements mandate that directors of firms listed in the London Stock Exchange provide a statement on the firm's going-concern status and that such statements be reviewed by the auditors prior to publication as part of the annual report. Uang et al. (2006) find that the directors' going-concern statements do not provide incrementally useful information to users in predicting going concern outcomes.[4] Neither study, however, examines the time-series predictive ability of managements' going concern disclosures nor the extent to which such disclosures help predict bankruptcy outcomes beyond financial and market variables.

3. Sample Selection, Research Design and Variable Measurement

3.1. Sample

Following prior research, we use the occurrence of bankruptcy as our measure of a firm's cessation as a going concern. To identify our treatment sample of bankrupt firms we begin with the universe of firm observations in the Compustat Annual database during the period 1995-2011[5]. From this large time-series data, we identify 354 firms that are headquartered in the US and have filed for bankruptcy (either filed as Chapter 11 or Chapter 7) using the Compustat delisting reason code (DLRSN=02). We then identify the exact date of bankruptcy filing by examining the SEC Form 8K filed by the bankrupt firms. We eliminate 92 firms with missing

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[4] The study's sample is restricted to firms that received an auditor going concern. Thus, the benefits of linguistic tone are likely to be understated.
[5] Note that our sample period is much smaller than other studies that consider over 40 years of data. This is because to compute linguistic variables we require availability of 10K filings in a machine readable format which is not readily available prior to 1995.

data for the fiscal year prior to bankruptcy filing – i.e., data necessary to compute financial ratios and textual MD&A disclosures. This results in a final treatment sample of 262 firms.

For each treatment firm, we identify a distinct "healthy" control firm (i.e., a firm that did not file for bankruptcy during the sample period) matched based on industry and total assets for the fiscal year prior to the bankruptcy filing by the treatment firm. To ensure that the control firms are proximate in size with that of treatment firms, we impose the requirement that total assets of a matched firm is within 20% of total assets for the treatment firm. For industry matching, we follow the Frankel et al (2002) SIC-based industry classification scheme[6] (see also Feng et al. 2010). Our final sample for empirical analysis is therefore comprised of 524 firm year observations, corresponding to 262 matched pairs.

We obtain market variables such as stock returns, variance of stock returns, and market capitalization from CRSP. However, market variables are not available for all firms. Therefore, when we estimate regressions involving market predictors our sample size is reduced to 211 matched pairs, i.e., 422 firm year observations.

3.2. Research Design and Variable Measurement

We begin with a research design that enables us to evaluate the ability of textual MD&A disclosures to predict that a firm will cease as a going concern in the following year. Specifically, we estimate the following model step-wise to determine the predictive ability of textual content in a firm's MD&A:

$$\Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + \beta_4 GC\_AUD_t$$
$$+ \beta_5 WCTA_t + \beta_6 RETA_t + \beta_7 EBITTA_t + \beta_8 MVETL_t + \beta_9 SALETA_t + \upsilon_t \quad (1)$$

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[6] Industry membership is determined by SIC code as follows: agriculture(0100-0999), mining and construction (1000-1999, excluding 1300-1399), food (2000-2111), textiles and printing/publishing(2200-2799), chemicals (2800-2824, 2840-2899), pharmaceutical(s2 830-2836), extractive(1300-1399, 2900-2999), durable manufacturers (3000-3999, excluding 3570-3579 and 3670-3679), transportation (4000-4899), utilities (4900-4999), retail (5000-5999), services (7000-8999, excluding 7370-7379), and computers (3570-3579, 3670-3679, 7370-7379). Finance is 6000-6999.

where BRUPT equals one if the firm filed for bankruptcy under Chapter 11 or Chapter 7, and zero otherwise; t and t+1 are yearly time subscripts. Because the dependent variable is dichotomous and our sample is comprised of matched pairs, we estimate all models using conditional logistic regressions (McFadden 1973; Ohlson 1980).

The first three independent variables in equation (1) represent qualitative textual disclosures within the MD&A section of each firm's annual 10-K filing. The first measure, GC_MGMT, is an indicator variable that takes the value of one if the firm made a statement in the MD&A suggesting the possibility the firm may be unable to continue as a going concern, and zero otherwise. To identify such statements, we read each firm's MD&A and locate sentences explicitly referencing the term "going concern" or discussing the firms' ongoing operations. Examples of such statements are provided in Appendix A. We manually identify such references because there is no established automated tool for this purpose. If the textual references about the firm's inability to continue as a going concern are useful in predicting bankruptcy, we expect $\beta_1 > 0$.

The second and third measures capture the linguistic tone of entire MD&A using the established dictionary based technique (Tetlock, 2007; Pennebaker 2010) modified by Loughran and McDonald (2011) for business settings. Specifically, we use the Linguistic Inquiry and Word Count (LIWC) software to measure the fraction of positive and negative words in the entire MD&A using the dictionary developed by Loughran and McDonald (2011).[7] The resulting frequency of positive (POSMDA) and negative (NEGMDA) words capture the linguistic tone of the MD&A. If these linguistic tone metrics derived from textual MD&A disclosures are indicative of a potential going concern problem, we expect the likelihood of

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[7] Appendix B lists sample positive and negative words from the Loughran and McDonald (2011) dictionary.

subsequent bankruptcy to be decreasing (increasing) in the proportion of positive (negative) words. This implies $\beta_2 < 0$ and $\beta_3 > 0$.

We next consider whether an auditor's going concern opinion complements or substitutes for the managerial going concern statements or management tone in the MD&A disclosures. We measure auditor going concern opinion using an indicator variable (GC_AUD) that takes the value of one if the auditor expressed substantial doubt about the firm continuing as a going concern, and zero otherwise. We manually obtain the audit opinion data from reviewing the auditor report in each 10-K filing. As with the GC_MGMT variable, we expect the coefficient on GC_AUD to be positive.

In addition to the audit opinion variable, we include several other control variables, particularly financial variables that have been shown to predict bankruptcy. For financial ratios we follow prior research (Altman 1968; Ohlson 1980; Shumway 2001) and consider the ratios of working capital to total assets (WCTA), retained earnings to total assets (RETA), earnings before interest and taxes to total assets (EBITTA), market value of equity to total liabilities (MVETL), and sales to total assets (SALETA). Complete definitions of each variable are provided in Table 1. Consistent with prior research we predict the coefficients on WCTA, RETA, EBITTA, MVETL and SALETA to be negative.

We assess whether textual disclosures are informative for predicting bankruptcy via reference to statistical significance on the coefficients of interest (β_1, β_2, and β_3). To facilitate assessment of the extent to which textual disclosures are informative we measure predictive accuracy via the area under the receiver operating characteristic (ROC) curve or AUC[8] (Hosmer

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[8] In our sample, a ROC curve specifies how the probability of correctly predicting a bankrupt firm is traded off against the probability of correctly predicting a going concern for all possible cut-off points. Sensitivity refers to the probability of correctly predicting a 1 (i.e., bankruptcy) and specificity refers to the probability of correctly predicting a 0 (i.e., no bankruptcy). The further the ROC curve is from the 45 degree reference line, the better the

and Lemeshow, 2000; Kim and Skinner, 2012; Hobson, Mayew and Venkatachalam, 2012), and goodness of fit via the Pseudo-R^2 statistic.

4. Empirical Findings

4.1. Descriptive Statistics

Table 2 provides the descriptive statistics and correlation matrix for the variables used in the regression analyses. Panel A of Table 2 presents the descriptive statistics for the treatment and control samples separately. All continuous variables are winsorized at the 1% and 99% level to prevent undue influence of outliers. Relative to treatment firms, control firms on average have a lower incidence of management disclosure about going concern, and have a higher (lower) proportion of positive (negative) words in the MD&A. Control firms also have a lower incidence of auditors' going concern opinion.

With respect to financial variables, the mean (median) of total assets (AT) for the treatment sample is $437 ($48) million whereas for the control sample it is $479 ($47) million. The mean (median) of total assets is not statistically different across the two samples, suggesting the matching procedure was effective. The two samples are different on other dimensions, however, as expected. The median return on assets (EBITTA) is much lower (-14.6% versus 6%) for the bankrupt firms relative to the control firms, consistent with prior evidence that bankrupt firms are more likely to be loss firms relative to control firms. Moreover, bankrupt firms have relatively lower retained earnings as a percentage of total assets (median RETA is 21.5% versus 56.3%), relatively greater leverage (median MVETL is 0.489 versus 3.025), and greater return volatility (median LSIGMA is 21.3% versus 14.6%). The means and medians for other market variables (LERET and LRSIZE) are also statistically different between the

model predicts both 1s and 0s. The area under the ROC curve (AUC) summarizes this information, with higher values indicating higher predictive accuracy.

treatment and control samples. Taken together, the univariate evidence is consistent with the prediction that firms that have poorer economic performance are more likely to cease as a going concern.

Regarding voluntary going concern disclosures by management in the MD&A (GC_MGMT) we find that 38% of the bankrupt firms discuss uncertainties about going concern whereas only 8% of the control firms discuss uncertainties about going concern (this difference is statistically significant at the 1% level). This suggests that i) a significant number of firms do voluntarily disclose uncertainties about going concern and ii) some managers (albeit a small number) are conservative enough to disclose uncertainties even when the firm does not subsequently file for bankruptcy. Our examination of the auditor going concern opinion indicates that 44% of the bankrupt firms receive a going concern audit opinion relative to 12% for the control firms. Taken together, the proportion of voluntary disclosures by management relative to the mandated disclosures by the auditors is open to two interpretations. First, in comparison with the proportion of voluntary going concern disclosure by the management it appears that auditors are more likely to report going concern issues relative to the management. That is, managers have more Type II errors or false negative rates (i.e., not issuing a going concern opinion when the firm faces subsequent bankruptcy) relative to auditors. Second, auditors have more Type I errors or false positive rates (i.e., issuing a going concern opinion without a subsequent bankruptcy outcome) relative to management (12.2% vs. 7.6%) in that auditors are more likely to raise going concern problems when in fact, ex post, the firm continues as a going concern. This suggests that auditors are more conservative relative to management in providing a going concern opinion in the firms' financial statements.

Regardless of the differential proportion of the Type I and Type II errors one might argue that the proportion of going concern disclosure by both the management and auditor is similar and hence, disclosure by either party would subsume the information contained in the other. That is, when auditors (managers) question the firm's ability to continue as a going concern, managers (auditors) may follow suit, suggesting the possibility that an auditors' going concern opinion and management's voluntary going concern disclosure are substitutes. Furthermore, given the disclosure by the auditor and management of going concern problems, the value added by the linguistic tone measures based on management discussion in MD&A may be questionable.

To provide more evidence on these two issues, we compare the descriptive statistics of the linguistic tone variables and the audit opinions across firms that did and did not voluntary disclose going concern uncertainty (see Table 2, Panel B). If management discussion of going concern uncertainties merely mirrored the auditor going concern opinion we would expect the proportion of going concern audit opinion to be 100% (0%) when the management reports (does not report) going concern uncertainties in the MD&A. However, the results in Panel B suggest this is not the case. When management reports a going concern uncertainty (GC_MGMT=1), in 84% (100 out of 119) of the cases the auditor also issues a disclaimer. Furthermore, when management does not report a going concern uncertainty (GC_MGMT=0), about 11% (46 out of 405) of the time auditor issues a going concern opinion. These proportions reveal that in 65 cases out of a possible 524 cases the auditor's opinion and the management's opinion are discordant. This reveals that audit opinion and management opinion are not perfect substitutes. Next, we explore whether the linguistic measures are likely to add to the predictive power for bankruptcy beyond management opinion about going concern uncertainty. We find that

regardless of whether management provides a going concern disclosure the proportion of

positive words (negative words) are consistently lower (higher) for treatment firms that

subsequently enter bankruptcy relative to control firms. This gives us an early indication that

management opinions need not necessarily subsume the management tone of the overall

disclosure in the MD&A. Overall, the results in Panel B suggest that management opinion, audit

opinion and the linguistic variables may individually contain incrementally useful information to

predict bankruptcy.

In Panel C of Table 2, we report Pearson and Spearman correlations. All of the main

predictor variables with the exception of SALETA are significantly correlated with the variable

of interest, BRUPT. Moreover, the signs on all these correlations are as expected. Despite the

strong univariate correlations of the various predictors with the bankruptcy variable, we find

many of the financial variables are correlated with the MD&A disclosures of interest

(GC_MGMT, POSMDA, and NEGMDA). To assess whether textual disclosures of the MD&A

are incremental to financial variables and to assess the extent to which textual MD&A

disclosures predict bankruptcy in the subsequent year, we turn to multivariate analysis.

4.2. Multivariate Results

Table 3 reports the results of estimating equation (1) in a step-wise manner to facilitate

comparison of the predictive ability of textual measures against standard metrics used for

bankruptcy prediction. In column (1), we focus only on the management disclosure variable

(GC_MGMT) and find that the coefficient is statistically significant (at the 1% level) and that

area under the ROC curve (AUC) is 0.75.[9] Thus, we infer that management going concern

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[9] Hosmer and Lemeshow (2000, p.162) indicate that AUC of 0.5 indicates no discrimination, AUC of between 0.7
and 0.8 indicates acceptable discrimination, AUC of between 0.8 and 0.9 indicates excellent discrimination, and
AUC greater than 0.9 is considered outstanding discrimination (See also Kim and Skinner 2012).

disclosure in MD&A section exhibits reasonable predictive ability (75%) that is well above a chance threshold of 50%. The goodness of fit, as measured by Pseudo-R^2, is also reasonable at 21%.

Next, we test the predictive ability of the linguistic variables POSMDA and NEGMDA and report the results in column (2). The coefficient on POSMDA is negative (-1.019) as expected and significant (p-value <0.01). The coefficient on NEGMDA is positive (1.380) and statistically significant (p-value <0.01). The linguistic variables taken together register an AUC of 80%. In column (3), we include all 3 variables corresponding to MD&A content. The coefficients on GC_MGMT, POSMDA, and NEGMDA are all of the predicted sign and statistically significant with an associated AUC of 85% and Pseudo R^2 of approximately 32%. As AUCs between 80% and 90% indicate excellent discriminatory ability (Hosmer and Lemeshow, 2000), we conclude that management going concern disclosure and linguistic tone of the MD&A disclosure together possess remarkable predictive accuracy for bankruptcy. However, it is unclear whether the discriminatory ability of these variables would continue to hold after controlling for other quantitative predictors or potential correlated omitted variables.

In column 4, we control for all the standard financial statement predictors in prior literature by adding financial ratios and auditor going concern opinion. As a collection, the explanatory variables in column (4) represent what a reader could extract from a 10-K filing. The inclusion of these variables increases AUC to 91%, suggesting the model has an outstanding level of discriminative ability (Hosmer and Lemeshow, 2000). The predictive ability of the text variables POSMDA and NEGMDA continues to be strong and statistically significant. However, the coefficient on GC_MGMT is no longer significant. The coefficient on auditor opinion variable (GC_AUD) is insignificant as well, despite the strong positive univariate

association with bankruptcy noted in Table 2. Thus, the opinions of both the management and the auditor about going concern do not contain unique incremental information for bankruptcy prediction beyond the information content in underlying fundamentals.[10] With respect to the financial ratios only two of the five financial ratios (RETA and EBITTA) are statistically significant, consistent with the findings in Shumway (2001).

In terms of predictive accuracy, each of the models examined in columns (1) to (4) show sizeable and significant increases in AUC as we add linguistic variables and financial variables to management opinion about going concern. We also note that, in tandem with AUC, the goodness of fit as measured by Pseudo-R^2 steadily increases from 20% in column (1) to 43% in column (4). To provide a pictorial comparison of the predictive ability we plot the AUC for each of the four model specifications reported in columns (1)-(4) of Table 3 (see Figure 1).

In Table 3, we evaluate the incremental predictive ability of the MD&A disclosures by starting with the management opinion variable. An alternative way to present the findings is to compare the incremental explanatory power of the textual MD&A variables relative to a model with only financial variables. In untabulated results we find that a model consisting of only the financial statement ratio variables yields an AUC of 89% and a Pseudo-R^2 of 32%. As with the results reported in column (4) of Table 3, the coefficients on RETA (-0.945) and EBITTA (-2.267) are negative and significant at the 1% level, while coefficients of all other financial variables are insignificant. Thus, comparing these results with those reported in column (4) of Table 3, we can conclude that adding the linguistic variables to a financial variables only specification improves the predictive ability by 2%, an increase that is statistically significant at the 5% level.

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[10] We also estimated a specification where we include the auditor opinion variable in the model reported in column (3) of Table 3 and find that the management opinion variable is positive and statistically significant.

4.3. Relative Timeliness of Predictive Ability of Linguistic Variables

Having established that textual MD&A disclosures have incremental and substantial explanatory power in predicting whether a firm will cease as a going concern, in this section we investigate *when*, relative to other predictors MD&A disclosures become more or less useful. That is, we explore the relative timeliness of the predictors both two and three years prior to the year of bankruptcy. Prior research (Altman 1968; Beaver et al. 2005) shows that the ability of financial ratios to predict bankruptcy improves as the year of bankruptcy approaches. Although one might expect a similar trend in predictive ability of linguistic variables as more information is available for a better going concern assessment, it is unclear *ex ante* which of the predictors are relatively more timely. For example, if textual MD&A disclosures provide a better venue to describe the future state of the firm relative to financial numbers which are arguably more backward looking, it is conceivable that MD&A disclosures may become a more potent predictor of future bankruptcy much earlier than the financial variables.

To investigate the relative timeliness, we isolate a sub sample of 242 firms (121 matched pairs) for which we have all required data (i.e. text variables, management opinion in MD&A, auditor opinion, and financial ratios) for three years prior to the bankruptcy filing by treatment firms. For this limited subsample, we first re-estimate the full model containing all 10-K information (i.e., column 4 of Table 3), and report the results in Column (1) of Table 4, Panel A. Except for the weak negative association for POSMDA and RETA, the results are broadly consistent with those reported in column (4) of Table 3 and the predictive accuracy of the model (91.7%) is similar to the 91.2% obtained for the full sample in Table 3.

To assess the time trend, we estimate the full model in column (1) of Table 4 both two years prior (column 2) and three years prior (column 3) to bankruptcy. The AUC of the full model declines from 91.7% to 85.8%, and then to 76.5% across the three years prior to

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bankruptcy, consistent with the information in 10-K losing predictive ability as the horizon to bankruptcy increases. However, in terms of individual coefficients, NEGMDA is positive and significant at all horizons, and POSMDA (GC_MGMT) is significantly negative (positive) at both two and three year horizons.[11] Of the financial variables, only EBITTA is reliably negative in each of the three years. These results suggest that textual MD&A disclosures have incremental explanatory power at horizons greater than one year.

To assess how the potential for differential predictive ability of each class of variables are, we begin in Figure 2 by graphing the AUCs listed in Table 4 Panel A for the full model at all horizons as the benchmark case (see the thick line in Figure 2). We then estimate subsets of the full model based on different classes of explanatory variables. In particular, we estimate a management going concern only model, a linguistic tone only model, a management going concern and linguistic tone model, and a financial variables only model. We report the AUCs of these models at all horizons in Panel B of Table 4 and plot the time series trend in AUCs in Figure 2.

As expected, Figure 2 reveals the full model (thick line) has the highest explanatory power relative to all other models at each horizon. Also, across all models the predictive ability declines as horizon to bankruptcy increases. In terms of ranking the explanatory power of the models, at one year prior to bankruptcy, the financial variables model (short dashed line) outperform the full textual variable model (long dashed line), which in turn outperforms the linguistic tone only model (thin line), which outperforms the management going concern only model (dotted line). This rank ordering holds at the two year horizon as well. However, at three

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[11] Notice that the coefficient on GC_AUD in column (3) of Table 4 is negative, inconsistent with the predictions. Further analysis reveals that this negative coefficient is a manifestation of high correlation between GC_AUD and GC_MGMT. When we consider the predictive ability of GC_AUD separately, we find the coefficient to be positive and statistically significant, as predicted.

years prior to bankruptcy, the financial variables only model (short dashed line) is outperformed by both the full textual variable model (long dashed line) and the linguistic tone only model (thin line). Obviously the overall effect of the full textual variable model (long dashed line) is driven by linguistic tone, because the management going concern only model has the lowest predictive ability across all models.

As a collection, the results in Figure 2 suggest that as the time horizon increases, when considered separately, the importance of textual MD&A disclosures, relative to financial statement ratios, increases for assessing a firm's ability to continue as a going concern. In addition, the incremental predictive ability of textual MD&A disclosures in comparison to financial ratios displays a similar pattern. Panel B of Table 4 reveals that three years prior to bankruptcy, the incremental AUC of MD&A disclosures is 11% whereas that of financial variables is a mere 1%. However, as the horizon gets closer to bankruptcy, the incremental predictive ability reverses. That is, financial variables have more incremental predictive ability relative to textual variables. These trends may be due to the forward looking nature of the MD&A in addition to the flexibility afforded to management in describing the state of the firm.

Overall, our findings have the following implications. Voluntary disclosures currently provided by management in the MD&A provide both incremental and relatively higher predictive power at longer horizons whereas financial ratios provide predictive power at shorter horizons. The latter result suggests that MD&A disclosures provide leading indicators of bankruptcy. Moreover, this lends support for the FASB's position that managers should consider a period beyond 12 months when making going concern assessments. Given that the current FASB's proposal recommends a period of not more than 24 months from the fiscal year end

when evaluating going concern assessments, our results suggest that the FASB consider an even longer period that is line with the broader time frame considered in IFRS under IAS 1.

4.4. Effects of Cross-sectional Differences in Financial Attributes

In this section, we explore the effects of cross-sectional differences in the financial statement attributes on the predictive ability of both financial and linguistic variables. This allows us to assess under what conditions financial and linguistic variables may be more or less useful for predicting bankruptcy. Beaver et al. (2012) appeal to the long stream of accounting research on accounting quality (e.g., Dechow and Schrand (2004)) to hypothesize that the informativeness of financial variables for predicting bankruptcy is likely to be influenced by either (i) the lack of recognition of intangible assets or (ii) the discretion exercised by management in producing the financial statements. They show that financial variables of firms with poorer accounting quality (proxied by accounting restatements and discretionary accounting accruals) and with higher unrecognized intangibles (proxied by the ratio of book values to market values and by R&D intensity) have lower predictive power for bankruptcy.

We extend the results in Beaver et al. (2012) by investigating whether the informativeness of MD&A disclosures are more salient when the financial statements are of lower quality either due to managers' opportunistic discretion in presenting financial statements or due to the presence of unrecognized intangible assets. We posit that firms with significant intangible assets and growth opportunities are more likely to provide information in the MD&A disclosures about future firm prospects, as the MD&A affords flexibility in format. However, if manipulated accounting numbers are accompanied by MD&A that are manipulated in a similar fashion, we will not observe any differential predictive ability. We acknowledge that litigation may limit the extent to which MD&A disclosures are misleading and also that proprietary costs

may temper the propensity with which managers supplement inadequacies in financial statements with more voluntary disclosures. Together, then it is unclear whether textual MD&A disclosures will differentially predict bankruptcy when accounting quality varies.

We use three proxies for capturing differences in accounting quality: R&D intensity, Industry type (Manufacturing vs. Non-manufacturing) and the Market-to-Book ratio.[12] Findings in prior research (e.g., Lev and Sougiannis 1996) argue that R&D expenditures represent economic assets that are not captured in the balance sheet because the current accounting rules require such expenditures to be expensed. Also, firms in non-manufacturing industries are likely to have more intangible assets that are unrecognized relative to firms in the manufacturing industries. The Market-to-Book ratio is also a proxy for intangible assets and growth options apart from capturing the inability of the accounting system to fully reflect the economic value of a firm's asset in place.

We partition the sample into low and high R&D intensity (based on whether the treatment firms have a zero or non-zero R&D), manufacturing and non-manufacturing firms, and high and low Market-to-Book ratio (based on the median values for the treatment sample) and examine whether the predictive accuracy of the financial variables and the MD&A variables differ systematically across the two samples. As before, we estimate conditional logit regression using the matched pairs of treatment and control firms in each of the sub-samples and report the findings in Table 5.[13]

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[12] We also considered discretionary accruals as a direct measure of the extent of management discretion. However, we were able to obtain accruals information for only a small number of firm-pairs (31 firm-pairs) in our sample.
[13] Because we form the sub-samples based on the treatment firm characteristics, it is important to ensure that the distribution of the financial attribute of interest (R&D and Market-to-Book) is not different between the treatment and control firms within each sub-sample. We do not find significant differences in means between the two groups in each of the R&D subsamples.   In the low Market-to-Book subsample, the treatment and control firms have statistically different Market-to-Book ratios, and as such the results should be interpreted accordingly.

Consistent with the findings in Beaver et al. (2012) we find that the financial variables have better predictive ability for firms with no R&D activities, manufacturing firms, and firms with lower growth opportunities or fewer intangible assets. The AUC for financial variables is considerably lower (87.6% vs. 90.4%) for R&D intensive firms relative to firms with no R&D. Similarly, for manufacturing firms and low market to book ratios, the role of financial variables in predicting bankruptcy is much greater (AUC of 93.1% vs. 88.2% and AUC of 98.0% vs. 85.0%, respectively). The predictive ability of management opinion is virtually identical across the two R&D groups. However, for manufacturing firms and low market-to-book firms we find that the predictive ability of management opinion is relatively higher. The linguistic tone variables for low R&D and low market-to-book subsamples show better predictive power than high R&D and high market to book, respectively, while we observe essentially no difference based on the manufacturing industry partition. Taken together, these results suggest that, regardless of differences in financial statement attributes, the management going concern opinion and the linguistic tone variables tend to complement, rather than substitute, for the predictive ability of financial variables.

4.5. Does Placement Matter for the Predictive Ability of the Linguistic variables?

The results thus far suggest that the linguistic tone variables are important indicators useful for bankruptcy prediction, incremental to all other predictors. Is it possible to improve upon the linguistic tone variable by focusing on certain sections of the MD&A where management is more likely to discuss risk and uncertainties? We examine this question by focusing on the liquidity and capital resources section where firms typically provide information about uncertainties that have affected the current financial position and are likely to affect future financial position. Specifically, we test whether the linguistic tone measures for the liquidity

section is more predictive of going concern problems relative to the remainder of the MD&A. To accomplish this, we compute the linguistic tone measures for the liquidity section and the remainder of the MD&A separately and re-estimate equation (1). Results presented in columns (7) and (8) of Table 5 suggest that, if anything, the linguistic tone variables computed from sections other than the liquidity sections are more predictive of bankruptcy than those computed from the liquidity section. The incremental AUC of linguistic tone variables from the non-liquidity sections is about 2 percentage points higher (78.2% vs. 80.3%). Thus, we conclude that the tone of the communication in the entire MD&A is useful for bankruptcy prediction.

5. Robustness Checks

5.1. Control for Market Variables

Recent bankruptcy research (Shumway 2001; Chava and Jarrow 2004; Beaver et al. 2005; Beaver et al. 2012) establish the significance of market based variables in predicting bankruptcy. To control for market variables we augment the specification in Table 3, column (4) and report our findings in column (1) of Table 6. The market based variables commonly used in prior research are: logarithm of market capitalization (LRSIZE), lagged cumulative abnormal stock return (LERET), and lagged standard deviation of abnormal stock returns (LSIGMA). Market capitalization is computed as the ratio of market capitalization of the firm at the end of the fiscal year divided by the market cap of the market index. Abnormal stock returns are computed as the excess of cumulative raw returns over the cumulative market returns for the fiscal year. Standard deviation of abnormal returns is computed as the standard deviation of the error terms in a regression of the firm's monthly stock return on the market monthly returns for the fiscal year.

Similar to the results in Beaver et al. (2005) and Beaver et al. (2012), coefficients on all market variables are of the predicted sign and significant at the 1% level. That is, the coefficients on LERET and LRSIZE are negative whereas the coefficient on LSIGMA is positive. Notwithstanding, the coefficients on POSMDA, NEGMDA continue to remain significant and so do the coefficients on financial variables RETA and EBITTA. The coefficient on MVETL is now weakly significant (at the 10% level) but of the wrong sign. There are two possible explanations for obtaining the opposite sign for MVETL despite the negative univariate correlation ($\rho = -0.158$) between MVETL and BRUPT observed in Table 2, Panel C. First, MVETL is significantly correlated with the market variables. Second, MVETL is similar to LRSIZE in that both are proxies for firm size that causes the coefficient of MVETL to deviate from the predicted sign. The predictive ability of the model after the inclusion of market variables as measured by pseudo R^2 increases from 43% to 57%. The AUC, after adding market variables, also increases to 95% exhibiting outstanding discriminatory power.[14] As stated in prior research (Beaver et al. 2005), market based variables reflect a rich and comprehensive mix of information which includes financial statement data as a subset. Hence, it is no surprise that the predictive ability of a model specification with market variables is superior to all other models. Regardless, it is striking that textual content continues to exhibit incremental information not captured by any of the other variables.

The inclusion of market based variables has one drawback. The lack of data availability of the market variables causes considerable data attrition. To assess whether this data attrition is associated in some way with a confounding factor, we re-estimate the empirical specifications reported in columns (1) to (4) of Table 3 using the reduced sample used in Table 6 Column (1).

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[14] Note that the models estimated in columns (4) and (5) of Table 3 are not comparable in that the estimation of column (5) uses a smaller sample because of lack of availability of market variables for the full sample.

Untabulated results reveal that our inferences are unchanged and the AUCs for the models estimated in columns (1) – (4) of Table 3 using the reduced sample are almost identical if not slightly better.

5.2. Hold-out Sample Analysis

An inherent drawback of the cross-sectional analysis reported in Table 3 is that it suffers from possible over-fitting and optimistic prediction errors (see Kim and Skinner, 2012; Larcker and Zakolyukina, 2012). One way to address this limitation is to perform a "K-fold" cross validation procedure described by Efron and Tibshirani (1993).[15] Consistent with common practice, we use a 10-fold cross-validation repeated 10 times (Witten and Frank, 2005). The procedure involves the following steps.   First, we randomly choose 10% of the full sample, which forms the first fold. Next, we randomly choose a second group (of 10%) from the remaining sample (i.e., another 10% from the 90% remainder sample), which forms the second fold. We then continue this procedure until we get ten such "folds" of data. We use the newly created data and estimate the various models in Table 3 using nine of the ten folds, and apply the estimated coefficients to the fold that was held out of the estimation. This yields an "out of sample" estimate of AUC. We repeat this process ten times and use the average of the ten estimates as our out-of-sample AUC estimate. In unreported results we find that the AUC estimates using the hold-out sample procedure described above are virtually identical to the in-sample estimates in all specifications. Hence, our reported AUC estimates are quite robust.

5.3. Hazard Model Estimation

Despite the robustness of our findings using a hold-out sample analysis, one might argue that static logit models that we use produce regression coefficients that are biased and inconsistent. By ignoring the data on the bankrupt firms that were once healthy, we induce

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[15] We thank Irene Kim for providing us the SAS code to perform this procedure.

estimation bias particularly because bankruptcies occur so infrequently. Shumway (2001) proposes a hazard model to ensure consistent and accurate bankruptcy likelihood estimates. However, estimating a hazard model for the entire sample period 1995-2011 requires hand-collection of management going concern opinion by examining each firm's MD&A disclosure, which is cost prohibitive. Therefore, we obtain data for three years prior to the bankruptcy for both treatment and control firms and estimate a reduced-form hazard model and present our empirical findings in column (2) of Table 6. In comparison to the logit model presented in column (1), we find that with the exception of EBITTA and LRSIZE, the other financial and market variables retain significance. The coefficient on the audit opinion variable (GC_AUD) is now positive and statistically significant. More important, the coefficients on the linguistic tone variables continue to be statistically significant and are of the predicted sign. Thus, we conclude that our inferences are robust to using a hazard model.

6. Conclusions

The primary objective of this study is to inform the debate on mandating additional management disclosure regarding going concern assessment. We construct and compare several predictive models using explanatory variables in the form of management going concern disclosure in the MD&A, linguistic tone in MD&A disclosures, auditor going concern opinions, standard financial ratios, and market based variables. We adopt a matched pair research design and utilize conditional logistic regressions for estimation. Our findings indicate that current management textual disclosure in the MD&A of the form of voluntary going concern assessments and linguistic tone has significant incremental information content over and above what can be discerned from financial ratios and market based variables. The predictive content of MD&A disclosures on a standalone basis is significant as measured by the area under the

ROC curve of 85%. Moreover, the textual MD&A disclosures convey incremental and relative predictive power as early as three years prior to bankruptcy. This suggests that MD&A disclosures are leading indicators of bankruptcy above and beyond financial ratios.

We find evidence that in many circumstances management has voluntarily expressed uncertainty about going concern despite the auditor not providing a disclaimer due to a going concern opinion. Further, we find that any explicit disclosure by management regarding going concern assessment is incrementally uninformative once we control for fundamentals in the form of quantitative and qualitative content in financial statements. Hence our study provides some evidence consistent with the claims made by those opposing the proposed requirement for additional mandatory management disclosures on going concern assessment. Opponents contend, among other reasons, that managers already disclose sufficient information in their MD&A voluntarily, suggesting additional regulation is unnecessary. At the same time, if one were to consider the management opinion in isolation, several (over 60%) of the sample firms did not provide a going concern opinion despite filing for bankruptcy the year following the 10K filing. Further, mandating the going concern assessment to consider future events beyond one year is likely to improve the timeliness of MD&A disclosures and consequently, its predictive ability.

We believe our paper directly informs this debate by assessing whether, to what extent, and when existing disclosures in a firm's MD&A inform about a firm's ability to continue as a going concern. Our findings that textual information content in MD&A has incremental predictive power for bankruptcy prediction even after controlling for auditor opinion and financial ratios and that it outperforms financial ratios only models at longer horizons, offer support for the FASB's position on mandating additional management disclosures relating to going concern assessment. Moreover, the evidence that MD&A disclosures provide relatively

greater information content three years prior to bankruptcy supports the FASB's view that managers should look beyond a twelve month period when performing the going concern assessment. However, our results alone are not sufficient to conclude whether mandatory disclosure is necessary, because our analysis does not take into account the costs of Type I and Type II errors inherent in management opinions.[16] Although the costs of false negatives (Type II errors) are material enough to justify mandatory requirement of management going concern, it should be recognized that such a mandate may induce Type I errors (false positives) that could potentially reduce rather than improve the predictive power of management going concern opinions.

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[16] From an investor stand point, Type II errors (false negatives) lead to a loss of the entire investment that can be quite substantial. In contrast, the cost of Type I errors (false positives) is the opportunity loss of avoiding the investment or tax losses due to unexpected sale of the investment. From the firm's perspective, Type I errors may lead to a self fulfilling prophecy of the firm ending up in bankruptcy proceedings. On average, while the costs of Type II errors are likely to outweigh the costs of Type I errors, we are neither able to quantify nor are aware of any study that provides us with meaningful estimates of these costs.

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Appendix A

Sample statements in MD&A section for determining whether management expressed going concern issues

For coding GC_MGMT = 1 (i.e., management expressed a going concern)

"However, due to continuing losses and immediate need for additional financing, it is possible that the Company may not be able to continue as a going concern."

"The uncertainties involved in the receipt of additional licensing fees or receipt of additional financing, many of which are outside the control of the Company raise substantial doubt as to the Company's ability to continue as a going concern."

"These losses raise doubt about the Company's ability to continue as a going concern."

"Management believes that it is unlikely that the Company will be able to meet its obligations as they become due and to continue as a going concern."

"Our liquidity and working capital constraints have caused us to receive a going concern opinion from our independent auditors, negatively affect our business and results of operation, and could result in bankruptcy."

"The items discussed above raise substantial doubts about our ability to continue as a going concern."

"There can be no assurance that the Company will be successful in its defense of this litigation or that as a result of the institution of this litigation that the Company will not be compelled to commence a proceeding under Chapter XI of the Federal Bankruptcy laws. These factors create uncertainty whether the Company can continue as a going concern."

"In the event that the Company is unsuccessful, it is possible that the Company will cease operations or seek bankruptcy protection."

"In the event that the Company is unable to locate other sources of funding to meet its current cash needs, it will then be unable to continue to operate as a going concern and will seek protection under the Federal bankruptcy laws."

"Absent any waiver, forbearance or modification to our current credit agreement, we believe our recurring losses from operations, interest and debt burden amid declining sales and potential inability to generate sufficient cash flow to meet our obligations and sustain our operations raise substantial doubt about our ability to continue near-term as a going concern."

For coding GC_MGMT = 0 (i.e., management did not express a going concern)

"The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern."

"By utilizing cash which had been received pursuant to the settlement of the Company's litigation with ....., management believes it has sufficient capital resources and liquidity to operate the Company for the foreseeable future. However………..the Company's independent registered public accounting firm has expressed substantial doubt about the Company's ability to continue as a going concern."

"The Company has performed an evaluation of its ability to continue as a going concern and believes it has sufficient financial resources to fund its operations through at least ..... Accordingly, the consolidated financial statements have been prepared assuming the Company will continue as a going concern, which contemplates the realization of the assets and the satisfaction of liabilities in the normal course of business."

Appendix B

Sample Positive and Negative words from L&M Dictionary

Positive Words	Negative Words
ACCOMPLISH	AGGRAVATE
ADEQUATELY	ANTITRUST
BENEFIT	BANKRUPTCY
COLLABORATE	BARRIER
CONFIDENT	BREACH
CREATIVE	CAUTION
FAVORABLY	CATASTROPHIC
GAIN	CHALLENGING
IMPRESSIVE	CONCERNS
INNOVATE	CUTBACK
INVENT	DEFICIT
LEADERSHIP	DELAY
OPPORTUNITY	DEPLETE
OPTIMISTIC	FAIL
OUTPERFORM	FORECLOSE
PROACTIVE	HINDER
PROFITABLE	LIQUIDATE
REBOUND	LITIGATION
SATISFACTORY	REASSESS
STABILITY	RENEGOTIATE
SUCCESSFULLY	RESTATEMENT
SURPASS	SCRUTINY
TREMENDOUS	UNABLE
UNPARALLELED	UNFORESEEN
WIN	WEAKEN

Figure 1
Plot of ROC curves for Conditional LOGIT regressions

This figure shows a plot of "sensitivity" (probability of correctly predicting 1) versus "1-specificity" for all possible cut-off points. Specificity is the probability of correctly predicting 0. The estimating equations for the various models plotted are given below.

Model (1): $Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + v_t.$

Model (2): $Pr(BRUPT_{t+1}) = \beta_0 + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + v_t.$

Model (3): $Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + v_t.$

Model (4): $Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + \beta_4 GC\_AUD_t + \beta_5 WCTA_t +$

$\beta_6 RETA_t + \beta_7 EBITTA_t + \beta_8 MVETL_t + \beta_9 SALETA_t + v_t.$
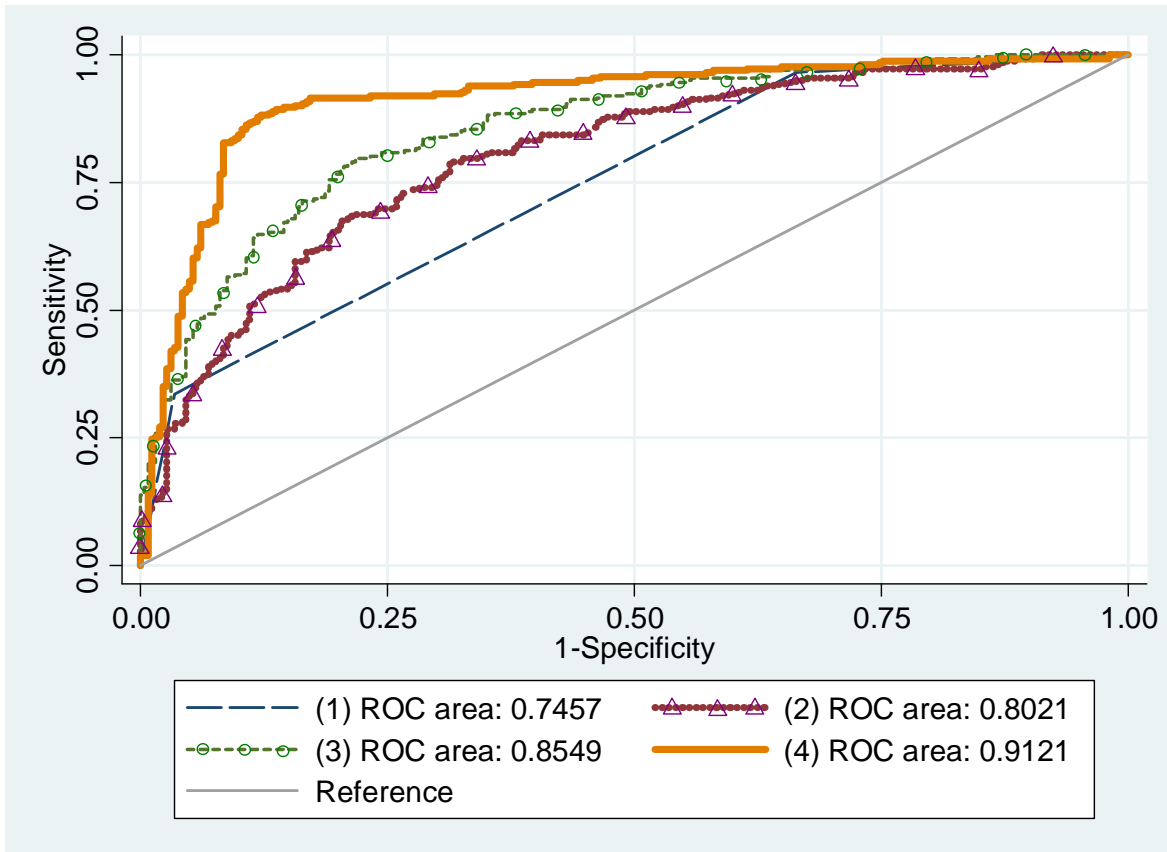
Figure 2
Time Series Analysis

This figure shows a plot of Area under the ROC Curve (AUC) for predicting bankruptcy using predictor variables in prior periods. Separate plots are shown for each of the regression models (1)-(4) and (FIN) described below.

Model (1): $\quad Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + v_t$

Model (2): $\quad Pr(BRUPT_{t+1}) = \beta_0 + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + v_t.$

Model (3): $\quad Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + v_t.$

Model (4): $\quad Pr(BRUPT_{t+1}) = \beta_0 + \beta_1 GC\_MGMT_t + \beta_2 POSMDA_t + \beta_3 NEGMDA_t + \beta_4 GC\_AUD_t + \beta_5 WCTA_t +$

$\qquad \beta_6 RETA_t + \beta_7 EBITTA_t + \beta_8 MVETL_t + \beta_9 SALETA_t + v_t.$

Model (FIN): $\quad Pr(BRUPT_{t+1}) = \beta_0 + \beta_5 WCTA_t + \beta_6 RETA_t + \beta_7 EBITTA_t + \beta_8 MVETL_t + \beta_9 SALETA_t + v_t.$
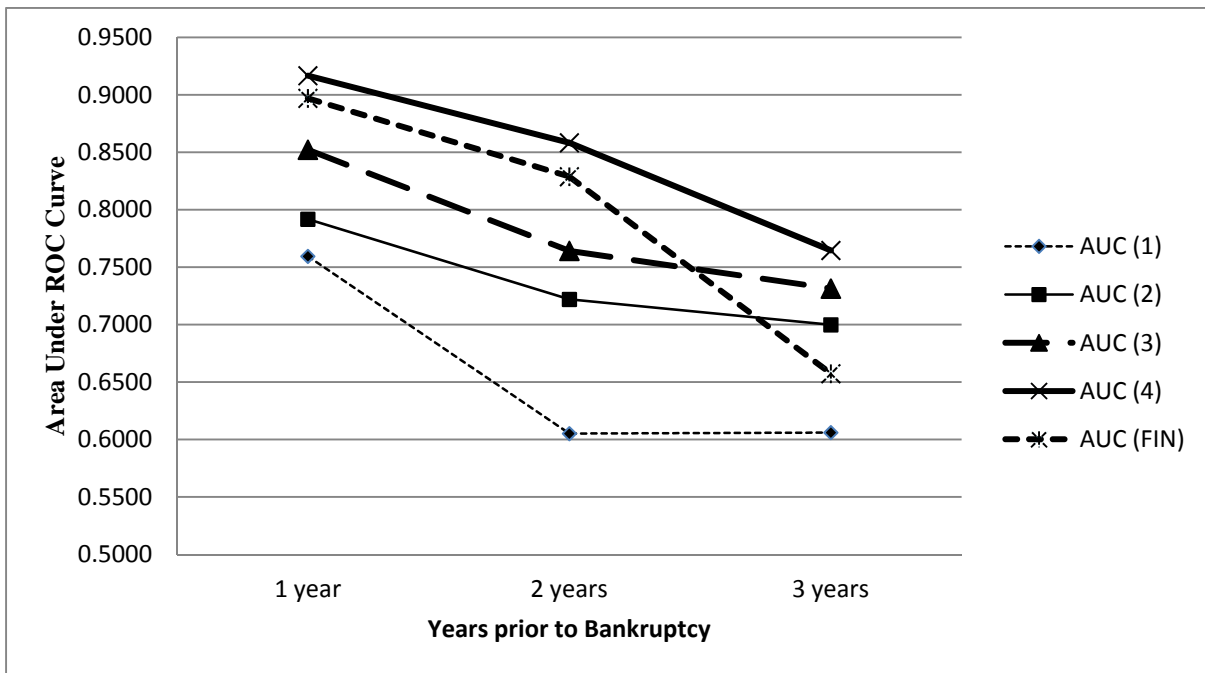
Table 1
Description of Regression Variables

Variable	Description
BRUPT	*Indicator variable set to 1 if a firm goes bankrupt in year t+1 and 0 otherwise.*
WCTA	*Working Capital (current assets – current liabilities) divided by Total Assets [Compustat reference: (act$_t$ - lct$_t$) / at$_t$]*
RETA	*Retained Earnings divided by Total Assets [Compustat reference: (at$_t$ – lt$_t$) / at$_t$]*
EBITTA	*Earnings Before Interest and Taxes divided by Total Assets [Compustat reference: ebit$_t$ / at$_t$]*
MVETL	*Market Value of Equity (stock price at the end of fiscal year * shares outstanding) divided by Total Liabilities [Compustat reference:(csho$_t$ * prcc_f$_t$) / lt$_t$]*
SALETA	*Sales divided by Total Assets [Compustat reference: sale$_t$ / at$_t$]*
GC_MGMT	*Indicator variable set to 1 if management has expressed uncertainty about the firm being a going concern in the MD&A section of the 10K and 0 otherwise*
GC_AUD	*Indicator variable set to 1 if auditors expressed substantial doubt about the firm being a going concern in the independent auditor report section of the 10K and 0 otherwise*
POSMDA	*Percentage of words in "MD&A" belonging to the POSITIVE category as defined in LM dictionary*
NEGMDA	*Percentage of words in "MD&A" belonging to the NEGATIVE category as defined in LM dictionary*
LERET	*Cumulative security residual return for the fiscal year t*
LRSIZE	*Logarithm of market capitalization at the end of fiscal year t (market capitalization of the firm divided by the market capitalization of the market index)*
LSIGMA	*Standard deviation of security residual returns for the fiscal year t*
AT	*Total Assets [Compustat reference: at]*
LT	*Total Liabilities [Compustat reference: lt]*

Table 2
Descriptive Statistics

Panel A: Descriptive statistics for the regression variables are reported for Treatment and Control samples separately. All the variables are measured in the year prior to bankruptcy for the treatment firm and their control counterparts. All variables are described in Table 1. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. N=262 for all the variables with the exception of market variables LERET and LSIGMA where N= 211.

Variables	Treatment sample			Control sample			T-stat of Diff. in Means	Z-stat of Diff. in Medians
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.		
GC_MGMT	0.378	0.000	0.486	0.076	0.000	0.266	-8.81***	-8.24***
POSMDA(%)	0.749	0.720	0.280	0.801	0.760	0.356	1.85*	1.05
NEGMDA(%)	1.703	1.670	0.654	1.219	1.150	0.623	-0.87***	-8.18***
GC_AUD	0.435	0.000	0.497	0.122	0.000	0.328	-8.51***	-7.99***
WCTA	-0.093	0.032	0.704	0.202	0.257	0.517	5.45***	7.16***
RETA	0.009	0.215	0.905	0.439	0.563	0.589	6.44***	10.13***
EBITTA	-0.400	-0.146	0.670	-0.108	0.060	0.525	5.56***	8.56***
MVETL	3.021	0.489	11.103	7.330	3.025	15.476	3.66***	9.96***
SALETA	1.403	1.258	1.116	1.339	1.148	1.013	-0.68	-0.87
LERET	-0.507	-0.712	0.775	-0.058	-0.223	0.886	5.87***	9.32***
LSIGMA	0.288	0.213	0.252	0.198	0.146	0.194	-4.33***	-5.14***
LRSIZE	-13.296	-13.320	1.711	-12.354	-12.392	1.924	5.92***	4.54***
AT	437.250	47.925	4062.200	479.086	47.331	4839.414	0.11	0.18
LT	350.285	35.894	3147.686	274.961	16.420	2832.101	-0.29	-2.97***

Panel B: Two-by-Two Analysis of Treatment versus Control firms, by Management Going Concern opinion. Mean values of the tone variables and audit opinion variables are shown in each cell. All variables are described in Table 1.

	No Management Going Concern Uncertainty (GC_MGMT = 0)				Management Going Concern Uncertainty (GC_MGMT = 1)			
	N	GC_AUD	POSMDA(%)	NEGMDA(%)	N	GC_AUD	POSMDA(%)	NEGMDA(%)
Control firms (BRUPT=0)	242	0.062	0.792	1.165	20	0.850	0.909	1.882
Treatment firms (BRUPT=1)	163	0.190	0.749	1.531	99	0.838	0.751	1.985
Total	405	0.114	0.775	1.312	119	0.840	0.849	1.968

Table 2 (continued)

Panel C: Correlation matrix for regression variables. Spearman correlation is shown above diagonal and Pearson below. Two-tailed p-values are shown in brackets. All variables described in Table 1. (N= 524 for all variables except for market variables *LERET, LSIGMA, and LRSIZE* where N= 422)

Variables	BRUPT	GC_MGMT	GC_AUD	POSMDA	NEGMDA	WCTA	RETA	EBITTA	MVETL	SALETA	LERET	LSIGMA	LRSIZE
BRUPT	1	0.360	0.349	-0.058	0.375	-0.340	-0.452	-0.428	-0.455	0.015	-0.407	0.322	-0.244
		[<0.01]	[<0.01]	0.188	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.731	[<0.01]	[<0.01]	[<0.01]
GC_MGMT	0.360	1	0.679	-0.004	0.412	-0.398	-0.410	-0.397	-0.314	-0.031	-0.313	0.336	-0.344
	[<0.01]		[<0.01]	0.919	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.474	[<0.01]	[<0.01]	[<0.01]
GC_AUD	0.364	0.672	1	0.071	0.347	-0.391	-0.400	-0.478	-0.260	-0.050	-0.283	0.351	-0.401
	[<0.01]	[<0.01]		0.107	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.253	[<0.01]	[<0.01]	[<0.01]
POSMDA	-0.081	0.003	0.058	1	0.099	0.039	-0.096	0.050	0.005	0.095	0.156	-0.059	0.043
	0.065	0.937	0.183		0.024	0.373	0.028	0.252	0.913	0.030	[<0.01]	0.204	0.350
NEGMDA	0.355	0.403	0.353	0.085	1	-0.361	-0.397	-0.364	-0.431	0.101	-0.340	0.287	-0.344
	[<0.01]	[<0.01]	[<0.01]	0.053		[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.021	[<0.01]	[<0.01]	[<0.01]
WCTA	-0.232	-0.401	-0.406	0.013	-0.282	1	0.648	0.331	0.456	0.017	0.292	-0.315	0.253
	[<0.01]	[<0.01]	[<0.01]	0.762	[<0.01]		[<0.01]	[<0.01]	[<0.01]	0.699	[<0.01]	[<0.01]	[<0.01]
RETA	-0.271	-0.385	-0.402	-0.067	-0.290	0.808	1	0.307	0.723	-0.202	0.302	-0.299	0.302
	[<0.01]	[<0.01]	[<0.01]	0.125	[<0.01]	[<0.01]		[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]
EBITTA	-0.236	-0.334	-0.399	-0.013	-0.139	0.457	0.423	1	0.079	0.284	0.381	-0.470	0.416
	[<0.01]	[<0.01]	[<0.01]	0.764	[<0.01]	[<0.01]	[<0.01]		0.017	[<0.01]	[<0.01]	[<0.01]	[<0.01]
MVETL	-0.158	-0.111	-0.090	-0.067	-0.207	0.200	0.217	-0.074	1	-0.297	0.426	-0.172	0.418
	[<0.01]	0.011	0.040	0.125	[<0.01]	[<0.01]	[<0.01]	0.089		[<0.01]	[<0.01]	[<0.01]	[<0.01]
SALETA	0.030	0.001	-0.003	0.070	0.106	-0.061	-0.175	0.196	-0.201	1	0.008	-0.082	-0.066
	0.497	0.985	0.953	0.108	0.015	0.164	[<0.01]	[<0.01]	[<0.01]		0.872	0.076	0.155
LERET	-0.281	-0.203	-0.182	0.132	-0.210	0.081	0.070	0.154	0.182	0.005	1	-0.114	0.399
	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.080	0.131	[<0.01]	[<0.01]	0.917		0.014	[<0.01]
LSIGMA	0.197	0.234	0.260	-0.009	0.192	-0.326	-0.296	-0.222	-0.045	0.036	0.295	1	-0.413
	[<0.01]	[<0.01]	[<0.01]	0.853	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.337	0.437	[<0.01]		[<0.01]
LRSIZE	-0.256	-0.351	-0.409	0.057	-0.332	0.283	0.308	0.290	0.195	-0.089	0.275	-0.266	1
	[<0.01]	[<0.01]	[<0.01]	0.222	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	0.054	[<0.01]	[<0.01]	

Table 3
Estimation of Conditional Logistic Regression Models

This table reports estimation of regression equation (1) using conditional logit model for all firms. We estimate equation (1) sequentially as presented in columns (1) – (4). Z-statistics included in brackets. Two-tailed p-values are reported: *** p<0.01, ** p<0.05, * p<0.10.

Variables	Predicted Sign	(1)	(2)	(3)	(4)
GC_MGMT	+	2.280***		1.828***	0.545
		[6.515]		[4.960]	[1.149]
POSMDA	-		-1.019***	-0.964**	-1.401***
			[-2.865]	[-2.509]	[-3.064]
NEGMDA	+		1.380***	1.108***	1.032***
			[7.130]	[5.393]	[4.240]
GC_AUD	+				0.481
					[1.215]
WCTA	-				0.168
					[0.383]
RETA	-				-0.770**
					[-2.301]
EBITTA	-				-1.716***
					[-3.821]
MVETL	-				-0.013
					[-0.880]
SALETA	-				-0.095
					[-0.662]
Observations		524	524	524	524
Pseudo R^2		0.2052	0.2211	0.3158	0.4339
Receiver Operating Characteristics					
AUC		0.7457	0.8021	0.8549	0.9121
STD ERR		0.0166	0.0190	0.0162	0.0136

Table 4
Estimation of Conditional Logistic Regression Models for Examining Relative Timeliness

Panel A: This table reports estimation of regression equation (1) using conditional logit model for a reduced sample of firms using predictor variables in prior periods. Z-statistics included in brackets. Two-tailed p-values are reported: *** p<0.01, ** p<0.05, * p<0.10.

Variables	Predicted Sign	Years prior to Bankruptcy		
		1 year (1)	2 years (2)	3 years (3)
GC_MGMT	+	0.450	1.701**	2.909**
		[0.760]	[2.040]	[2.520]
POSMDA	-	-1.122	-1.752**	-0.974**
		[-1.510]	[-2.530]	[-2.020]
NEGMDA	+	0.909***	0.547*	0.810***
		[2.580]	[1.620]	[2.770]
GC_AUD	+	0.809	-0.607	-1.623*
		[1.490]	[-0.920]	[-1.890]
WCTA	-	0.192	1.729**	0.409
		[0.340]	[1.960]	[0.730]
RETA	-	-0.508	-1.973***	0.032
		[-1.210]	[-2.680]	[0.070]
EBITTA	-	-1.485**	-1.666**	-1.233*
		[-2.410]	[-2.170]	[-1.940]
MVETL	-	-0.124**	-0.013	-0.007
		[-2.250]	[-1.220]	[-0.810]
SALETA	-	-0.011	-0.136	-0.140
		[-0.060]	[-0.690]	[-0.720]
Observations		242	242	242
Pseudo R^2		0.4703	0.3099	0.1797
Receiver Operating Characteristics				
AUC		0.9167	0.8583	0.7646
STD ERR		0.0190	0.0250	0.0299

Panel B: AUC for various models with independent variables listed in parenthesis

AUC (GC_MGMT)		0.7595	0.6052	0.6061
AUC (POSMDA, NEGMDA)		0.7918	0.7220	0.6999
AUC (Financial Variables)		0.8970	0.8299	0.6573
AUC (GC_MGMT, POSMDA, NEGMDA)		0.8523	0.7642	0.7314
Incremental AUC (GC_MGMT, POSMDA, NEGMDA)		0.0198	0.0293	0.1112
Incremental AUC (Financial Variables)		0.0405	0.0953	0.0136

Note: Incremental AUC is determined as the difference between the AUC of the full model and AUC of the model excluding the variables of interest listed in parenthesis

Table 5
Estimation of Conditional Logistic Regression Models for Examining Cross-sectional Analysis

This table reports Area under the ROC curve (AUC) obtained by the estimation of regression equation (1) using conditional logit model across different groups of firms based on the extent of intangible assets and across different sections of the MD&A. .

AUC	R&D Intensity		Industry Type		MTB		MD&A Placement	
	Low	High	Manufacturing	Non-Manufacturing	Low	High	Liquidity Section	Other Sections
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GC_MGMT	0.7485	0.7403	0.7609	0.7359	0.8147	0.6653	0.7457	0.7457
Linguistic Tone Variables	0.8281	0.7491	0.7953	0.8088	0.8406	0.7776	0.7822	0.8028
Financial Variables	0.9040	0.8759	0.9312	0.8820	0.9803	0.8504	0.8909	0.8909
GC_MGMT, Linguistic Tone Variables	0.8737	0.8172	0.8819	0.8409	0.8987	0.8096	0.8324	0.8658
Full Model	0.9248	0.9097	0.9593	0.8967	0.9835	0.8882	0.9026	0.9194
Observations	346	178	208	316	262	262	524	524

Table 6
Estimation of Conditional Logistic Regression Models after Controlling for Market Variables

This table reports estimation of regression equation (1) using conditional logit model and hazard model after controlling for market variables. Z-statistics included in brackets.   Two-tailed p-values are reported: *** p<0.01, ** p<0.05, * p<0.10.

Variables	Predicted Sign	Logit Model (1)	Hazard Model (2)
GC_MGMT	+	0.314	0.328
		[0.562]	[1.190]
POSMDA	-	**-1.658***	**-0.569***
		[-2.750]	[-1.930]
NEGMDA	+	**0.741**	**0.504***
		[2.412]	[3.380]
GC_AUD	+	0.549	**0.936***
		[1.120]	[3.550]
WCTA	-	0.667	0.360
		[1.103]	[1.250]
RETA	-	**-1.092**	**-0.590**
		[-2.179]	[-2.450]
EBITTA	-	**-1.887***	-0.046
		[-3.392]	[-0.240]
MVETL	-	**0.0197*	-0.010
		[1.804]	[-1.070]
SALETA	-	-0.132	-0.035
		[-0.704]	[-0.380]
LERET	-	**-0.840**	**-0.931***
		[-2.548]	[-5.380]
LSIGMA	+	**3.712**	**3.147***
		[2.534]	[4.750]
LRSIZE	-	**-0.531***	-0.021
		[-2.974]	[-0.340]
Observations		422	1014
Pseudo R^2		0.5718	0.2340
Receiver Operating Characteristics			
AUC		0.9485	0.8255
STD ERR		0.0110	0.0153