Using Altman's Z-Score to assess the appropriateness of management's use of the going concern assumption in the preparation of financial statements

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By

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ABSTRACT

Auditors are responsible for assessing management's use of the going concern assumption in the financial statements. However, the guidance given to auditors is not specific and arguably not sufficient. According to research done in other countries, the Z-Score is a statistical tool that has been proven to work in aiding auditors going concern decisions. The objective of this paper is to ascertain whether Altman's Z-Score can aid South African auditors to more accurately assess the appropriateness of management's use of the going concern assumption in the preparation of financial statements. This is done by applying two corporate failure prediction models developed by Altman to South Africa listed companies. The study compares the predictive accuracy of the two models against each other and against auditors' actual going concern decisions. The study investigates whether, given the two models' predictive accuracy, the auditor could have made more accurate going concern judgment decisions. The results indicate that the Z-Score is quite accurate in predicting failure for companies that eventually fail (delisted and liquidated or in the process f being liquidated), with a classification accuracy ranging from 78% to 86%. The EM Score is less accurate with a classification accuracy ranging from 36% to 96%. The classification accuracy of the 2 models for non-failed companies (still in business after a going concern uncertainty report) is very low, but still more accurate than the auditors' going concern uncertainty classification. The EM Score and the Z-Score can therefore aid auditors to more accurately assess whether a company's going concern is at risk. Contrary to the finding by (Altman, 1968), the models produced mixed results in predicting failure for companies liquidated more than 2 years after the going concern uncertainty report/last audited financial statements was issued. For the going concern uncertainty sample, both the EM Score and the Z-Score predictive accuracy rates were higher for companies liquidated more than 2 years after the going concern uncertainty report compared to companies liquidated less than 2 years after the going concern uncertainty report. For the failed companies sample however, the Z-Score accuracy is higher for companies liquidated within 2 years after the last audited financial statements, while the EM Score accuracy was higher for companies liquidated more than 2 years after the last audited financial statements. The literature review summaries some of the key related past studies.

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1. INTRODUCTION

Auditors are responsible for assessing management's use of the going concern assumption in the financial statements. High profile corporate failures have led some to query why the auditors did not warn the public about the firms' failures, (Tucker, Matsumura & Subramanyam, 2003). Some of the well known corporate failures include Polaroid Corporation, Enron Corporation, WorldCom, Leman Brothers, Barings Bank, Daewoo, The Reader's Digest Association, and Stanford Financial Group. Examples of well known local failed companies include Witwatersrand Gold Mining Company Limited, Leisure Net, Saambou Bank, BOE, Regal Treasury Bank, and Nationwide Airlines. According to the JSE Equity Markets Division, 61 listed companies were delisted and liquidated between January 2000 and December 2009.

Most stock markets require listed companies to issue financial statements at least annually. In addition, certain stock markets require semi-annual or quarterly reports to be issued or published. The going concern assumption is fundamental in the preparation of a company's financial statements as it impacts the basis upon which the assets and liabilities of a company are recorded, (International Federation of Accountants Handbook, 2005 Edition). According to the International Federation of Accountants, the assets and liabilities of a going concern entity are recorded on the basis that the company will be able to realise its assets and discharge is liabilities in the normal course of business (International Federation of Accountants Handbook, 2005 Edition).

Companies prepare their annual financial statements on a going concern basis except when management either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so, (International Federation of Accountants Handbook, 2010 Edition). If a company is not a going concern, this could result in the impairment of the company's assets (in order to reflect forced sale values) and also an up-ward adjustment of liabilities due to penalties for early settlement and or breach of loan terms or covenants. Equity holders in a company risk losing part or all of their equity investments when a company is not a going concern.

In their study, Altman and McGough state that a company's financial position is quantified in the financial statements and that the auditor's report adds a qualitative dimension to that information. They further state that, the auditor's role is to express an opinion of the fairness of the financial statements. They also state that users of financial statements place reliance of on the auditor's opinion (Altman & McGough, 1974).

Auditing standards require the auditor to obtain sufficient and appropriate audit evidence about the appropriateness of management's use of the going concern assumption in the preparation of a company's financial statements and to conclude whether there is a material uncertainty about the entity's ability to continue as a going concern. When there is doubt about an entity's ability to continue operating as a going concern the auditor is required to issue a qualified or modified audit opinion. Depending on the severity of the matter and disclosure by management, the auditor's opinion may be modified as follows; it may include an emphasis of matter paragraph, it may be qualified, or the auditor may issue an adverse opinion (International Federation of Accountants Handbook, 2010 Edition). The types of

audit opinions and reasons for issuing such opinions are summarised in table 1 below and are further discussed further in Chapter 4.2.

According to research, qualified audit opinions or reports perform an important signalling role on behalf of capital markets, (Hopwood, McKeown & Mutchler, 1989), (Altman & McGough, 1974) and hence audit opinions are an important component of a company's financial statements. Studies also show that some of the failed companies received clean audit opinions a year prior to the company failing. According to (Tucker, Matsumura & Subramanyam, 2003), Weiss (2002) found that out of 228 bankrupt companies, Enron and 95 other companies received clean audit opinions in the year prior to bankruptcy (Tucker, Matsumura & Subramanyam, 2003). This has led to debate concerning the auditor's role in predicting corporate failure.

The requirements and responsibilities for management to assess a company's ability to continue operating as a going concern are set in International Accounting Standard (IAS) 1 and for some countries in law or regulations (International Federation of Accountants Handbook, 2010 Edition).

The auditor is faced with the risk of issuing an inappropriate opinion because of a client's going concern uncertainty. The penalty for issuing an inappropriate audit opinion can be very severe for the auditor and could, for example result in litigation from third parties such as investors and lenders, who may have relied on such a report. (Anandarajan & Anandarajan, 1999)

Below is a going concern decision table based on the current ISA 570.

Table 1 – Opinion Decision Tree

Appropriate to use going concern assumption	Appropriate to use going concern assumption	Appropriate to use going concern assumption	Not appropriate to use going concern assumption
No material uncertainty	Material uncertainty	Material uncertainty	
Disclosure included	Disclosure included	Disclosure not included	

Clean opinion No emphasis of matter	Emphasis of matter	Qualified opinion	Adverse opinion
		Adverse opinion	

Source: KPMG

In 1968, Altman developed a multiple discriminant analysis tool, Altman's Z-Score, to predict corporate failure. Altman found the Z-Score to be extremely accurate in predicting bankruptcy correctly – (Altman, 1968).

Previous related research, mostly in the United States of America (US), includes the following:

- Evaluation of a company as a going concern (Altman & McGough, 1974)
- Using a bankruptcy model in the auditing course: The evaluation of a company as a going concern (Paquette & Skender 1996)
- Using financial and market information to identify pre-engagement factors associated with lawsuits against auditors (Stice, 1991)
- A test of the incremental explanatory power of opinions qualified for consistency and uncertainty (Hopwood, McKeown & Mutchler, 1989)
- A comparison of machine learning techniques with a qualitative response model for auditor's going concern reporting (Anandarajan & Anandarajan, 1999)
- The efficacy of liquidation and bankruptcy prediction models for assessing going concern (Kuruppu, Laswad & Oyelere, 2003)
- An investigation into auditors' continuity and related qualification judgements (Kida, 1980)
- Predicting financial distress in IT and services companies in South Africa (Kidane, 2004)
- Forecasting corporate failure using financial ratios: a Z-Score calculation for non-listed companies in South Africa (Truter, 1996)
- The success of business failure prediction models: An international survey (Altman, 1984)
- A multivariate analysis of the auditor's going concern opinion decision (Mutchler, 1985)
- Assessing the probability of bankruptcy (Hillegeist and others, 2004).

Although some research has been done on the application of the Z-Score model to South African companies, for example studies by Kidane and Truter, (Kidane, 2004), (Truter, 1996). I am not aware of published research, which has looked at the application of the Z-Score or other statistical models by auditors in South Africa to assess the appropriateness of management's use of the going concern assumption in the preparation of financial statements. Studies to date have mostly focused on developing models or using existing models to predict corporate failure. It is therefore important to ascertain whether the Z-Score or other statistical models can aid South African auditors, in the going-concern assessment decision.

2. RESEARCH OBJECTIVE

The auditors responsibilities with respect to the going concern assumption used in the preparation of a company's financial statements are quite clear, ISA 570 requires the auditor to obtain sufficient appropriate audit evidence to determine whether a material uncertainty exists if events or conditions have been identified that may cast doubt on the entity's ability to continue as a going concern (International Federation of Accountants Handbook, 2010 Edition). However, the guidance given to auditors is not specific and arguably not sufficient. ISA 570 further states that, performing insufficient audit procedures could result in the auditor issuing an inappropriate opinion. According to research, the Z-Score model is a tool that has worked in other countries such as the USA, (Altman & McGough, 1974). The Z-Score model was selected for this paper because it is easy to apply and it has been proven to work in other countries. As the Z-Score was developed using USA manufacturing companies' data, the study simultaneously and using the same sample data, applies the EMS model which was specifically developed for emerging markets such as South Africa.

The objective of this paper is to ascertain whether Altman's Z-Score can aid South African auditors to more accurately assess the appropriateness of management's use of the going concern assumption in the preparation of financial statements. This will be done by applying two corporate failure prediction models developed by Altman to South Africa listed companies. The study will compare the predictive accuracy of the two models against each other and against auditors' actual going concern decisions. The study investigates whether, given the two models' predictive accuracy, the auditor could have made more accurate going concern judgment decisions with the aid of the Altman models (Altman & McGough, 1974).

Given the record breaking corporate failures and consequent litigations against auditors , as reported in the press, there are a number of benefits that can be derived from using such a model, including; enhancing new audit client screening procedures (companies with a high risk of failure are not accepted as clients); it can also be used for early identification of going concern risks on existing audit clients, thus ensuring that sufficient audit procedures are performed to confirm whether or not a client company is a going concern; and it provides the auditor with a statistically proven tool to support his or her audit opinion on a company's financial statements, (Altman & McGough, 1974), (Stice, 1991). Ultimately this tool could assist auditors reduce their audit, financial, and reputational risks resulting from failed audit clients.

3. SCOPE OF STUDY, DATA AND RESEARCH METHODOLOGY

3.1 Scope of study

As stated in the introduction, the going concern assumption is fundamental in the preparation of a company's financial statements. The scope of the study is restricted to the application of Altman's Z-Score statistical models to aiding the auditor's going concern decision in South Africa. Due to challenges with respect to accessing data for private companies in South Africa, the study is limited to JSE listed companies whose financial statements are publicly available. The study looks at two broad categories of listed companies; (1) listed companies that have been wound up or liquidated ("failed companies"); and (2) listed companies with going concern uncertainty reports. For the purpose of this research paper, failed companies are delisted companies (except majors, takeovers or similar transactions involving financially sound companies that have been wound up voluntarily).

3.2 Data and research methodology

The objective of the study is stated in chapter 2 above. The sample of companies used in this study is based on information obtained from the JSE's Equity Markets and Continuing Obligations Divisions. The Equity Markets Division provided me with a list of 61 "failed companies" (delisted and liquidated companies) for the period 1 January 2000 to 31 December 2009 and the Continuing Obligations Division sent me a list of 168 companies' financial statements with qualified or modified audit opinions for the period 1 May 2001 to 31 December 2009.

Sample selection

The list of 61 failed companies provided by the JSE includes some financially sound companies that have been delisted and wound up as part of a takeover, unbundling transaction or for some other non-failure reason. These companies were removed from the final sample of failed companies. The final sample of sample of failed companies comprises 36 companies whose financial statements for the period prior to being liquidated are available.

The list of 168 companies' financial statements with modified audit reports includes companies that appear on the list more than once due to their audit reports being modified more than once during the period. The list also includes companies whose audit reports were qualified for reasons other than going-concern uncertainties. The final sample of 63 companies with modified audit opinions comprised all companies on the list whose audit reports were qualified due to going-concern uncertainties and whose audited financial statements are available. Two companies with modified audit opinions were excluded from the sample. The first company was excluded because the company did not have any assets and hence a Z-Score could not be calculated. The second company was excluded from the sample because the company operated in hyper-inflationary environment and its financial

statements were not prepared in compliance with international financial reporting standards. Each company was only included once in the final sample as only the "first-time" audit opinion qualifications were selected in line with the study by Dopuch *et al* (1987) ('Nicholas Dopuch', 'Robert W. Holthausen', 'Richard W. Leftwich', 1987).

Company financial data, including market capitalisations, for both the failed companies sample and the sample of companies with modified opinions was obtained from the McGregor BFA Research Domain, a reputable internet based resource. For companies whose financial data was not available online, I called McGregor and requested for this data to be sent to me.

Methodology

Once the financial data for the failed companies and companies with modified opinion was obtained, I entered the data for each of the companies into a spreadsheet model set up to calculate the variables (ratios) required for both the original Altman's Z-Score and the EM Score calculations. I then checked each company's financial statements to confirm:

- The type of audit report issued by the company's auditor;
- Management's going concern uncertainty disclosure in the financial statements; and
- The status of the company at the last balance sheet date (still operating or a cash shell);

The subsequent legal status (liquidated or still in business) of each company was checked to the Companies and Intellectual Property Registration Office of South Africa (Cipro) data base. The variables were calculated in line with Altman's Z-Score and EM Score models. The X_3 variable calculated for the original Z-Score and the EM Score (Earnings before interest and tax/ Total assets for the original Z-Score and Operating income/ Total assets for the EM Score), was in certain instances, not the same because of non-operating income and or expenses being included in the "earnings before interest and tax" figure used for the original Z-Score. The original Altman Z-Score model is explained in detail in chapter 5.2 below. The EM Score model which is based on the original Z-Score model is briefly explained below (Altman, 2005).

According to Altman, the EM Score model is an improved version of the Z-Score model which can be used for manufacturing and non-manufacturing companies, and also privately held and publicly owned companies. The model's most useful application is comparing emerging credits. Atman used 30 Mexican companies to develop the model and has since then applied the model to other emerging markets such as Brazil, Argentina, and some Asian countries. Altman found that the model results were robust when applied to these countries (Altman, 2005). The EM Score model is as follows:

EM Score = $6.56X_1 + 3.26X_2 + 6.72X_3 + 1{:}05X_4 + 3.25$

Key
X_1 = working capital/total assets
X_2= retained earnings/total assets
X_3 = operating income/total assets
X_4 = book value of equity/total liabilities.
Source: (Altman, 2005)

3.25 is a constant in the model and which derived from the median Z-Score for bankrupt US entities (Altman, 2005).

Once the data for each company was entered into the spreadsheet model and variables calculated per the two models, the Z-Score and EM Score for each of the sample companies were calculated.

The remainder of this paper is divided into four sections. The first section deals with the definition of failure, and the legal and regulatory matters related to the study. It's a brief discussion of the current South African Companies Act requirements and procedures for winding up of companies in South Africa, and the management and auditor responsibilities as set out in ISA 570. The second section is a detailed study of relevant literature including; a discussion of the original Z-Score model, and a review of past related studies. The third and four sections detail the research results and conclusions, respectively.

4. LEGAL AND REGULATORY MATTERS

Citing Altman (1993), Truter lists four generic terms that are used to define corporate failure; (1) failure, in an economic sense, is when a company's value drops significantly or the rate of return realised on invested capital is considerably and persistently less than prevailing rates of return on similar investments, allowing for risk; (2) insolvency, on the other hand, is a more technical term and signals that a company has liquidity problems and hence cannot meet its obligations to creditors; (3) default, which is a term used when a debtor company violates a condition(s) of a loan agreement; and (4) bankruptcy, which is used to describe a company whose total liabilities exceed the fair value of its total assets (Truter, 1996).

Truter states that bankruptcy is not a formally accepted term in South Africa. He further states that, insolvency is rather used for company failure, with companies undergoing a formal liquidation procedure upon classification as failed, (Truter, 1996). For the purpose of this paper, a failed company is a company that has been delisted from the JSE and has been wound up (liquidated) or is in the process of being wound up in terms of the Companies Act. This excludes financially sound companies delisted and voluntarily wound up because of a major, takeover, unbundling or similar transaction.

The Companies Act, 1973 sets out the different modes and procedures for winding up a company and as ISA 570 sets out the responsibilities for both management and the auditor with respect to the use of the going concern assumption in preparation of a company's financial statements. The purpose of this section is to summarise the legal requirements regarding the winding up process and the regulatory requirements, as defined by ISA 570, for the management and auditor of a company facing going concern uncertainties.

4.1 Liquidations in terms of the Companies Act, 1973

The Companies Act, 1973 (s 343) provides for the following modes of winding-up:

(1) "A company may be wound up -
(a) By the Court; or
(b) Voluntarily
(2) A voluntary winding-up of a company may be -
(a) Creditors' voluntary winding-up; or
(b) A members' voluntary winding-up

Source: Republic of South Africa Companies Act, 1973

According to the Companies Act, 1973 (s 344) company may be wound up by the Court if –

(a) The company has by special resolution resolved that it be wound up by the Court;
(b) The company commenced business before the Registrar certified that it was entitled to commence business;
(c) The company has not commenced its business within a year from its incorporation, or has suspended its business for a whole year;

(d) In the case of a public company, the number of members has been reduced below seven;
(e) Seventy-five per cent of the issued share capital of the company has been lost or has become useless for the business of the company;
(f) The company is unable to pay its debts as described in section 345 of the Act;
(g) In the case of an external company, that company is dissolved in the country in which it has been incorporated, or has ceased to carry on business or is carrying on business only for the purpose of winding up its affairs;
(h) It appears to the Court that it is just and equitable that the company should be wound up" (Republic of South Africa, 1973).

According to the Companies Act, 1973 (s 349) "a company, not being an external company may be wound up voluntarily if the company has by special resolution resolved that it be so wound up. The Companies Act, 1973 (ss 350-353) provides for both a members' voluntary winding up and a creditors' voluntary winding up.

According to the Companies Act, 1973 (s 353), a voluntary winding-up of a company shall commence at the time of the registration in terms of section 200 of the special resolution authorising the winding-up.

According to the Companies Act, 1973 (s 353) a company which is being wound up voluntarily shall, notwithstanding anything contained in its articles, remain a corporate body and retain all its powers as such, but shall from the commencement of the winding-up cease to carry on its business except in so far as may be required for the beneficial winding-up thereof" (Republic of South Africa, 1973).

4.2 IFAC ISA 570

The International Federation of Accountants (IFAC) is the worldwide organisation for the accountancy profession – (International Federation of Accountants Handbook, 2010 Edition). The International Auditing and Assurance Standards Board (IAASB), an independent standard-setting board within IFAC, is responsible for developing the ISAs. According to the (International Federation of Accountants Handbook, 2010 Edition), ISAs are to be applied to the audit of historical financial information. A number of countries worldwide including South Africa have adopted ISAs. ISAs therefore have authority in South Africa. The purpose of this section is to summarise the objectives, requirements (auditor and entity management) and guidelines of the IAASB relating to the going concern assumption.

IAS 570 deals with the auditor's responsibilities in the audit of financial statements relating to management's use of the going concern assumption in the preparation of the financial statements (International Federation of Accountants Handbook, 2010 Edition).

According to ISA 570, when a company's financial statements are prepared under the going-concern assumption, the company is viewed as continuing in business for the foreseeable future. ISA 570 further states that, a company will prepare its financial statements on a going concern basis, except when management either intends to liquidate the company or to cease operations, or has no other choice. When financial statements are prepared under the going concern assumption, the company's assets and liabilities are recorded on the basis that the

company will be able to realise its assets and discharge its liabilities in the normal course of business (International Federation of Accountants Handbook, 2010 Edition).

Because the going concern assumption is a fundamental principal in the preparation of a company's financial statements, management is required to assess the company's ability to continue operating as a going concern (International Federation of Accountants Handbook, 2010 Edition).

As stated in ISA 570, management's assessment of the entity's ability to continue as a going concern is a matter of judgment on uncertain future outcomes of events or conditions. Some of the factors relevant to that judgment listed by ISA 570 are; the amount of uncertainty associated with the outcome of an event or condition increases considerably the further dated into the future an event or condition or the outcome occurs; the size, nature, state, complexity of the company, and the degree to which external factors affect the judgment regarding the outcome of events or conditions; and subsequent events may result in outcomes that are not in line with judgments that were reasonable at the time they were made by management (International Federation of Accountants Handbook, 2010 Edition).

ISA 570 also sets out responsibilities of the auditor with respect to the going concern assumption of an audit client. ISA 570 requires the auditor to consider events or conditions that may cast doubt on the entity's ability to continue operating as a going concern when performing risk assessment procedures as required by ISA 315. ISA 570 also requires the auditor to remain alert throughout the audit for audit evidence of events or conditions that may cast significant doubt on the entity's ability to continue as a going concern. ISA 570 requires the auditor to cover the same period as that used by management to make its going concern assessment. The period of assessment, according to ISA 570 cannot be less than twelve months. The auditor is also required to consider whether management's assessment includes all relevant information of which the auditor is aware as a result of the audit (International Federation of Accountants Handbook, 2010 Edition).

ISA 570 sets out, in broad terms, the procedures to be performed by the auditor when events or conditions have been identified that cast doubt on a company's ability to continue operating as a going concern (International Federation of Accountants Handbook, 2010 Edition). According to ISA 570, the procedures shall include:

- Requesting management to make its going concern assessment if this has not been done (International Federation of Accountants Handbook, 2010 Edition).
- The auditor is required to evaluate management's plans for future actions in relation to its going concern assessment, and determine whether the outcome of these plans is likely to improve the situation and whether management's plans are feasible in the circumstance (International Federation of Accountants Handbook, 2010 Edition).
- When applicable, the auditor is required to evaluating the reliability of the underlying data generated to prepare cash flow forecasts and also verify whether there is adequate support for the assumptions underlying the forecast (International Federation of Accountants Handbook, 2010 Edition).
- The auditor is also required to take into account additional facts or information that may have become available since the date on which management made its assessment (International Federation of Accountants Handbook, 2010 Edition).

- The auditor must obtain written representations from management and, where appropriate, those charged with governance, regarding their plans for future action and the feasibility of these plans (International Federation of Accountants Handbook, 2010 Edition).

The objective for the auditor, according to ISA 570, is to conclude based on the audit evidence obtained whether there is a material uncertainty related to events or conditions that, individually or collectively, may cast significant doubt on the company's ability to continue operating as a going concern, (International Federation of Accountants Handbook, 2010 Edition). A material uncertainty is said to exist, when the extent of its potential impact and likelihood of occurrence is such that, in the auditor's judgment, appropriate disclosure of the nature and implications of the uncertainty is necessary to ensure, either a fair presentation of the financial statements, or that the financial statements are not misleading (International Federation of Accountants Handbook, 2010 Edition).

According to ISA 570, in the event the auditor concludes that the use of the going concern assumption is appropriate in the circumstances but a material uncertainty exists, the auditor is required to determine whether the financial statements (International Federation of Accountants Handbook, 2010 Edition):

- Describe sufficiently, events or conditions that may cast significant doubt on the company's ability to continue operating as a going concern and management's plans to deal with these events or conditions (International Federation of Accountants Handbook, 2010 Edition); and
- Include sufficient disclosure that there is a material uncertainty related to events or conditions that may cast significant doubt on the company's ability to continue operating as a going concern and hence it may be unable to realise its assets and discharge its liabilities in the normal course of business (International Federation of Accountants Handbook, 2010 Edition).

The auditor's decision tree with respect to the going concern is summarised in table 1. When there is adequate disclosure in the financial statements, the auditor shall express an unmodified opinion and include an *Emphasis of Matter* paragraph in the auditor's report to draw attention to (International Federation of Accountants Handbook, 2010 Edition):

- The material uncertainty that may cast significant doubt on the company's ability to continue operating as a going concern, (International Federation of Accountants Handbook, 2010 Edition); and
- The company's disclosure in financial statements about the events or conditions that may cast significant doubt on the company's ability to continue operating as a going concern (International Federation of Accountants Handbook, 2010 Edition).

If the company has not made sufficient disclosure in its financial statements, the auditor is required to express a qualified opinion or adverse opinion, as appropriate, in accordance with ISA 705. The auditor's report is required to state that there is a material uncertainty that may cast significant doubt about the company's ability to continue operating as a going concern (International Federation of Accountants Handbook, 2010 Edition).

When a company prepares its financial statements on a going concern basis but, the auditor has concluded that management's use of the going concern assumption in the financial statements is inappropriate, the auditor is required to express an adverse opinion (International Federation of Accountants Handbook, 2010 Edition).

Below are example events or conditions that may cast significant doubt about the going concern assumption. These are listed under financial, operating, and other conditions (International Federation of Accountants Handbook, 2010 Edition).

"***Financial***

- Net liability or net current liability position
- Fixed-term borrowings approaching maturity without realistic prospects of renewal or repayment; or excessive reliance on short-term borrowings to finance long-term assets
- Indications of withdrawal of financial support by creditors
- Negative operating cash flows indicated by historical or prospective financial statements.
- Adverse key financial ratios
- Substantial operating losses or significant deterioration in the value of assets used to generate cash flows
- Arrears or discontinuance of dividends
- Inability to pay creditors on due dates
- Inability to comply with the terms of loan agreements
- Change from credit to cash-on-delivery transactions with suppliers
- Inability to obtain financing for essential new product development or other essential investments

Operating

- Management intentions to liquidate the entity or to cease operations
- Loss of key management without replacement
- Loss of a major market, key customer(s), franchise, license, or principal supplier(s)
- Labour difficulties
- Shortages of important supplies
- Emergence of a highly successful competitor

Other

- Non-compliance with capital or other statutory requirements
- Pending legal or regulatory proceedings against the entity that may, if successful, result in claims that the entity is unlikely to be able to satisfy
- Changes in law or regulation or government policy expected to adversely affect the entity
- Uninsured or underinsured catastrophes when they occur". *Source*: (International Federation of Accountants Handbook, 2010 Edition) (IAS 570)

It's important to note that the significance of events or conditions listed above can often be alleviated by other factors, for example, if a company is unable to make its normal debt repayments, this may be mitigated by such actions as disposing of assets, rescheduling loan

repayments, or raising equity capital (International Federation of Accountants Handbook, 2010 Edition).

It is clear from reading ISA 570 what the responsibilities of both the auditor and management are with respect to the going concern assumption as used in historical financial statements. What is not clear however, is specifically how or what tools the auditors should use to verify the appropriateness of management's use of the going concern assumption in the preparation of historical financial statements. Some of the example conditions listed above may only be identified or become apparently clear when it's "too late" in the eyes of stakeholders such as investors, lenders and auditors themselves (for example when deciding whether to take on a new client or indeed ensuring that the they issue the correct audit opinion). The ISA 570 list of example conditions includes adverse financial ratios but does not give specific ratios to be calculated by the auditor. Further, most ratio analysis is univariate in nature, (Altman, 1968). According to (Altman, 1968), such ratio analysis is prone to faulty interpretation and is potentially confusing. There is therefore the risk that the auditor has not obtained sufficient and appropriate audit evidence and ends up issuing the wrong opinion or accepting as a client a company that eventually fails. For the purpose of this research paper and following other researchers (Altman, 1968), and (Kuruppu, Laswad & Oyelere, 2003), a Type 1 error is misclassifying a failed company as non-failed and a Type 2 error is misclassifying a healthy company as failed. While the auditor's decision on whether there is material uncertainty concerning the going concern assumption is a matter of judgement, a tool such as Altman's Z-Score, which has been proven to work in predicting corporate failure may aid the auditor in assessing the going concern assumption with greater accuracy and hence reduce the risk of issuing a wrong opinion or accepting a client that has a high risk of failure (Altman, 1968).

5. LITERATURE REVIEW

5.1 Key findings from literature review of past studies

Up to this date few studies have examined the usefulness of the corporate failure models in assessing the going concern status of a company, (Kuruppu, Laswad & Oyelere, 2003). Altman and McGough (1974) were the first to suggest the usefulness of bankruptcy prediction models for assessing going concern status. In a 1974 paper, they carried out a study the objective of which was to develop criteria to assist auditors identify situations where the status of a company as a going concern is in doubt by analysing the relationship between bankrupt companies and auditors' reports prior to bankruptcy. The model achieved an accuracy rate of 82% in predicting failed companies compared to 46% going concern uncertainty reports for the same sample of companies. For the 21 sample companies with going concern uncertainty reports, the authors found that the model indicated going concern problems earlier in six cases. The study concluded that the judgment of the auditor must be the deciding factor on the appropriate going concern opinion and that the Z-Score model may be an effective aid to the auditor in forming his judgment (Altman & McGough, 1974). Following the work by Altman and McGough, other authors have since published papers on the subject. These are discussed below.

Despite its critics, different researchers have proved that the Altman Z-Score does indeed work in predicting corporate bankruptcy, (Paquette & Skender 1996), (Stice, 1991). Paquette and Skender published a paper in 1996 which describes an activity based classroom exercise. The exercise introduces students to the use of the Altman Z-Score as an aid to making a going concern judgment. The authors' note that for the auditor to evaluate whether or not a company's going concern is in doubt, the auditor must know what information needs to be obtained as well as how to combine such information. The exercise entailed students performing ratio analysis and calculating Z-Score's using data obtained from Compact Disclosures. The authors' conclusion is similar to (Altman & McGough, 1974), as it advocates for the use of models such as Altman's Z-Score when assessing the going concern status of the company, (Paquette & Skender 1996). The study by Stice looked at whether a company's financial condition, asset structure, and sales growth have an impact on the likelihood of a company issuing flawed financial statements. Stice used Altman's Z-Score to measure the financial conditions of the companies in the sample. He concluded that the model is effective in identifying high-risk audit engagements and that an auditor can then use this information as a basis for higher audit fees and audit hours that match up with the risk of litigation attributed to the client, (Stice, 1991). This supports Altman and McGough's conclusion.

Other authors, such as Kuruppu, Laswad & Oyelere (2003) and Kida (1980), make a case against Altman's Z-Score. Kuruppu *et al* (2003) published a paper in 2003 whose purpose was to establish whether statistical corporate liquidation models are effective for assessing a company's going concern status. The study is based on sample of New Zealand Stock Exchange listed companies, in contrast to Altman and McGough's study which is based on US companies. The authors argue that because of the differences between the debtor and creditors oriented insolvency frameworks, results of the study can aid auditors when selecting appropriate business failure prediction models for assessing a company's going concern

status. They conclude that the corporate liquidation model developed outperformed Altman's bankruptcy prediction model in predicting company liquidation (Kuruppu, Laswad & Oyelere, 2003). Kida's study looked into different facets of auditors' going concern decisions when only financial statements data is taken into account. In contrast to Altman's model and other models discussed above he undertook a two-step process analysis. He started by comparing the auditors' abilities to identify problems when using relevant cues to the accuracy of a mathematical model. Kida used Brunswik's lens model as it allows both behavioural and environmental systems to be explicitly considered. The second step focused on identifying alternative reasons for the low problem–qualification association reported by Altman and McGough (1974). Kida concluded that ratios can provide auditors useful information when making going–concern decisions and argued that this is demonstrated by the fact that auditors were able to distinguish problem from non-problem firms, given only ratios, with an average accuracy rate of 83 percent compared to the 90-percent accuracy rate achieved by the discriminant model. Kida attributed the difference between auditor and model accuracy previously found by Altman and McGough (1974) to auditors' judgments of continuity qualifications, which according to Kida is not the same as auditors' predictions of problem firms. According to Kida, the results of the study indicate that for a number of reasons, auditors may not qualify audit reports when going concern problems are identified (Kida, 1980).

Alternative predictive models to the Altman Z-Score have been developed by other authors, for example, Hopwood, McKeown & Mutchler (1989), and Anandarajan & Anandarajan (1999). Hopwood *et al* (1989) use a log-linear approach to investigate the relationship between bankruptcy and audit report qualifications within the context one univariate and two multivariate models. The univariate model examined the relationship between bankruptcy and a single opinion type. The first multivariate model uses the same audit opinion variables as the univariate model, while the second multivariate model (a ratios and audit opinion model) is based audit opinions types and 6 ratios that were derived from Beaver (1966), Deakin (1972) and Libby (1975) studies. In contrast to the Altman and McGough (1974) study, Hopwood *et al* (1989) considered consistency exceptions, the subject-to opinion issued for other than going-concern opinion reasons, and going-concern opinion qualifications. Altman and McGough (1974) only considered going-concern opinion qualifications in their study. The study found that the audit-opinion-only multivariate model was the least-cost option in the last three years before a company goes bankrupt, (Hopwood, McKeown & Mutchler, 1989). Anandarajan & Anandarajan, (1999) carried out a study to aid the decision making process of auditors in relation to the choice of audit report to be issued when a company is faced with going concern uncertainties. The study contrasts the predictive power of two machine learning techniques (Artificial Neural Networks (ANN), and Expert Systems (ES)) and Multiple Discriminant Analysis (MDA). The models were developed based on actual decisions of auditors. The authors found that the ANN model achieved the highest predictive accuracy at 85.8% compared to the MDA and ES models which achieved predictive accuracies of 74.1% and 69.1%, respectively. The results for the ANN model compared favourably to Altman and McGough's (1974) study which was 82% accurate. The study further found that companies with non-going concern problems were appropriately categorised at a rate of 90% for ANNs, 75% for ES and 81% for MDA. These are lower than Altman's original study which achieved 97% accuracy for non-failed companies. Regarding the test on which form of going concern uncertainty report, the ANN model achieved a predictive accuracy of 80% for modified reports and 83.2 % for disclaimer reports, compared to 72.1% and 74.3% for MDA, and 66% and 60.3% for ES, respectively. Except for Hopwood

et al (1989) and Anandarajan & Anandarajan, (1999), none of other studies above distinguished between the various forms of going concern uncertainty reports. The study concluded that auditors can use the ANN model as a persuasive analytical tool when discussing going concern problems with clients and to recommend changes to the financial statements (Anandarajan & Anandarajan, 1999).

As noted by Truter (1996), a number of failure prediction models developed in South Africa achieved a high level of accuracy in predicting corporate failure, (Truter, 1996). None of these of studies however have examined the relationship between corporate failure prediction models and audit reports issued.

In 5.2 and 5.3 below I discuss in more detail, the Altman Z-Score and some of the more important related studies, respectively.

5.2 Altman (1968) – Financial ratios, discriminant analysis and prediction of corporate bankruptcy

The purpose of this section is to give a brief background and a description of the original Altman Z-Score model.

According to Altman, before the development of quantitative measures of company performance, agencies supplied qualitative type information which was used for assessing the credit worthiness of particular merchants. Altman further states that corporate failure models developed from studies done as early as in the 1930's are questionable mainly because the methodology used was essentially univariate in nature and emphasis was placed on individual signals of impending problems. Altman also points out that ratio analysis presented in this fashion is susceptible to faulty interpretation and is potentially confusing. As an example, Altman states that a company faced with a poor profitability and/or solvency record may be regarded as a potential bankrupt. However, this may not be considered a significant risk because, for example, of the firm's good liquidity position (Altman, 2000).

Altman developed the Altman Z-Score in his 1968 paper titled; Financial Ratios, Discriminant Analysis and Prediction of Corporate Bankruptcy. The purpose of the paper was to assess the quality of ratio analysis as an analytical technique (Altman, 1968).

According to Altman, he chose to use a multiple discriminant analysis (MDA) as the appropriate statistical technique after careful consideration of the nature of the problem and of the purpose of the paper. He states that the MDA is a statistical technique used to categorise an observation into one or more *a priori* groupings dependent upon the observation's individual characteristics. Altman further states that the technique is mainly used to categorise and/or make predictions in problems where the dependent variable appears in qualitative form, for example, male or female, bankrupt or non-bankrupt. According to Altman, an advantage of using the MDA technique is that it simultaneously takes into account all characteristics common to the relevant firms, plus the interaction of these properties. A univariate study, however, can only take into account the measurements used for group assignments one at a time (Altman, 1968).

Sample Selection

The original model developed by Altman comprised a sample of 66 corporations – 33 bankrupt corporations and 33 non-bankrupt corporations. The bankrupt group was made up of manufacturing firms that filed a bankruptcy petition under Chapter X of the National Bankruptcy Act during the period 1946-1965. The average asset size of these firms was $6.4 million, with a range of between $0.7 million and $25.9 million. The non bankrupt group consisted of a paired sample of manufacturing firms that Altman chose on a stratified random basis. The data collected for the two groups are from the same years (Altman, 1968).

After defining the initial groups and selecting the firms, Altman used the firm's balance sheets and income statements to collect relevant data. Altman then compiled a list of 22 potentially helpful variables (ratios) for evaluation. The variables were then classified into five standard ratio categories, including liquidity, profitability, leverage, solvency, and activity ratios. From the original list of variables, Altman selected five variables as doing the best overall job together in the prediction of corporate bankruptcy. Altman used the following procedures to select the final profile of variables (Altman, 1968):

- Observation of the statistical significance of various alternative functions including determination of the relative contributions of each independent variable;
- Evaluation of inter-correlations between the relevant variables;
- Observation of the predictive accuracy of the various profiles; and
- Judgment of the analyst (Altman, 1968).

The final discriminant function developed using the final profile of variables is as follows:

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

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 = Sales/Total assets
Z = Overall Index

Source: (Altman, 1968).

X_1—*Working Capital/Total Assets*

According to Altman, this ratio is frequently found in studies of corporate problems. He defines working capital as the difference between current assets and current liabilities. According to Altman, a firm that regularly makes operating losses will have shrinking current assets in relation to total assets (Altman, 1968).

X_2—*Retained Earnings/Total Assets*

Altman noted that the age of a firm is implicitly considered in this ratio as demonstrated by newly established firms that will probably show a low RE/TA ratio because they have not had time to build up cumulative profits. The prevalence of failure, as noted by Altman, is much higher in a firm's earlier years (Altman, 1968).

X_3—*Earnings Before Interest and Taxes/Total Assets*

According to Altman, this ratio measures the true productivity of the firm's assets before deducting any tax or leverage factors. Altman further states that a firm will only continue to exist if its assets generate profits and the fair values of assets exceed total liabilities (Altman, 1968).

X_4—*Market Value of Equity/Book Value of Total Debt*

According to Altman, this ratio indicates by how much the firm's assets can decline in value before the liabilities exceed the assets and the firm becomes insolvent. Altman also states that this ratio adds a market value dimension not considered by previous which other failure studies (Altman, 1968).

X_5—*Sales/Total Assets*

According to Atman, this ratio measures the sales generating power of a firm's assets and management's capability in dealing with competition. Altman selected this ratio because of its unique relationship to other variables in the model (Altman, 1968).

Altman performed an "F" test to test the individual discriminating of each of the variables. He found that variables X1 to X4 are all significant at the 0.001 level and therefore indicating extremely significant differences in these variables between groups. Altman also found that firms with a greater bankruptcy potential had a lower discriminant score (Altman, 1968).

Altman determined the relative contribution of each of the five variables. This is summarised in the table below.

Table 2
Relative Contribution of the Variables

Variable	Scale Vector	Ranking
X_1	3.29	5
X_2	6.04	4
X_3	9.89	1
X_4	7.42	3
X_5	8.41	2

Source: (Altman, 1968)

Empirical results of model

Altman started by illustrating the format for presenting the results. Altman used the table (classification chart or accuracy-matrix) below.

Chart 1
Classification chart

Actual Group Membership	Predicted Group Membership	
	Bankrupt	Non-Bankrupt
Bankrupt	H	M_1
Non-Bankrupt	M_2	H

Source: (Altman, 1968)

The actual group membership above is the same as the *a priori* groupings and the model attempts to classify correctly these firms (Altman, 1968).

Chart key

- The H's are for correct classifications (Hits),
- M's are for misclassifications (Misses),
- M_1 stands for a Type I error and M_2 a Type II error,
- The total correct Hits is derived by the sum of the diagonal elements,
- The accuracy of the model in classifying firms is derived by dividing the total Hits by the total number of firms classified (sixty-six in the case of the initial sample), (Altman, 1968).

Altman performed a series of six tests to observe the model's accuracy in predicting bankruptcy (Altman, 1968).

The results of the six tests are summarised in the charts/tables below.

(1) Initial Sample – Altman's initial sample comprised 33 firms in each of the two groups and was examined using data obtained from audited financial statements one prior to bankruptcy. Altman found that the model is accurate in classifying 95 per cent of the total sample – see below (Altman, 1968).

Chart 2

Actual	Predicted	
	Group 1	Group 2
Group 1	31	2
Group 2	1	32

	Number Correct	Per cent Correct	Per cent Error	n
Type I	31	94	6	33
Type II	32	97	3	33
Total	63	95	5	66

Source: (Altman, 1968)

(2) Results Two Years Prior to Bankruptcy – Altman's second test used data from audited financial statements two years prior to bankruptcy. Altman found a reduction in accuracy compared to the first test. The model was correct in classifying 83 percent of the total sample – see below (Altman, 1968).

Chart 3

Actual	Predicted	
	Group 1	Group 2
Group 1	23	9
Group 2	2	31

	Number Correct	Per cent Correct	Per cent Error	n
Type I	23	72	28	32
Type II	31	94	6	33
Total	54	83	17	65

Source: (Altman, 1968)

(3) Potential Bias and Validation Techniques – Altman states that the purpose of this test was to estimate parameters for the model using only a subset of the initial sample, and then to classify the remainder of the sample based on the parameters established. He used a simple t-test to validate the significance of the results. He tested five different replications of the suggested method of choosing subsets (sixteen firms) of the original sample, (Altman, 1968). From the results obtained, Altman found that the model does, in fact, possess discriminating power on observations and that any search bias was not significant – see below (Altman, 1968).

Table 3

Accuracy of Classifying a Secondary Sample

Replication	Per cent of Correct Classifications	Value of t
1	91.2	4.8*
2	91.2	4.8*
3	97.0	5.5*
4	97.0	4.5*
5	91.2	4.8*
Average	93.5	5.1*

Total number of observations per replication – 34
*Significant at 0.001 level
Source: (Altman, 1968)

(4) Secondary Sample of Bankrupt Firms – Altman used a new sample of 25 bankrupt firms in order to test the model rigorously. He found the new sample's results to be superior to the initial sample – see below (Altman, 1968).

Chart 4

		Predicted	
		Bankrupt	Non-bankrupt
	Bankrupt Group (Actual)	24	1

	Number Correct	Per cent correct	Per cent Error	n
Type I (total)	24	96	4	25

Source: (Altman, 1968)

(5) Secondary Sample of Non-Bankrupt Firms – Altman used a new sample of 66 firms that experienced temporary difficulties (reported losses/negative profits). Although not as accurate as the initial sample, Altman nonetheless found the results were impressive – see below (Altman, 1968).

Chart 5

		Predicted	
		Bankrupt	Non-bankrupt
	Non-Bankrupt Group (Actual)	14	52

	Number Correct	Per cent correct	Per cent Error	n
Type II (total)	52	79	21	66

Source: (Altman, 1968)

(6) Long-Range Predictive Accuracy – Using the original sample, Altman performed this test to check whether the model could predict failure going as far back as five years prior to the actual bankruptcy. He found that after the second year, the model becomes unreliable – see below (Altman, 1968).

Table 4

Five Year Predictive Accuracy of the MDA Model (Initial Sample)

Year Prior to Bankruptcy	Hits	Misses	Per cent Correct
1st n = 33	31	2	95
2nd n = 32	23	9	72
3rd n = 29	14	15	48
4th = 28	8	20	29
5th = 25	9	16	36

Source: (Altman, 1968)

Applications of the model

Altman found that all firms having a Z score of greater than 2.99 clearly feel into the "non-bankrupt" sector, while those firms having a Z below 1.81 are all bankrupt. He defined the area between 1.81 and 2.99 as the "zone of ignorance" or "grey area" because of the susceptibility to error classification. After some further analysis of misclassified firms he chose the score of 2.675 as the Z value that discriminates best between the bankrupt and non-bankrupt firms (Altman, 1968).

Practical applications suggested by Altman include:

- Business loan evaluation – banks and other institutions can uses this as a guide to lower the costs of investigating loan applicants (Altman, 1968);
- Internal Control Considerations – management can use the model to predict corporate problems early enough so as to enable management to realise the gravity of the situation in time to avoid failure (Altman, 1968);
- Investment Criteria – investors can use it as a technique for screening out undesirable investments (Altman, 1968);
- In a 1974 paper, Altman and McGough concluded that the model may be an effective aid to the auditor in forming his going concern judgement decision (Altman & McGough, 1974); and
- Altman and other authors have developed variants of the model used in other countries such as the Emerging Market Score Model, the Canadian Z-Score and others (Altman & Narayanan, 1997).

5.3 Related studies

According to research, a range of models have been developed to help identify which type of audit reports to issue for going concern reporting, (Anandarajan & Anandarajan, 1999). These models can help auditors plan to increase testing and to satisfy themselves that their report is appropriate (Anandarajan & Anandarajan, 1999).

The objective of this section is to review related past studies. I will start by looking at studies that have focused on applying the Altman Z-Score model to the going concern decision. I will then look at studies that have either developed other statistical techniques and/or compared other techniques to Altman's Z-Score. I will also look at some of the South African studies on corporate failure prediction models.

Altman & McGough (1974) – Evaluation of a company as a going concern

The purpose of this study was to develop criteria to assist the auditor identify situations where the status of a company as a going concern is in doubt by analysing the relationship between bankrupt companies and auditors' reports prior to bankruptcy (Altman & McGough, 1974).

In summary, the study entailed; (1) assessing the predictability accuracy of the Z-Score model developed by Altman for bankruptcies as well as examining the auditors' opinions just prior to these failures; and (2) examining the subsequent performances of the firms as well as the bankruptcies model's prior assessments in an independent sample of firms whose auditors either disclaimed or qualified their opinions because of going concern problems (Altman & McGough, 1974).

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Altman and McGough point out that the bankruptcy model and the auditors' reports have dissimilar but analogous functions. The authors state that the bankruptcy model was developed to predict bankruptcy while the auditor does not attempt any such prediction. According to the authors, a company with an unqualified audit report could still "go under" and a company with a qualified audit report could still continue operating as a going concern. As stated in chapter 4.2 above, audit opinions expressing doubts concerning a company's ability to continue as a going concern are based on the uncertainty of the fairness of presentation of the financial statements. The authors also note that financial statements prepared on a historical cost basis can still be fairly presented when the company is facing bankruptcy if the carrying value of the assets of that company represents the realisable value of those assets. However, a proven prediction technique may aid the auditor identify issues that may not be readily identified by using traditional auditing procedures (Altman & McGough, 1974).

Using the Z-Score model on a sample of bankrupt companies, the authors found evidence that the model can identify going-concern problems earlier than an auditors' opinion in a company that eventually goes into bankruptcy. The study did not distinguish between Chapter X and Chapter XI bankruptcy because both indicate going concern problems. According to the authors, of the 28 companies that issued financial statements preceding bankruptcy, 23, or 82%, had a Z-Score below 2.675, with 13 of these falling below 1.8. When the authors included the latest available audited financial statements of the six companies that did not issue financial statements within 15 months preceding bankruptcy they found that the model accuracy remained at 82%. The authors further found that the auditors' opinions highlighted going-concern problems in 13 cases, or 46% of the cases. The authors also found that the model's accuracy reduced the further dated the financial data was from the bankruptcy date. 19 of the 33 companies that issued financial statements two years prior to bankruptcy had a score below 2.765 resulting to a prediction accuracy of 58% compared to 21% going concern uncertainty reports for the same sample of companies (Altman & McGough, 1974).

The authors then analysed 21 companies whose opinions were qualified or disclaimed because of going concern uncertainties. They examined financial statements for the year preceding the qualified report and the available subsequent reports to establish the nature of the auditors' reports and the corresponding relevant Z-Scores. This was done to determine if the model would have indicated going-concern problems earlier than the auditors' reports and what transpired to companies that had going-concern problems (Altman & McGough, 1974).

For the 21 companies analysed, the authors found that qualified audit opinions do indeed indicate future distress for a company. According to the authors, this is evident from six bankrupt companies, eight companies with continuing problems and four companies taking significant action to avoid ongoing "going under". They further found that the model results provided similar caveats as the auditors' opinions, indicating going concern problems earlier in six cases. The author's also found that auditors' reports highlighted going-concern problems earlier than the model in four cases (Altman & McGough, 1974).

The authors concluded that the judgment of the auditor must be the deciding factor on the appropriate going concern audit opinion and that the Z-Score model may be an effective aid to the auditor in forming his judgment (Altman & McGough, 1974).

Paquette & Skender (1996) – Using a bankruptcy model in the auditing course: The evaluation of a company as a going concern

This paper describes an activity-based classroom exercise, which introduces students to the use of Altman's Z-Score model as an aid in making a going-concern judgment (Paquette & Skender 1996).

The Paquette & Skender state in the 1996 paper that for the auditor to evaluate whether or not a company's going-concern is in doubt, the auditor must know what information needs to be obtained as well as how to combine such information. They further state that bankruptcy prediction models such as Altman Z-Score can aid auditors in evaluating the appropriateness of the going-concern assumption by focusing attention to indicators ratios as well as by providing a method for combing the information obtained. (Paquette & Skender 1996)

Citing (Chow et al., 1987; Ho, 1994), the authors allude to the difficulty that the auditors face when making going-concern judgment decisions. This is attributed to challenges auditors face in obtaining and evaluating information when rendering a going concern judgment. According to the authors, auditors can use the Z-Score models at different phases of the audit, starting with identifying whether there is significant doubt about the company's ability to continue operating as a going concern. They further state that auditors can then use the models to evaluate management's plans to remove significant doubt about the company's ability to continue operating as going concern. In addition auditors can also use the model to performing a sensitivity analysis on the impact that management plans might have on the company's financial statements (Paquette & Skender 1996).

The exercise entailed students performing ratio analysis and calculating Z-Score's using data obtained from Compact Disclosures. In line with Altman's original Z-Score, company data was narrowed to manufacturing companies. Each student was asked to perform the exercise on two manufacturing companies, one with a going concern qualification audit report and one other company that did not have a going concern qualification (Paquette & Skender 1996).

The authors conclude by advocating for the use of models such as Altman's Z-Score when evaluating a company's going concern status. The authors further state that the Z-Score model can aid the training of auditors by indicating what information should be acquired, how to correctly combine that information, and how much attention should be given to each ratio (Paquette & Skender 1996).

Stice (1991) – Using financial and market information to identify pre-engagement factors associated with lawsuits against auditors

This study looked at whether a company's financial condition, asset structure, and sales growth have an impact on the likelihood of a company issuing flawed financial statements. The study also looked at whether the auditor's ability to detect and willingness to disclose errors are related to the probability of an audit failure. The study also considered whether the auditors' litigation risk increases for clients with greater market value and a higher variability of returns (Stice, 1991).

Citing Kinney and McDaniel (1989, 74), the author states that there is evidence that shows that a company's financial condition is frequently a sign of flawed financial statements (Stice, 1991).

The author used Altman's Z-Score to measure the financial conditions of the companies in the sample. For his sample, the author selected companies involved in lawsuits against auditors (Stice, 1991).

The study identified a number of client and auditor characteristics that can be connected with law suits against auditors. The author selected a controlled sample matched on time and industry membership as this was found to have an influence on the significance of characteristics associated with law suit against auditors (Stice, 1991).

The author found that there is evidence of some connection between pre-audit engagement characteristics of both the client and the auditor, and the subsequent filing of a lawsuit against the auditor. The author further found that lawsuits against auditors are significantly associated with abnormal returns, financial condition, and market value. According to author, the model is effective in identifying high-risk audit engagements. Auditors can use this information as a basis for higher audit fees and audit hours that match up with the risk of litigation attributed to the client (Stice, 1991).

Hopwood, McKeown & Mutchler (1989) – A test of the incremental explanatory power of opinions qualified for consistency and uncertainty

Citing the Journal of Accountancy (1982, 1983), the authors make reference to the public's demands for qualified audit opinions as early-warning signals of company failure. The purpose of this study was to investigate the ability of qualified audit opinions to serve as warning signals for bankruptcy (Hopwood, McKeown & Mutchler, 1989).

To undertake their study, the authors developed one univariate and two multivariate log-linear models. The univariate model examined the relationship between bankruptcy and a single opinion type and according to the authors indicated a situation in which, for example, a

financial statement user perceives the consistency exception or the subject-to opinion as irrelevant to bankruptcy and, therefore focuses only on the going concern opinion. The first multivariate model uses the same audit opinion variables as the univariate model and coefficients estimated by the logistic-regression approach when the opinion types are jointly treated. According to the authors, the second multivariate model (a ratios and audit opinion model) is based on audit opinion type and 6 ratios that were derived from Beaver (1966), Deakin (1972) and Libby (1975) studies (Hopwood, McKeown & Mutchler, 1989).

The study found that the tests of the univariate model revealed incremental explanatory power for each type of opinion. The first multivariate model also revealed incremental explanatory power for both the going concern and subject to opinions. For the second multivariate model, the authors found that the consistency exception and the going concern opinion had incremental explanatory power and hence further proof that the two opinions types have unique explanatory effects beyond the ratios and other opinion variables. They also found that the audit-opinion-only model was the least-cost option in the last three years before a company goes bankrupt (Hopwood, McKeown & Mutchler, 1989).

The authors concluded that their results support financial statement users' argument that the qualified audit opinion has the ability to serve as an early warning signal for company failure (Hopwood, McKeown & Mutchler, 1989).

Anandarajan & Anandarajan (1999) – A comparison of machine learning techniques with a qualitative response model for auditor's going concern reporting

The purpose of this study was to aid the decision making process of auditors in relation to the choice of audit report to be issued when a company is faced with going concern uncertainties. The study contrasts the predictive power of two machine learning techniques (Artificial Neural Networks (ANN), and Expert Systems (ES)) and Multiple Discriminant Analysis (MDA). The viability of using machine learning techniques to assist auditors to predict the type of going concern uncertainty report to be issued is examined in the study. The accuracy of the two machine learning techniques and the MDA model are then compared (Anandarajan & Anandarajan, 1999).

The authors' developed the models based on actual decisions of auditors. Sample data comprised companies that had been issued going concern uncertainty reports between 1990 and 1991. The authors found that the ANN model achieved the highest predictive accuracy at 85.8% compared to the MDA and ES models which achieved predictive accuracies of 74.1% and 69.1%, respectively. The study also found that companies with non-going concern problems were appropriately categorised at a rate of 90% for ANNs, 75% for ES and 81% for MDA. Regarding the test on which form of going concern uncertainty report, the ANN achieved a predictive accuracy of 80% for modified reports and 83.2 %for disclaimer reports, compared to 72.1% and 74.3% for MDA, and 66% and 60.3% for ES, respectively (Anandarajan & Anandarajan, 1999).

The study concluded that auditors can use the ANN model as a persuasive analytical tool when discussing going concern problems with clients and to recommend changes to the financial statements. The study also concluded that the ANN model can be used at both the beginning and end of the audit: to make an initial risk assessment at the beginning of an audit;

and to it decide on which audit opinion is most appropriate for a financially distressed firm (Anandarajan & Anandarajan, 1999).

Kuruppu, Laswad & Oyelere (2003) – The efficacy of liquidation and bankruptcy prediction models for assessing going concern

The purpose of this study was to establish whether statistical corporate liquidation models are effective for assessing a company's going concern status (Kuruppu, Laswad & Oyelere, 2003).

Citing (Levitan and Knoblett, 1985; Cormeir et al, 1995; Grant et al, 1998), the authors state that earlier research has demonstrated that statistical bankruptcy prediction models outperform auditors' going concern judgement decisions when discriminating between bankrupt and non-bankrupt companies (Kuruppu, Laswad & Oyelere, 2003).

The authors argue that because of the differences between the debtor and creditors oriented insolvency frameworks, results of the study can aid auditors when selecting appropriate business failure prediction models for assessing a company's going concern status (Kuruppu, Laswad & Oyelere, 2003).

The study used a sample of 135 New Zealand Stock Exchange listed companies. The study achieved predictive accuracy rates of 36% and 92% for non-failed and failed companies, respectively. The model's Type 1 and Type 2 errors are 8% and 64%, respectively. The authors note that since Type 1 errors are claimed to be more damaging to auditors, the low Type 1 error rate makes it useful as a tool for assessing going concern risk (Kuruppu, Laswad & Oyelere, 2003).

The authors concluded that the corporate liquidation model developed outperformed Altman's bankruptcy prediction model in predicting company liquidation. According to the authors, the result is significant because Altman's model is a proven model that has been used to benchmark the performance of newly developed corporate failure prediction models. Due to its high precision level, the model developed can be used by auditors as a means for assessing going concern status (Kuruppu, Laswad & Oyelere, 2003).

Kida (1980) – An investigation into auditor's continuity and related qualification judgments

The study looked into different facets of auditors' going concern decisions when only financial statements data is taken into account (Kida, 1980).

Kida used a two-step process analysis. He started by comparing the auditors' abilities to identify problems when using relevant cues to the accuracy of a mathematical model. Kida used Brunswik's lens model as it allows both behavioural and environmental systems to be explicitly considered. The second step focused on identifying alternative reasons for the low problem–qualification association reported by Altman and McGough (1974), (Kida, 1980).

According to Kida, the auditor's going-concern qualification decision is influenced by potential ramifications for both the client and the accounting firm. Kida states that an auditor, for example, may quickly disclose going-concern problems, to avoid lawsuits by investors

and creditors because of not qualifying the audit opinion of a firm that declares bankruptcy. He further states that the auditor may also be reluctant to disclose going-concern problems to avoid losing the client because his opinion is wrong (Kida, 1980).

According to Kida, the relationship between qualification decisions and attitudes was analysed by firstly looking at whether auditors' qualification decisions correspond with judgments of continuity problems in all cases. Kida then looked at whether there is an association between auditors' qualifying attitudes and decisions to issue going-concern qualifications. Kida also looked at the underlying causes of those attitudes (Kida, 1980).

Kida concluded that ratios can provide auditors useful information when making going – concern decisions. According to Kida, this is demonstrated by the fact that auditors were able to distinguish problem from non-problem firms, given only ratios, with an average accuracy rate of 83 percent compared to the 90-percent accuracy rate achieved by the discriminant model. As a result, Kida attributes the difference between auditor and model accuracy previously found by Altman and McGough (1974) (auditor-44 percent, model-82 percent) to a difference between the prediction of problems by the mathematical models and the auditors' judgments of continuity qualifications, which according to Kida is not the same as auditors' predictions of problem firm. According to Kida, the results of the study indicate that for a number of reasons, auditors may not qualify audit reports when going concern problems are identified (Kida, 1980).

A South African perspective

Kidane (2004) – Predicting financial distress in IT and services companies in South Africa

The main objective of the study was to examine the ability of the Altman and Springate Z-Score models in predicting corporate failure for selected South African IT and services companies listed on the Johannesburg Security Exchange. The Altman model is described in chapter 5.2 of this research report. Citing (Doukas, 1985:479), Kidane notes that the Springate model was developed in 1978 for use in Canada and is based on Altman's Z-Score model. He further notes that the Springate model achieved a predictive accuracy rate of 92.5% (Kidane, 2004).

Kidane found that for the sample of companies tested these models were inconsistent in predicting companies correctly as failed or non-failed amongst South African IT and services sample companies. The Altman model achieved average correct classification rates of 74% and 38% for failed companies and non-failed companies, respectively. The correct classification rates achieved using the Springate model are 47% and 52% for failed and non-failed companies, respectively (Kidane, 2004).

Truter (1996) – Forecasting corporate failure using financial ratios: A Z-Score approach for non-listed companies in South Africa

In his 1996 study, Truter states that there is a number of failure prediction models developed in South Africa. He further states that the most comprehensive study was by De la Rey (1981). According to Truter, the De la Rey model achieved an accuracy of 96% in classifying companies in his sample as either failed or non-failed (Truter, 1996).

Some of the other studies mentioned by Truter include –

- A multivariate model developed by Clark, Hamman and Smit (1991), which achieved a prediction accuracy of 85% (Truter, 1996)
- A multivariate study by Vietri (1979) on 40 failed and 40 non-failed non-listed companies from various industries, which achieved an accuracy of 90% in predicting failures (Truter, 1996)
- According to Truter, Olivier (1992) based on his study argued that time dimension adjustment of existing models would increase a model's total classification accuracy (Truter, 1996).

Using financial ratios as calculated from the audited financial statements of 30 failed and 30 non-failed companies, Truter developed a Z-Score discriminant function for predicting corporate failure for non-listed companies (Truter, 1996).

A multivariate statistical technique, forward stepwise multiple discriminant analysis was used for the study. Truter found that the developed model proved to be very successful, achieving a high classification accuracy of 90%. Truter further found that when compared to the Z-score of Altman and the Z-score of Vietri, his model achieved higher accuracy tested on both primary and secondary samples (Truter, 1996).

6. RESULTS

6.1 Analysis of failed companies

As noted by Altman & McGough, the bankruptcy model was developed to predict bankruptcy while the auditor does not attempt any such prediction. A company with an unqualified audit report could still "go under" and a company with a qualified audit report could still continue operating as a going concern, (Altman & McGough, 1974). Altman & McGough further state that financial statements prepared on a historical cost basis can still be fairly presented when the company is facing bankruptcy if the carrying value of the assets of that company represents the realisable value of those assets (Altman & McGough, 1974).

Table 5

Auditor's opinions and Z-Scores for failed (liquidated) companies

JSE Ticker	Date liquidation commenced	Status at last balance sheet date	Auditor's opinion	EM Score	Z-Score	Period liquidated after last audited financial statements (years)
AQU	07-Jul-04	O	U	3.222	0.845	1.0
AQL	18-Jan-05	O	U	18.304	0.310	0.9
BLL	23-Jul-02	O	U	1.881	4.596	2.4
BOC	06-Dec-00	O	U	2.510	0.056	1.2
CST	27-Feb-02	O	U	-0.774	0.081	0.7
CFC	20-Dec-02	O	U	24.302	0.255	1.0
CCH	01-Oct-01	O	U	6.949	1.471	1.3
CPM	05-Nov-01	O	U	4.554	0.696	1.2
DNL	08-Mar-02	O	U	7.760	1.186	1.2
ERA	26-Feb-03	O	Q	9.873	0.387	4.7
EQX	30-Apr-02	O	U	8.403	0.264	1.6
LFS	06-Nov-00	O	U	9.507	1.389	1.4
FRC	01-Aug-02	O	U	6.938	0.236	0.8
FUS	20-Jun-01	O	U	8.013	0.168	1.5
GLT	24-Jan-05	O	Q	-20.785	2.565	1.1
IDI	18-Dec-06	O	U	-0.066	1.096	1.0
IOT	06-Jun-05	O	U	7.177	0.520	3.9
KLG	23-Nov-09	C	Q	-67.813	0.986	2.4
MIR	01-Feb-05	C	U	-0.355	19.140	4.6
MOL	27-Jul-00	O	U	6.278	1.667	1.1
SPR	30-Jan-01	O	U	8.818	2.473	0.8
NWT	30-Jul-01	C	U	9.246	0.111	2.1

NEI	08-May-00	O	Q	8.183	1.645	1.0
OZZ	18-Jul-03	O	U	12.848	1.233	1.3
PAL	10-Feb-09	O	Q	6.027	2.082	1.6
PNT	22-May-00	O	U	20.010	3.728	0.7
PRM	04-Mar-09	O	U	4.772	0.151	3.8
RGL	19-Oct-04	O	U	6.886	0.070	4.6
RNS	27-Sep-01	O	U	6.008	1.916	1.5
RHW	31-Oct-02	O	U	3.751	0.114	1.3
SRY	22-Nov-01	O	U	6.302	2.962	1.4
SRV	17-Dec-02	O	U	4.363	1.405	0.8
SPI	19-Sep-02	O	U	2.770	1.143	2.2
VLY	10-Feb-03	C	U	2035.126	9.980	1.0
VOG	12-Jun-00	C	U	44.739	0.188	1.0
WKN	11-May-00	O	U	17.538	0.117	0.9

Table 5 above is a sample of 36 JSE listed companies that have either been liquidated/ dissolved or are in the process of being liquidated/ dissolved. The legal status and the date of going into liquidation for each company were verified against the Cipro data base. I examined the last audited financial statements issued prior to the company being liquidated to determine both the operating status and the type of audit opinion. The period from last balance sheet date to liquidation date ranges from just under 10 months to just over 4 years and 8 months. "O" and "C" in the status at last balance sheet date column indicate whether a company was operating or was a cash shell (non-operating) respectively. 5 of the 36 companies on the list were cash shells at the last balance sheet date prior to liquidation. The bankruptcy models are unlikely to be effective when applied to cash shells due to the financial statements of such companies not having all the variables required by the models. The "U" under auditor' opinion column is for unqualified audit opinions and "Q" is for modified audit opinions. Only five companies on the list had modified audit opinions. All the modified audit opinions were either due to going concern uncertainties only or going concern uncertainties and other issues.

Chart 6

Hits and Misses (failed companies)	**EM Score**	**Z-Score**	**Auditor's report**
Hits (correct prediction)	13	31	5
Misses (Type I errors)	23	5	31
Total	36	36	36
Accuracy (%)	36%	86%	14%

Management's disclosure	**No.**	**%**
GCU	4	11%
WU	6	17%
GC	19	53%
ND	7	19%
Total	36	100%

Status at last reporting date	**No.**	**%**
O	31	100%
C	5	16%
Total	36	116%

Key

GCU - entity faces going concern uncertainty
WU - entity is winding up
GC - entity is a going concern
ND - no GCU disclosure
O - entity was operating
C - entity was a cash shell

From the 36 companies examined, the EM Score model predicted that 13, or 36%, of the companies would fail (EM Score of below 5.85), and the original Z-Score model predicted that 31, or 86%, of the companies would fail (Z-Score of below 2.675). The EM Score prediction accuracy is low at 36%. However, this is still higher than the 5, or 14%, of companies whose audit opinions indicated a going concern uncertainty. The Z-Score accuracy of 86% is higher than the 82% found by Altman & McGough in a similar study (Altman & McGough, 1974).

The EM Score Type I error for the 36 companies examined is 23, or 64%, of the companies. The Z-Score Type I error is lower at 5, or 14% of 36 companies examined. There are no Type II errors for this sample as the sample comprises entirely of failed companies.

The Z-Score accuracy increases by 4% to 90% while the EM Score accuracy reduces by 1% to 35% when the cash shell companies are excluded. Because of the low number of cash shell companies, the impact on the model results is not significant.

Of the 36 companies examined, 9 were liquidated more than 2 years after the last audited financial statements. For these 9 companies, the EM Score predicted that only 5, or 56%, of the companies would fail while the Z-Score predicted that 7, or 78%, of the companies would fail.

For the remaining 27 companies liquidated within two years of the audited financial statements being issued, the EM Score predicted that only 8, or 30%, of the companies would fail. The Z-Score on the other hand predicted that 24, or 89%, of the 27 companies would fail.

Upon examination of the 36 companies' financial statements, I found that only 10, or 28%, of the companies included a statement by management that the company was faced with going-concern uncertainties or that management planned to wind up the company. Only 5 of the 10 companies had modified audit reports. For the remaining 26 companies, 19 had a statement by management that the company was still a going concern and 7 did not have any statement by management on going concern.

The results above indicate that the Z-Score model, and to a lesser degree the EM Score model, are more accurate than auditors' opinions in signalling going-concern problems for South African companies that eventually get liquidated. The difference between the Z-Score and the EM Score models can partly be attributed to the fact that the EM Score was developed using Mexican company data while the Z-Score was developed using more robust US company data. While it is accepted that there will be similarities between Mexico and South Africa, the two countries have their own peculiarities which could affect model accuracy when a model developed in one country is applied in another country. An EM Score model developed specifically for South African companies may therefore be more appropriate. The next section looks at a sample of companies whose audit reports have been modified because of going concern uncertainties.

6.2 Analysis of companies with going concern modified audit reports

Table 6 below is a sample of 63 JSE listed companies with going concern modified audit reports. This was extracted from a list of companies' financial statements with modified audit reports that I obtained from the JSE Continuing Obligations department. I examined each of the companies' financial statements to confirm that the auditor's report was modified due to either going concern uncertainties or going concern uncertainties and other reasons. All 63 companies were checked against the Cipro data base to confirm their current legal status and where applicable the date when the company went into liquidation. Companies with "N/A" in the last two columns are still in business. Of the 63 companies, 23, or 37%, have subsequently been liquidated. 3 of the 23 liquidated companies were liquidated within 2 years after the first going concern uncertainty audit report and the 21 were liquidated between 25 months and 89 months after the first going concern uncertainty report.

Table 6

Z-Scores of companies with going-concern uncertainty audit reports

JSE Ticker	Last balance sheet date	Auditor's opinion	EM Score	Z-Score	Date liquidated/ dissolved	Period liquidated after first going concern uncertainty report (years)
ABO	30-Jun-07	Q	-9.559	0.522	N/A	N/A
ADL	31-Aug-02	Q	-14.998	1.552	05-Nov-09	7.2
AGI	30-Jun-09	Q	0.551	1.995	N/A	N/A
AHL	31-Mar-09	Q	3.320	1.292	N/A	N/A
ALD	30-Jun-03	Q	-3.167	1.944	12-May-08	4.9
Anbeeco	28-Feb-07	Q	-136.061	-0.052	N/A	N/A
APE	31-Dec-02	Q	-6.123	1.233	01-Aug-06	3.6
AWT	30-Jun-05	Q	-13.127	0.145	12-Nov-09	4.4
BPL	30-Jun-04	Q	-13.679	0.490	N/A	N/A
BEE	31-Dec-04	Q	-11.128	1.082	N/A	N/A
BEL	31-Dec-08	Q	8.528	1.408	N/A	N/A
BIO	30-Jun-09	Q	0.885	0.771	N/A	N/A
BRE	30-Jun-09	Q	8.049	0.461	N/A	N/A
BDS	31-Dec-04	Q	3.606	2.295	N/A	N/A
BRY	30-Jun-02	Q	-0.181	0.914	12-Nov-09	7.4
CSY	28-Feb-02	Q	-2.565	4.245	N/A	N/A
CCG	31-Dec-01	Q	-7.354	0.945	02-Nov-04	2.8
CMA	30-Jun-03	Q	-1.733	2.240	N/A	N/A
DAE	31-Dec-01	Q	-13.953	0.889	16-Mar-04	2.2
DEC	28-Feb-05	Q	2.611	0.179	N/A	N/A
DLG	31-Dec-08	Q	3.009	1.410	N/A	N/A
DMR	30-Jun-05	Q	-0.108	0.067	28-Aug-09	4.2
DNA	31-Dec-03	Q	-43.029	87.544	26-Apr-06	2.3
ECH	30-Jun-03	Q	-7.171	3.062	09-Nov-04	1.4
ELX	31-Aug-01	Q	-25.859	3.596	03-Jul-07	5.8
FSH	28-Feb-01	Q	-1.724	2.199	05-Nov-07	6.7
GLT	31-Dec-02	Q	-4.830	1.158	24-Jan-05	2.1
GDH	30-Jun-06	Q	2.770	0.033	12-Nov-09	3.4
HCL	31-Dec-01	Q	2.025	1.125	N/A	N/A
HOR	31-Mar-01	Q	2.907	0.931	27-Sep-02	1.5
IFC	31-Dec-08	Q	-14.860	0.318	N/A	N/A

ILT	30-Apr-02	Q	-2.605	1.053	N/A	N/A
JCI	31-Mar-04	Q	0.556	0.087	N/A	N/A
JDH	30-Jun-07	Q	-4.185	0.554	12-Nov-09	2.4
KIR	28-Feb-09	Q	0.852	1.288	N/A	N/A
KCM	28-Feb-08	Q	3.619	0.277	N/A	N/A
KOL	30-Apr-01	Q	0.953	2.124	N/A	N/A
LAB	28-Feb-06	Q	4.847	0.902	N/A	N/A
LYS	31-May-03	Q	-23.427	0.710	N/A	N/A
MTO	30-Sep-01	Q	-3.792	2.838	N/A	N/A
MES	31-Dec-03	Q	2.037	0.060	N/A	N/A
MTX	30-Jun-08	Q	5.637	0.176	N/A	N/A
MFL	30-Jun-06	Q	-1.825	1.157	N/A	N/A
MLL	28-Feb-02	Q	-0.382	1.409	23-Nov-04	2.7
NMS	31-Dec-05	Q	0.027	0.845	N/A	N/A
NSI	31-Mar-01	Q	-8.118	16.271	05-May-04	3.1
PAC	30-Jun-02	Q	-5.754	0.410	21-Jan-09	6.6
PAL	30-Jun-07	Q	6.027	2.082	10-Feb-09	1.6
PZG	31-Dec-07	Q	-1.340	0.416	N/A	N/A
PNG	28-Feb-09	Q	4.398	0.073	N/A	N/A
RCO	30-Jun-01	Q	12.106	0.025	N/A	N/A
REF	28-Feb-01	Q	-1.216	1.880	16-May-05	4.2
SAL	30-Jun-06	Q	1.996	0.522	N/A	N/A
SMR	31-Mar-06	Q	1.703	0.028	N/A	N/A
SKY	30-Jun-09	Q	5.610	0.906	N/A	N/A
SKW	28-Feb-09	Q	5.219	1.407	N/A	N/A
SQE	31-Dec-02	Q	4.215	3.171	N/A	N/A
TRF	28-Feb-01	Q	-3.699	6.319	12-Oct-04	3.6
TBX	28-Feb-08	Q	3.189	0.078	N/A	N/A
TMT	31-Aug-02	Q	-8.516	-0.100	N/A	N/A
WWR	31-Mar-09	Q	-14.477	-0.001	N/A	N/A
WNE	31-Jul-01	Q	2.114	1.189	14-Jan-05	3.5
ZPT	30-Apr-02	Q	1.977	0.579	N/A	N/A

Chart 7

Predicting Modified Opinions	**EM Score**	**Z-Score**
Hits	59	55
Misses	4	8
Total (modified opinions)	63	63
Modified opinion predictive accuracy	94%	87%

Predicting failed companies	**EM Score**	**Z-Score**
Hits	22	18
Misses	1	5
Total (failed companies with modified opinions)	23	23
Failure predictive accuracy	96%	78%

Total classification	**EM Score**	**Z-Score**
Hits (failed and non-failed)	25	21
Misses (failed and non failed)	38	42
Total (failed companies with modified opinions)	63	63
Overall classification predictive accuracy	40%	33%

Subsequent status	**No.**	**%**
Failed	23	37%
Still in business	40	63%
Total	63	100%

Status at last reporting date	**No.**	**%**
O	62	98%
C	1	2%
Total	63	100%

Of the 63 companies examined, the EM Score and Z-Score correctly predicted the auditor's going concern uncertainty reports for 94% and 87% of the companies, respectively. In contrast to the results from 6.1 above, the results from examining failed companies with going concern uncertainty reports show that the EM Score is more accurate than the Z-Score by 18%. Only 1 of the 63 companies examined was a cash shell at the balance sheet reporting date. For the 23 companies that were eventually liquidated, the EM Score predicted that 22, or 96%, of the companies would fail, and the Z-Score predicted that 18, or 78%, of the companies would fail. As all 23 companies auditors' reports had going concern uncertainty qualification, the models results are less accurate that the auditors' reports.

Contrary to the finding by (Altman, 1968), the models' predictive accuracy is lower for companies that failed within 2 years after the first going concern uncertainty report than it is for companies that failed after more than 2 years after the first going concern uncertainty report. The EM Score accuracy for the 20 companies that failed after more than 2 years after the going concern uncertainty report is 100% compared to an accuracy rate of 67% for companies that failed less than 2 years after the going concern uncertainty reports. The Z-Score on the other hand achieved an accuracy of 80% for the 20 companies that failed after more than 2 years after the going concern uncertainty report was issued compared to an accuracy rate of 67% for companies that failed less than 2 years after the going concern uncertainty report was issued.

Chart 8
EM Score classification chart – modified reports

Actual Group Membership	Predicted Group Membership	
	Bankrupt	Non-Bankrupt
Bankrupt	22	1
Non-Bankrupt	37	3

Chart 9
Z-Score classification chart – modified reports

Actual Group Membership	Predicted Group Membership	
	Bankrupt	Non-Bankrupt
Bankrupt	18	5
Non-Bankrupt	37	3

The EM Score correctly classified 25, or 40%, of the 63 companies as either failed or non-failed, while the Z-Score correctly classified 21, or 33%, of the 63 companies as either failed or non-failed. The auditor's classification accuracy for the 63 companies is 37%, which is 3% lower than the EM Score accuracy but 4% higher than the Z-Score accuracy. The EM Score Type I and Type II errors for the 63 companies examined are 1, or 4%, and 37, or 93%, of the companies, respectively. The Z-Score Type I and Type II errors for the 63 companies examined are 5, or 22%, and 37, or 93%, of the companies, respectively.

7. CONCLUSION

The results in chapters 6.1 and 6.2 above indicate that the Z-Score is quite accurate in predicting failure for companies that eventually fail (delisted and liquidated or in the process of being liquidated), with a classification accuracy ranging from 78% to 86%. The EM Score is less accurate with a classification accuracy ranging from 36% to 96%. Both models compare favourably with the auditor's classification accuracy of 14% to 100%. The classification accuracy of the 2 models for non-failed companies (still in business after a going concern uncertainty report) is very low at 7%, but still more accurate than the auditors' going concern uncertainty classification.

Contrary to the finding by (Altman, 1968), the models produced mixed results in predicting failure for companies liquidated more than 2 years after the going concern uncertainty report/last audited financial statements was issued. For the going concern uncertainty sample, both the EM Score and the Z-Score predictive accuracy rates were higher for companies liquidated more than 2 years after the going concern uncertainty report compared to companies liquidated less than 2 years after the going concern uncertainty report. For the failed companies sample however, the Z-Score accuracy is higher for companies liquidated within 2 years after the last audited financial statements, while the EM Score accuracy was higher for companies liquidated more than 2 years after the last audited financial statements.

As noted in chapter 4.2, ISA 570 requires auditors to assess a client entity's ability to continue operating as a going concern and to perform additional procedures when events or conditions that cast doubt on the entity's ability to continue operating as a going concern are identified. The EM Score and the Z-Score can aid auditors to more accurately assess whether a company's going concern is at risk. Both models are easy to apply, but as noted by (Anandarajan & Anandarajan, 1999), and (Altman & McGough, 1974), the going concern decision is a matter for the auditor's judgment. The auditor's going concern risk assessment should be done both during the planning phase of the audit or when assessing whether to accept a new client and as part of the auditor's substantive audit procedures to address going concern uncertainty risk. At the planning phase, the models will enable auditors to more accurately identify high risk audit engagements early in the planning phase and help ensure that the agreed audit fee budget matches the risks identified and planned work to be done. During substantive testing, auditors can use the models as part of their additional procedures to obtain the necessary audit evidence required in determining whether there is a material uncertainty about a client entity's ability to continue operating as a going concern, (International Federation of Accountants Handbook, 2010 Edition). When a client has put in place measures to address going concern uncertainty risks, for example, financial restructuring of the company, the auditor can use the models to assess the viability of the measures put in place. This can be done by applying the models to forecast pro-forma financial statements.

Besides auditors, the two models can be used by other decision makers with interests in company financial statements and audit reports, for example, investors and lenders. Research by authors such as (Hopwood, McKeown & Mutchler, 1989), has shown that audit reports do signal information to the stock market and can have an impact on share prices. Results from 6.2 above show that EM Score and Z-Score models can predict going concern uncertainty reports with accuracy rates of 94% and 87%, respectively. Investors can use the models to predict going concern uncertainty reports which information can then be used to make buy or sale investment decisions before a company releases its audited financial statements. Investors can also use the models to query auditors going concern uncertainty decisions. This can be applied to both failed companies and non-failed companies with going concern uncertainty reports. Lenders can use the models to predict earlier, whether an existing borrower is likely to fail, and for assessing whether to lend money to loan applicant. Lenders can also insist on using an agreed Z-Score as an additional loan covenant which a borrower can be measured against. Similar to the auditors going concern uncertainty decision, the two models should be supplemented by other information and judgement of the investor/lender.

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APPENDIX 1 – Failed companies

Auditor's opinions and Z-Scores for failed companies													
JSE Ticker	**AQU**	**AQL**	**BLL**	**BOC**	**CST**	**CFC**	**CCH**	**CPM**	**DNL**	**ERA**	**EQX**	**LFS**	**FRC**
EM Score	3.222	18.304	1.881	2.510	(0.774)	24.302	6.949	4.554	7.760	9.873	8.403	9.507	6.938
Z-Score	0.845	0.310	4.596	0.056	0.081	0.255	1.471	0.696	1.186	0.387	0.264	1.389	0.236
Auditor's opinion	U	U	U	U	U	U	U	U	U	Q	U	U	U
GCU disclosure by management	GC	WU	GC	GC	WU	GC	GC	ND	GC	GCU	GC	GC	WU
Last balance sheet date	30-Jun-03	29-Feb-04	29-Feb-00	30-Sep-99	30-Jun-01	30-Dec-01	30-Jun-00	31-Aug-00	31-Dec-00	30-Jun-98	30-Sep-00	30-Jun-99	30-Sep-01
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	O	O	O	O
Date liquidation/ deregistration commenced	07-Jul-04	18-Jan-05	23-Jul-02	06-Dec-00	27-Feb-02	20-Dec-02	01-Oct-01	05-Nov-01	08-Mar-02	26-Feb-03	30-Apr-02	06-Nov-00	01-Aug-02
Period liquidated after audit after last fin.stat	1.0	0.9	2.4	1.2	0.7	1.0	1.3	1.2	1.2	4.7	1.6	1.4	0.8
Variables ('000)													
Working capital	9 617	47 747	-15 292	-12 443 000	-25 302	-2 085	110 553	-42 078	149 741	-24 638	63 300	139 148	64 658
Total assets	34 942	267 461	115 338	62 738 000	37 679	249 573	425 669	350 199	857 823	855 924	152 877	350 394	183 474
Retained earnings	-9 626	162 909	18 574	2 771 000	-2 622	85 815	106 621	50 538	348 101	-25 930	36 476	76 019	34 016
Operating profit/(loss)	-13 446	-32 295	-23 028	1 474 000	2 071	19 364	32 356	58 324	75 839	-20 318	4 843	57 436	6 214
Profit before interest and tax	-13 446	6 524	-23 028	1 474 218	1 565	31 857	32 356	60 350	75 839	-6 242	4 035	57 436	26 494
Book value of equity	21 416	247 050	26 797	12 610 000	6 968	236 799	165 919	113 404	497 300	745 245	88 560	223 228	62 601
Total liabilities	13 626	20 411	88 541	51 128 000	30 711	12 774	260 750	236 795	360 523	110 679	64 317	127 166	120 873
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	18 540	333 697	18 304	5 430 835	35 267	305 112	475 973	201 071	303 612	207 132	63 293	553 324	47 153
Sales	29 750	53 592	531 148	3 568 000	3 086	25 705	618 044	239 888	1 004 665	323 043	38 127	473 226	40 829
Data source: Financial statements and price data obtained from the McGregor website													
- List of failed companies obtained from the JSE (Equity Market Division)													
- Financial statements and price data obtained from the McGregor website													

APPENDIX 1 – Failed companies

Auditor's opinions and Z-Scores for failed companies													
JSE Ticker	**FUS**	**GLT**	**IDI**	**IOT**	**KLG**	**MIR**	**MOL**	**SPR**	**NWT**	**NEI**	**OZZ**	**PAL**	**PNT**
EM Score	8.013	(20.785)	(0.066)	7.177	(67.813)	(0.355)	6.278	8.818	9.246	8.183	12.848	6.027	20.010
Z-Score	0.168	2.565	1.096	0.520	0.986	19.140	1.667	2.473	0.111	1.645	1.233	2.082	3.728
Auditor's opinion	U	Q	U	U	Q	U	U	U	U	Q	U	Q	U
GCU disclosure by management	ND	GCU	GC	GC	GCU	ND	GC	GC	GC	WU	GC	GCU	ND
Last balance sheet date	31-Dec-99	31-Dec-03	31-Dec-05	30-Jun-01	30-Jun-07	30-Jun-00	30-Jun-99	31-Mar-00	30-Jun-99	31-Dec-00	31-Mar-02	30-Jun-07	31-Aug-99
Status at last balance sheet date	O	O	O	O	C	C	O	O	C	O	O	O	O
Date liquidation/ deregistration commenced	20-Jun-01	24-Jan-05	18-Dec-06	06-Jun-05	23-Nov-09	01-Feb-05	27-Jul-00	30-Jan-01	30-Jul-01	07-Jan-02	18-Jul-03	10-Feb-09	22-May-00
Period liquidated after audit after last fin.stat	1.5	1.1	1.0	3.9	2.4	4.6	1.1	0.8	2.1	1.0	1.3	1.6	0.7
Variables ('000)													
Working capital	22 053	-84 135	2 884	161 524	1 516	-9 736	-4 358	135 246	43 594	104 815	272 145	8 011	10 904
Total assets	113 972	72 580	31 369	447 416	1 917	17 670	419 919	302 782	84 933	340 427	462 900	32 374	11 954
Retained earnings	-27 775	-249 178	-47 606	107 546	-46 375		117 618	24 681	32 661	102 442	237 573	13 380	7 426
Operating profit/(loss)	2 903	-52 161	573	15 836	-385	-1 131	91 378	24 596	3 304	24 972	81 461	-4 536	-3 830
Profit before interest and tax	4 212	-52 370	459	23 380	-385	-1 131	91 378	24 596	3 306	24 972	81 461	-4 536	-3 830
Book value of equity	90 813	-46 421	14 529	151 385	1 516	5 219	170 837	192 234	43 714	196 839	339 400	13 469	10 904
Total liabilities	23 159	119 001	16 840	296 031	401	12 451	249 082	110 548	41 219	143 588	123 500	18 904	1 050
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	58 482	8 830	158 719	97 092	27 270	42 470	474 000	83 605	56 675	88 723	396 203	11 000	12 042
Sales	17 458	192 584	33 257	227 841	1 755	338 332	691 302	745 292	7 673	555 809	552 967	67 211	43 681
Data source: Financial statements and price data obtained from the McGregor website													
- List of failed companies obtained from the JSE (Equity Market Division)													
- Financial statements and price data obtained from the McGregor website													

APPENDIX 1 – Failed companies

Auditor's opinions and Z-Scores for failed companies										
JSE Ticker	**PRM**	**RGL**	**RNS**	**RHW**	**SRY**	**SRV**	**SPI**	**VLY**	**VOG**	**WKN**
EM Score	4.772	6.886	6.008	3.751	6.302	4.363	2.770	2 035.126	44.739	17.538
Z-Score	0.151	0.070	1.916	0.114	2.962	1.405	1.143	9.980	0.188	0.117
Auditor's opinion	U	U	U	U	U	U	U	U	U	U
GCU disclosure by management	ND	GC	ND	GC	GC	ND	GC	GC	WU	WU
Last balance sheet date	30-Apr-05	29-Feb-00	31-Mar-00	30-Jun-01	30-Jun-00	28-Feb-02	20-Jun-00	28-Feb-02	30-Jun-99	30-Jun-99
Status at last balance sheet date	O	O	O	O	O	O	O	C	C	O
Date liquidation/ deregistration commenced	04-Mar-09	19-Oct-04	27-Sep-01	31-Oct-02	22-Nov-01	17-Dec-02	19-Sep-02	10-Feb-03	12-Jun-00	11-May-00
Period liquidated after audit after last fin.stat	3.8	4.6	1.5	1.3	1.4	0.8	2.2	1.0	1.0	0.9
Variables ('000)										
Working capital	-99 003	377 178	1 374	-5 548	-38 776	-6 033	207	153 831	217 968	48 884
Total assets	887 838	998 075	137 997	869 192	118 679	677 229	139 785	153 907	235 852	55 827
Retained earnings	-1 519	70 072	36 882	379	38 887	3 341	4 209	25 130	209 516	140
Operating profit/(loss)	84 992	26 311	25 502	57 887	61 666	11 695	-16 999	13 694	-3 648	2 400
Profit before interest and tax	84 992	55 502	25 502	57 887	61 666	11 695	-16 999	13 694	-3 648	2 480
Book value of equity	538 122	416 281	49 095	71 350	44 722	336 833	25 047	153 831	228 500	49 522
Total liabilities	349 716	581 794	88 902	797 842	73 957	340 396	114 738	80	7 352	6 305
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	671 919	716 711	82 214	259 902	286 652	115 237	32 252	131 280	193 133	34 030
Sales	122 514	55 691	262 487	95 850	347 005	950 781	160 264	14 099	1 766	4 031
Data source: Financial statements and price data obtained from the McGregor website										
- List of failed companies obtained from the JSE (Equity Market Division)										
- Financial statements and price data obtained from the McGregor website										

APPENDIX 2 – Going concern uncertainty reports

Z-Scores of companies with going-concern uncertainty audit reports													
JSE Ticker	**ABO**	**ADL**	**AGI**	**AHL**	**ALD**	**Anbeeco**	**APE**	**AWT**	**BPL**	**BEE**	**BEL**	**BIO**	**BRE**
EM Score	(9.559)	(14.998)	0.551	3.320	(3.167)	(136.061)	(6.123)	(13.127)	(13.679)	(11.128)	8.528	0.885	8.049
Z-Score	0.522	1.552	1.995	1.292	1.944	(0.052)	1.233	0.145	0.490	1.082	1.408	0.771	0.461
Auditor's opinion	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Last balance sheet date	30-Jun-07	31-Aug-02	30-Jun-09	31-Mar-09	30-Jun-03	28-Feb-07	31-Dec-02	30-Jun-05	30-Jun-04	31-Dec-04	31-Dec-08	30-Jun-09	30-Jun-09
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	O	O	O	O
Current status	O	L	O	O	L	O	L	L	O	O	O	O	O
Date liquidation/ deregistration commenced	N/A	05-Nov-09	N/A	N/A	12-May-08	N/A	01-Aug-06	12-Nov-09	N/A	N/A	N/A	N/A	N/A
Period liquidated after audit after qualification	N/A	7.2	N/A	N/A	4.9	N/A	3.6	4.4	N/A	N/A	N/A	N/A	N/A
Variables ('000)													
Working capital	-5 324	1 247	-13 411	3 005	-7 632	-114	-1 658	-3 149	-48 143	-2 933	1 377 614	-7 330	-4 380
Total assets	24 586	9 115	561 568	42 677	13 505	298	7 695	5 212	210 612	6 064	3 922 772	85 642	52 190
Retained earnings	-80 566	-56 371	-3 723	-9 240	-2 900	-9 163	-15 521	-17 102	-991 966	-14 534	1 326 761	-62 693	-10 397
Operating profit/(loss)	-3 520	-1 229	-226 368	-2 310	-3 837	-1 586	-2 251	-903	-15 528	-2 934	589 104	-10 403	-7 422
Profit before interest and tax	-3 590	-1 229	-226 479	-2 310	-2 589	-1 234	-2 251	-903	-20 457	-2 934	589 104	-10 403	-7 422
Book value of equity	4 817	5 894	85 369	16 742	-1 433	-1 484	2 742	-5 805	60 187	-934	1 769 555	48 923	45 344
Total liabilities	19 769	3 222	476 199	25 935	14 938	1 782	4 953	11 018	150 425	6 998	2 153 217	36 718	6 846
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	29 588	6 991	53 463	35 691	3 327		3 945	846	667 621	3 579	1 375 826	64 843	457 813
Sales	13 934	14 857	1 128 663	55 002	26 477	155	9 772	1 062	112 893	6 886	5 458 273	66 504	3 558
Data source:													
- List of companies with modefied reports was obtained from the JSE (Continuing Obligations)													
- Financial statements and price data obtained from the McGregor website													

APPENDIX 2 – Going concern uncertainty reports

Z-Scores of companies with going-concern uncertainty audit reports												
JSE Ticker	**BDS**	**BRY**	**CSY**	**CCG**	**CMA**	**DAE**	**DEC**	**DLG**	**DMR**	**DNA**	**ECH**	**ELX**
EM Score	3.606	(0.181)	(2.565)	(7.354)	(1.733)	(13.953)	2.611	3.009	(0.108)	(43.029)	(7.171)	(25.859)
Z-Score	2.295	0.914	4.245	0.945	2.240	0.889	0.179	1.410	0.067	87.544	3.062	3.596
Auditor's opinion	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Last balance sheet date	31-Dec-04	30-Jun-02	28-Feb-02	31-Dec-01	30-Jun-03	31-Dec-01	28-Feb-05	31-Dec-08	30-Jun-05	31-Dec-03	30-Jun-03	31-Aug-01
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	C	O	O
Current status	O	L	O	L	O	L	O	O	L	L	L	L
Date liquidation/ deregistration commenced	N/A	12-Nov-09	N/A	02-Nov-04	N/A	16-Mar-04	N/A	N/A	28-Aug-09	26-Apr-06	09-Nov-04	03-Jul-07
Period liquidated after audit after qualification	N/A	7.4	N/A	2.8	N/A	2.2	N/A	N/A	4.2	2.3	1.4	5.8
Variables ('000)												
Working capital	31 489	2 972	5 478	-2 270	-14 109	-178 134	62 651	-194	6 238	9 014	1 446	-9 542
Total assets	593 746	4 453	6 813	7 963	33 041	158 088	963 672	261 236	25 933	29 365	20 284	15 052
Retained earnings	-1 522	-10 573	-6 921	-25 241	-7 227	-257 108	-99 942	-29 914	-45 465	-143 913	-29 169	-101 122
Operating profit/(loss)	-41 648	-312	-7 534	2 249	-7 338	-93 008	-110 197	-57 832	-11 632	-143 248	-17 743	-6 069
Profit before interest and tax	-40 847	-312	-7 534	2 249	281	-93 008	-121 603	-54 696	-11 632	-197 514	-17 647	-6 069
Book value of equity	188 305	1 232	-3 349	-3 162	727	-177 439	36 461	158 678	20 311	9 014	-9 018	-7 205
Total liabilities	405 441	3 221	10 162	11 125	32 314	335 527	927 211	102 558	5 622	20 351	29 402	22 257
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	172 438	1 960	831	3 374	10 000	516	81 480	47 852	97 191	6 643	40 576	5 725
Sales	1 363 321	4 179	29 225	7 823	74 298	149 544	176 454	370 337		2 581 669	62 987	55 891
Data source:												
- List of companies with modefied reports was obtained from the JSE (Continuing Obligations)												
- Financial statements and price data obtained from the McGregor website												

APPENDIX 2 – Going concern uncertainty reports

Z-Scores of companies with going-concern uncertainty audit reports												
JSE Ticker	**FSH**	**GLT**	**GDH**	**HCL**	**HOR**	**IFC**	**ILT**	**JCI**	**JDH**	**KIR**	**KCM**	**KOL**
EM Score	(1.724)	(4.830)	2.770	2.025	2.907	(14.860)	(2.605)	0.556	(4.185)	0.852	3.619	0.953
Z-Score	2.199	1.158	0.033	1.125	0.931	0.318	1.053	0.087	0.554	1.288	0.277	2.124
Auditor's opinion	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Last balance sheet date	28-Feb-01	31-Dec-02	30-Jun-06	31-Dec-01	31-Mar-01	31-Dec-08	30-Apr-02	31-Mar-04	30-Jun-07	28-Feb-09	28-Feb-08	30-Apr-01
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	O	O	O
Current status	L	L	L	O	L	O	O	O	L	O	O	O
Date liquidation/ deregistration commenced	05-Nov-07	24-Jan-05	12-Nov-09	N/A	27-Sep-02	N/A	N/A	N/A	12-Nov-09	N/A	N/A	N/A
Period liquidated after audit after qualification	6.7	2.1	3.4	N/A	1.5	N/A	N/A	N/A	2.4	N/A	N/A	N/A
Variables ('000)												
Working capital	-40 030	-120 544	-8 174	25 833	7 450	-3 967	124	-472 156	-3 960	-2 015	-16 782	29 276
Total assets	131 432	287 956	103 643	120 406	37 289	18 210	7 274	2 507 771	15 800	190 146	174 242	600 792
Retained earnings	-87 027	-204 871	-55 818	-10 357	-24 514	-32 455	-8 916	-1 228 229	-33 202	-149 404	-26 066	-352 428
Operating profit/(loss)	-15 762	-135 737	-6 239	-52 660	2 390	-33 027	-3 286	-100 788	526	-8 743	-21 898	-99 671
Profit before interest and tax	-15 762	-303 328	-6 239	-52 660	2 390	-33 027	-3 286	83 537	526	2 557	-21 898	-98 822
Book value of equity	-1 475	36 655	70 137	43 167	1 977	10 131	3 664	701 735	7 001	64 732	120 157	168 894
Total liabilities	132 907	251 301	33 506	77 239	35 312	8 079	3 610	1 806 036	8 799	125 414	54 085	431 466
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	44 510	43 881	237 900	8 891	9 000	10 000	12 558	1 316 387	116 040	63 027	494 973	50 436
Sales	291 325	347 903	86	137 081	34 864	7 251	7 746	227 790	8 008	246 555	40 025	1 284 543
Data source:												
- List of companies with modefied reports was obtained from the JSE (Continuing Obligations)												
- Financial statements and price data obtained from the McGregor website												

APPENDIX 2 – Going concern uncertainty reports

Z-Scores of companies with going-concern uncertainty audit reports													
JSE Ticker	**LAB**	**LYS**	**MTO**	**MES**	**MTX**	**MFL**	**MLL**	**NMS**	**NSI**	**PAC**	**PAL**	**PZG**	**PNG**
EM Score	4.847	(23.427)	(3.792)	2.037	5.637	(1.825)	(0.382)	0.027	(8.118)	(5.754)	6.027	(1.340)	4.398
Z-Score	0.902	0.710	2.838	0.060	0.176	1.157	1.409	0.845	16.271	0.410	2.082	0.416	0.073
Auditor's opinion	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Last balance sheet date	28-Feb-06	31-May-03	30-Sep-01	31-Dec-03	30-Jun-08	30-Jun-06	28-Feb-02	31-Dec-05	31-Mar-01	30-Jun-02	30-Jun-07	31-Dec-07	28-Feb-09
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	O	O	O	O
Current status	O	O	O	O	O	O	L	O	L	L	L	O	O
Date liquidation/ deregistration commenced	N/A	N/A	N/A	N/A	N/A	N/A	23-Nov-04	N/A	05-May-04	21-Jan-09	10-Feb-09	N/A	N/A
Period liquidated after audit after qualification	N/A	N/A	N/A	N/A	N/A	N/A	2.7	N/A	3.1	6.6	1.6	N/A	N/A
Variables ('000)													
Working capital	6 162	-13 982	-26 017	-264 200	-113 563	-2 318	-7 604	-28 105	2 953	-5 239	8 011	-291 825	134 757
Total assets	173 793	14 509	92 213	1 198 238	7 959 443	235 317	66 123	68 417	6 878	11 330	32 374	862 653	1 682 386
Retained earnings	-4 202	-17 832	-115 507	-25 760	1 389 089	-473 497	-12 526	-21 793	-18 361	-17 406	13 380	-223 714	-50 738
Operating profit/(loss)	20 818	-34 213	-14 188	-50 097	920 862	73 751	-23 565	-1 042	-8 332	-919	-4 536	-201 606	-40 132
Profit before interest and tax	15 072	-40 955	-14 188	-50 097	873 493	77 396	-23 565	-1 042	-8 332	-919	-4 527	-201 584	-3 967
Book value of equity	65 696	-13 314	-7 008	428 661	4 133 674	-265 271	7 514	25 204	4 931	-7 483	13 469	35 316	767 613
Total liabilities	108 097	27 823	99 320	769 577	3 825 769	500 588	58 609	43 213	1 947	18 813	18 904	827 337	914 773
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	33 555	15 217	7 258	1 244 319	8 527 888	133 339	25 498	19 760	12 000	161	11 000	565 054	1 831 913
Sales	156 046	12 038	264 357	65 747	1 247 710	276 246	94 144	58 372	112 268	4 988	67 211	369 320	102 713
Data source:													
- List of companies with modefied reports was obtained from the JSE (Continuing Obligations)													
- Financial statements and price data obtained from the McGregor website													

APPENDIX 2 – Going concern uncertainty reports

Z-Scores of companies with going-concern uncertainty audit reports													
JSE Ticker	**RCO**	**REF**	**SAL**	**SMR**	**SKY**	**SKW**	**SQE**	**TRF**	**TBX**	**TMT**	**WWR**	**WNE**	**ZPT**
EM Score	12.106	(1.216)	1.996	1.703	5.610	5.219	4.215	(3.699)	3.189	(8.516)	(14.477)	2.114	1.977
Z-Score	0.025	1.880	0.522	0.028	0.906	1.407	3.171	6.319	0.078	(0.100)	(0.001)	1.189	0.579
Auditor's opinion	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Last balance sheet date	30-Jun-01	28-Feb-01	30-Jun-06	31-Mar-06	30-Jun-09	28-Feb-09	31-Dec-02	28-Feb-01	28-Feb-08	31-Aug-02	31-Mar-09	31-Jul-01	30-Apr-02
Status at last balance sheet date	O	O	O	O	O	O	O	O	O	O	O	O	O
Current status	O	L	O	O	O	O	O	L	O	O	O	L	O
Date liquidation/ deregistration commenced	N/A	16-May-05	N/A	N/A	N/A	N/A	N/A	12-Oct-04	N/A	N/A	N/A	14-Jan-05	N/A
Period liquidated after audit after qualification	N/A	4.2	N/A	N/A	N/A	N/A	N/A	3.6	N/A	N/A	N/A	3.5	N/A
Variables ('000)													
Working capital	-93	-2 495	20 078	-23 922	79 662	18 273	3 458	-5 116	-990	-2 883	21 542	14 453	3 736
Total assets	13 123	15 822	169 823	332 974	939 049	80 929	54 990	21 410	18 755	27 316	28 667	68 047	15 127
Retained earnings	-8 573	-13 975	-88 553	-129 323	149 252	-4 034	-4 901	-15 814	-11 250	-140 987	-265 067	-72 613	-14 562
Operating profit/(loss)	3 302	-1 855	-36 778	-3 390	101 394	-4 561	6 066	-9 531	-7 784	-1 205	-7 184	4 785	-9 985
Profit before interest and tax	3 302	-1 855	-36 693	-3 390	101 394	-2 644	6 066	-9 531	-7 784	-67 311	-7 548	5 010	-10 379
Book value of equity	11 797	2 903	87 856	65 830	326 499	40 050	4 844	352	15 516	23 276	25 722	21 258	12 355
Total liabilities	1 326	12 920	81 967	267 144	612 550	40 880	50 145	21 058	3 239	4 040	2 945	46 789	2 771
Constant term	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Market value of equity	5 770	868	321 048	4 085	386 203	11 925	30 800	7 635	42 014	37 128	62 993	25 943	4 344
Sales		30 052	86 882	11 458	841 389	113 761	174 196	135 974	430			81 449	9 130
Data source:													
- List of companies with modefied reports was obtained from the JSE (Continuing Obligations)													
- Financial statements and price data obtained from the McGregor website													