Predicting Financial Distress using Altman's Z-score and the Sustainable Growth Rate

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SUNNY ONYIRI

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Approval Page

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By

Sunny Onyiri

Approved by:

Chair: Dr. Sharon Kimmel, Ph.D. — Date: 20 December 2014

Certified by:

Committee Member: Dr. Chris Iyer, Ph.D.

Dean of School: Dr. Peter Bemski, Ph.D. — Date: 12/29/2014

Abstract

Due to the increase in corporate bankruptcy, financial distress studies have flourished since 1968. Firms do find themselves in financially distressful situations because of several factors including changing economic environment such as a decrease in aggregate demand, an increase in the cost of borrowed funds, and changes in government regulation. In addition to the Altman's z-score model, the sustainable growth rate (SGR) is another tool that is used primarily for financial planning. The problem with Altman's z-score model is that it does not consider whether a firm can be financially distressed or not if the sustainable growth rate of the firm is in fact higher than the growth rate of the firm's reported revenues. The purpose of this quantitative study was to investigate the efficacy of using ltman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate of the reported revenues. The sample for this study was drawn from all non-financial firms traded on the NYSE. The research question was investigated using two group design in two phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The Altman's z-score of the two groups were compared using Mann-Whitney *U* test to determine whether a statistically significant difference exists in the z-score. Phase 2 involved the correlation between the values of SGR and the values of Altman's z-score to determine if there was a statistically significant relationship between the two scores. The result of this research indicates that the Alman's z-score and the sustainable growth rate are conceptually independent and both can be used to ascertain whether a firm is financially distressed or not. In addition, result of this study provide practical application that could help management of firms

reach important financial and managerial decisions. While the result of this study provided useful information and added to existing knowledge on financial distress, additional research using more than one year of financial data is recommended in order to confirm the results of this study.

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Chapter 1: Introduction

Bankruptcy prediction research using different models has increased significantly in the past several years (Shiri & Raftar, 2012). Financial trepidation could happen as a result of changing economic environment such as a decrease in aggregate demand, an increase in the cost of borrowed funds, and changes in government regulation (Korol & Korodi, 2010; Aktas, Kaya, & Ozlale, 2010). Irrespective of how a company managed to find itself in a state of financial anxiety, the situation could lead to several consequences including the possibility of bankruptcy (Bhunia & Sarkar, 2011).

The Altman's z-score and the sustainable growth rate can be useful tools in the prediction of corporate financial distress (Lansdrom, Crijns, Lareren, & Smallbone, 2008). The Altman's z-score is a discriminant analysis technique widely used in the prediction of corporate bankruptcy (Alkhatib & Bzour, 2011; Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). While the Altman's z-score has produced consistent results based on financial statement data (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011), it does not incorporate growth in revenue and its effect on the overall viability of the firm when growth is not sustainable. Growth rate in revenue is the percentage increase in revenues (Cornett, Adair, & Nofsinger, 2012). In order to incorporate growth in revenue in bankruptcy prediction, it was necessary to use the sustainable growth rate. The sustainable growth rate is the growth rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008).

The Altman's z-score has been used in the prediction of financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011) while the sustainable growth rate has been used primarily as an internal planning tool (Lansdrom, et al., 2008). However, the Altman's z-score and the sustainable growth rate are not independent of each other when the growth rate in the reported revenues of a firm is incorporated into the models. The variables used in the calculation of the Altman's z-score and the sustainable growth rate are based on traditional financial data (Altman, 1968; Altman & Spivack, 1983; Palenu & Healy, 2008). For the Altman's z-score, the variables include sales, asset turnover, the ability to meet long-term financial obligation (leverage), ability to pay current maturing obligations (short-term leverage), and profitability analysis (profit margin, return on assets, and return on equity) (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). On the other hand, variables used in the calculation of the sustainable growth rate are sales, the dividend retention ratio, profit margin, financial leverage, and total asset turnover (Palenu & Healy, 2008). These variables are designed to measure the overall financial viability of the firm. However, the Altman's z-score model does not consider the growth rate of reported revenues and the sustainability of such growth. This study will investigate the efficacy of using the Altman's z-score in forecasting financial distress of firms when the sustainable growth rate is higher than the growth rate of reported revenues.

Background

Using the going concern concept, it is assumed that a company will operate for an indefinite period of time (Gibson, 2012). On the bases of this assumption, the extreme

possibility of a firm actually shutting down is not considered in the overall strategic plan of most companies. The reality is that companies do experience financial difficulties from time to time and some of these financial difficulties do in fact result to financial distress or to a total liquidation of firms (Gibson, 2011; Sormunen & Laitinen, 2012). Financial distress is a business failure where the firm is no longer operating as a going concern (Bhunia & Sarkar, 2011; Sormunen & Laitinen, 2012; Yeh, Chi, & Lin, 2014).

In order to understand business failures better, financial distress or bankruptcy prediction research using different models has flourished in the past several years. Financial trepidation could happen as a result of changing economic environment such as a decrease in aggregate demand, an increase in the cost of borrowed funds, and changes in government regulation (Aktas, et al., 2010; Korol & Korodi, 2010). Irrespective of how a company managed to find itself in a state of financial anxiety, the situation could lead to several consequences including the possibility of bankruptcy. For this reason, understanding how to help businesses avoid financially distressful situations continues to interest academic and professional researchers.

Prior to the prevalence of formal bankruptcy prediction models, traditional ratios analysis was used to determine the financial health of companies (June, 2012). By definition, financial ratios are relations between financial statement data (Monea, 2009). The most common financial statements used in ratio analysis are the balance sheet and the income statement. Other quantitative data may also be factored into ratios in order to highlight any underlying problem that may not be obvious by just observational analysis of the balance sheet and income statement numbers. Such quantitative data may be obtained from the footnotes to the financial statements (Loughran & McDonald, 2011).

Common examples of financial debt that are generally buried in the footnotes to the financial statements include lease payments and associated terms, contingent liabilities such as past and pending lawsuits, pension obligations, and settlements of previous lawsuits (Loughran & McDonald, 2011). While financial ratios provide good general information on the overall financial health of companies, they may not provide a complete picture to suggest an impending financial trouble (Smith, 1930, Kirkham, 2012). Several years of financial ratios and trend analysis are required in order to validate their usefulness. In addition, ratios analysis does not consider the changing conditions of firms. For this reason, the use of historical financial ratios alone may not necessarily indicate financial trouble (Cheng, Chu, and Ruey-Ching, 2010). In addition, the use of one-period financial information is inconsistent with the changing nature of the business environment in which companies operate (Cheng, et al., 2010).

The first meaningful bankruptcy prediction technique was developed in the 1970s. In his landmark study, Altman (1968) suggests that ordinary financial ratios alone are not enough to allow a possible forecast of bankruptcy (Altman, 1968; Altman & Spivack, 1983). In order to assess the predictive ability of various financial indicators, it is therefore necessary to look into combining ordinary financial ratios with other techniques in order to produce reliable bankruptcy forecast results. Altman, 1968 and Altman & Spivack, 1983 made a significant contribution to the development of bankruptcy resulting in the Altman's z-score. Since the two landmark studies in bankruptcy prediction (Altman, 1968; Altman & Spivack, 1983), there has been several other studies to help businesses understand and apply bankruptcy prediction models and the Altman's z-score. While the original z-score (Altman, 1968) was based on manufacturing firms, other

studies have expanded its application to other business sectors, including the pharmaceutical industry (Bhunia & Sarkar, 2011).

The history of financial distress prediction includes application of numerous statistical tools. Bankruptcy prediction models are more generally known as measures of financial distress. The three stages in the development of financial distress measures include univariate analysis, multivariate analysis, and logit analysis. Univariate analysis assumes that a single factor is able to predict the probability of a firm's financial distress. However, a single factor model does not capture other variables that may be associated with the overall financial risks of a firm. In order to overcome the limitations of the single factor model, the next stage in the history of bankruptcy prediction incorporated several variables, including working capital, assets, retained earnings, earnings prior to interest and taxes, the market value of equity, long-term debt, and revenue. The best known, and most-widely used, multiple discriminant analysis method is the one proposed by Edward Altman (1968). Altman's z-score, or zeta model, combined various measures of profitability or risk (Altman, 1968).

In addition to the one-period bankruptcy forecasting models such as ratios analysis and the Altman's z-score, other methods of bankruptcy predictions such as correlation analysis (Apegis, Sorros, Artikis, & Zissis, 2010), parametric hazard model (Cheng, et al., 2010), rolling-logit model (Chia-Liang & Kuan-Min, 2011), fuzzy logic system (Korol & Korodi, 2010), and the working capital and cash flow models (Fu, 2010) have also being used. However, none of them including, the Altman's z-score model, considered the growth dimension of the firms. (Chia-Liang, & Kuan-Min, 2011; Fabozzi, Ren-Raw, Shing-Yang, & Ging-Ging, 2010; Fu, 2010; Lin, 2009). When companies

grow at a rate that is not sustainable, they can face financial distress because available resources may not support the growth rate (Ashta, 2008). One of the goals of the manager of a firm is to grow the firm in order to maximize e current or market value of the firm (Ashta, 2008). However, growth must be sustainable in order for companies to strategically benefit from it (Raisch & von Krogh, 2007). The sustainable growth rate (SGR) is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Ashta, 2008; Cornett, et al., 2012; Palenu & Healy, 2008). As a planning tool, SGR can be used in conjunction with Altman's z-score model to help managers to incorporate possible financially distressful situations in their strategic plans.

Statement of the Problem

The Altman's z-score and sustainable growth rate can be useful tools in determining the financial viability of a firm prior to experiencing financial distress (Lansdrom, et al., 2008). While the Altman's z-score has been used in multiple financial distress studies (Chia-Liang, & Kuan-Min, 2011; Fu, 2010), none of them considered the growth dimension of the companies (Fabozzi, et al., 2010; Lin, 2009). The growth dimension of a company can be defined as the percentage increase in revenues and calculated as $S_{t2} = St_1(1 + G)$ and $G = [(S_{t2}/S_{t1})] - 1$, where S_{t2} = the reported revenues in the current year; S_{t1} = the reported revenues in the previous year and G = growth rate of revenue (Gardner, McGowan Jr., & Moeller, 2011).

According to Lansdrom, et al. (2008), sustainable growth rate is one of the dynamic strategy management tools used by companies to plan and acquire resources in order to continue growing. In previous studies, Altman's z-score and the sustainable

growth were considered independent of each other (Altman, 1968; Cornett, et al., 2012). However, if the growth in revenues is factored in, the two models are conceptually not independent because the non-sustainability of revenue streams will lead to possible financial distress (Raisch & von Krogh, 2007). While the Altman's z-score is one of the bankruptcy models that has proven to be successful in the forecast of financial distress (Bhunia & Sarkar, 2011). However, the problem with the Altman's z-score model is that it does not consider whether a firm can be financially distressed or not if the sustainable growth rate of the firm is in fact higher than the growth rate of its revenues. Analyzing and understanding this problem is important because it will help managers put together better strategic financial plans and grow their firms at a rate that is sustainable in order to avoid financial distress.

Purpose of the Study

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate of its revenues. Based on the nature of this research, the cross-sectional design will was used. The cross-sectional design involves the observation of all of a population, or a sample of the population (Pontiff & Woodgate, 2008). There was a total of 3057 U. S. domestic companies listed on the NYSE and includes companies from different industry segments (NYSE, n. d.). However, only 2,869 non-professional firms out of the 3,057 U. S. domestic firms was be included. The remaining 188 companies were not included in this study because they do not follow the traditional financial analysis procedures used in other industries (Gibson, 2011) and most of their financial ratios are not comparable with those of other industries (Gibson, 2011).

The sample for the study was drawn from the 2,869 non-professional U. S. domestic companies listed on the NYSE. The financial statements of the companies included in the sample will was used in this study. The financial statements of all U.S. publicly traded companies are reported to the Security and Exchange Commission (SEC, n. d). These financial statements are available to the public and there is no permission needed from researchers, educators, students, and financial analysts to use them (SEC, n. d.). Using G-Power statistical analysis and the Survey System (Faul, Erdfelder, Lang, & Buchner, 2007; Surveysystem.com, n. d.), the total sample for this research was 339 companies. The sample of 339 was drawn using probability sampling method. Each of the companies was assigned a number ranging from 1 through 2,869 (to correspond with the total population of 2,869). Using the Stat Trek random number generator (Stat Trek, n. d.), 339 random numbers (to match the sample size) ranging from 1 through 2,869 was generated. The companies with the corresponding random numbers were included in the study. Through the use of financial statement data of the sample of companies, the research focused on using the Altman's z-score in the forecasting of financial distress when the sustainable growth rate is higher than the growth rate of reported revenues. The research was organized in two (2) phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenue was compared by categorizing (grouping) them as higher or lower (higher and lower groups). The higher group are those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups were compared to determine if a statistical significant

difference exists between them. Phase 2 involved the correlation of SGR with the value of the Altman's z-score for the higher group and the correlation of SGR with the value of the Altman's z-score for the lower group. The purpose of performing the correlation was to determine if there is a statistically significant relationship between the SGR and the Altman's z-score.

Research Questions

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate is higher than the growth rate of its revenues. There are several methods in existence that can allow a researcher in this area to forecast a firm's possible financial difficulty including univariate, multivariate and logit analysis (Maryam & Sara, 2013; Zhou & Elhag, n. d.). However, existing financial distress forecasting methods including Altman's z-score method (Altman, 1968) do not consider the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is the percentage increase in the total revenue (Cornett, et al., 2012) and must be sustainable in order to avoid financial distress (Gardner, et al., 2011). The problem statement generated the following research question and hypotheses.

Q1: Using the Altman's z-score bankruptcy model, how does the probability of experiencing finance distress change when a company's sustainable growth rate is higher than the growth rate of its revenues?

Hypotheses

The following hypothesis was used to test the research question:

$H1_0$. The probability of experiencing financial distress is not significantly

different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

$H1_a$. The probability of experiencing financial distress is significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

Nature of the Study

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate is higher than the growth rate of its revenues. The use of Altman's z-score in the prediction of financial distress is well documented in the literature (Chia-Liang, & Kuan-Min, 2011; Fu, 2010). However, existing financial distress forecasting methods do not consider the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is measured by growth in total revenues (Cornett, el al., 2012). Such growth must be sustainable in order to avoid financial distress (Cornett, el al., 2012).

Based on the nature of this study, cross-sectional design was used. Cross-sectional is a research method involving the observation of all of a population, or a sample of the population at a specific point in time (Pontiff & Woodgate, 2008). As a descriptive research design, the use of cross-sectional does not involve the manipulation of variables (Pontiff & Woodgate, 2008). These characteristics of the cross-section design are particularly important because the data for this study was obtained and analyzed as is without manipulation. In addition, this design was most suitable in this study because cross-sectional studies involve special data collection, including questions about the past,

but they often rely on data originally collected for other purposes (Pontiff & Woodgate, 2008). In this case, the data used for this study came from the financial statements of the firms included in the study. Publicly available financial statements of a company are used for information purposes. For the purposes of this study, the publicly available financial data of the companies included were used to forecast financial distress.

The major advantage of the cross-sectional study is that the design is robust and accommodating to available data (Frank, van den Hout & van der Heijden, 2009). While some special case studies do require more specific data, for most cross-sectional studies, routinely collected data such as financial statements of companies will be generally sufficient. This allows for a quick and easy data gathering even for a large target population. Valuation of outcomes and threat the entire population can also be accomplished minimal difficulties because the date for the sample is a near-perfect view of the whole (Pontiff & Woodgate, 2008).

The research question for this study was to investigate whether the probability of experiencing finance distress changes when a company's sustainable growth rate is higher than the growth rate of the company's revenues. The research question was investigated using a two group design in two different phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenues was compared by categorizing (grouping) them as higher or lower. The higher group are those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. The

Altman's z-score of the two groups was compared to determine whether a statistically significant difference exists in z-score.

Phase 2 involved the correlation between the values of SGR and the values of Altman's z-score to determine if there is a statistically significant relationship between the two scores. Previous studies using Altman's z-score and other methods did not consider the growth rate of reported revenues. For that reason, the correlation between the SGR and the Altman's z-score was never tested (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). Phase 2 use a two-group design. One group contained companies with sustainable growth rate higher than their growth rate in reported revenues and another group contained companies with sustainable growth rate lower than their growth rate in revenues.

The values of the original Altman's z-score has a lower and upper limit of 1.81 and 3.00 points (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). When the z-score is used in the prediction of bankruptcy, a value lower than 1.81 indicates that the company will experience financial distress (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The sustainable growth rate depends on four independent factors: profit margin (operating efficiency), total asset turnover (efficiency in the use of assets), financial leverage (the use of debt versus equity to finance assets), and profit retention (reinvestment of net income into the firm rather than paying it out as dividends) (Palenu & Healy, 2008). The combination of these factors indicates whether the growth in the revenues of a firm that can be sustained without facing a financially distressful situation (Lansdrom, et al., 2008).

In order to address the research question and the hypothesis, the Mann-Whitney U test and the Spearman correlation were performed using SPSS Statistics Grad Pack 22.0 (IBM, n. d.). There multiple versions of SPSS and many can accommodate up to 50 variables and over 1,000 cases (IBM, n. d.). The variables for this study were much smaller with only 339 cases (sample size). SPSS software executes and provides several statistical descriptive data from different types of tests including parametric and nonparametric tests (IBM, n. d.). Mann-Whitney U test was compares the variations amongst independent groups (Arevalo, McCrea, &Yin, 2012).

The Spearman correlation was used to test the relationship between Altman's z-score and the sustainable growth rate (SGR). Spearman Correlation is a non-parametric test that is less sensitive to outliers (Vos, 2009) and the purpose of using it in this study was to ascertain empirical relationship between two variables and determine the probability of experiencing financial distress when the SGR was higher than the growth rate of reported revenues.

Significance of the Study

Financial distress is a business failure where the firm is no longer operating as a going concern (Bhunia & Sarkar, 2011; Sormunen & Laitinen, 2012). Beaver, Correia, and McNichols (2011) defined financial distress as "the inability of a company to pay its financial obligations as they mature" (p. 101). In such situation, the company is formally experiencing financial difficulties such that its cash inflows are insufficient to meet its debt obligations (Bhunia & Sarkar, 2011). Financial distress affects small, medium, and large companies. However, it is more prevalent among small businesses (Carter & Van Auken, 2006). Financial distress can lead to a reduction in company size, informal

reorganization, and restructuring of debts or Chapter 11 bankruptcy (Lehavy & Udpa, 2011). The most extreme form of financial distress is total liquidation of the entity or Chapter 7 bankruptcy (Jiménez, 2009). Based on the purpose of this research, no distinction was made as to whether the sampled companies are large, medium, or small size companies. However, they met the trading or listing requirements of the NYSE including the minimum financial requirements; were actively been traded in the NYSE; and they were not in any bankruptcy proceeding.

Companies experience financial distress as a result of many factors, including lack of funds (Molina & Preve, 2012), general economic conditions (Oxelheim & Wihlborg, 2012), financial frauds committed by both managers and employee (Choudhary, 2012; Patra, 2010; Shirur, 2011; Yuhao, 2010), conflict of interests between owners and managers (Young & Thyil, 2014), lack of uniformity of goals of the board of directors, or incompatible mergers and acquisitions (Fich & Slezak, 2008; Young & Thyil, 2014).

In order to avoid financial distress, this study focused on using the Altman's z-score bankruptcy model to forecast the probability of bankruptcy when a company's growth rate in revenue was not sustainable. The Altman's z-score is one of the bankruptcy models that have proven to be successful in the forecast of financial distress (Bhunia & Sarkar, 2011). However, the model does not consider the growth rate in the revenues of a firm. The benefit of including the growth rate in revenue in bankruptcy is because it may help managers put together a better strategic plan and grow their firms at a rate that is sustainable in order to avoid future financial distress.

The variables used in the calculation of the Altman's z-score and the sustainable growth rate are obtained from the same financial statements of firms. The Altman's z-score is generally used in the prediction of financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011) while the sustainable growth rate has been used primarily as an internal planning tool (Lansdrom, et al., 2008). However, since the variables used in their calculations are from the same source and are similar, the Altman's z-score and the sustainable growth rate are not conceptually independent of each other when the growth rate in the reported revenues of a firm is incorporated in the models. These variables are designed to measure the overall financial viability of the firm. However, the Altman's z-score model does not consider the growth rate of reported revenues and the sustainability of such growth. In that case, an additional benefit of this study is to contribute to the understanding of how the Altman's z-score model and the sustainable growth rate can be used together in the prediction of corporate financial distress. This will not only help firms have better strategic financial plans but will contribute to a general understanding of how sustainable growth rate can better be synchronized with the growth rate of revenues in order to avoid possible financial distress.

Definition of Key Terms

Altman's z-score. The z-score is a criterion variable used in study of corporate financial distress (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Its calculation is based on discriminant analysis technique that is widely used in the prediction of corporate bankruptcy (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Based on this model, a quantitative z-

score of 1.81 suggests that the firm has a high probability of experiencing financial distress while a z-score of 2.99 suggests that the firm has a low risk of financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011).

Bankruptcy. Bankruptcy is a situation where a company is no longer viable as a going concern (Bhunia & Sarkar, 2011). In that case, the company is no longer able to sustain its operations financially. In a bankruptcy situation, it is common for the financially distressed firm to renegotiate its debt using the bankruptcy court system (Bhunia & Sarkar, 2011).

Book value of long-term debt. The long-term debt of a firm is the debt obligations that extend beyond one accounting cycle (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). The book value of long-term debt is the unpaid balance of the debt including all capitalized interest payments associated with the debt (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011).

Capital structure. The capital structure of a firm is the extent a firm uses debt versus equity in the financing of long-term assets (Attaoui & Poncet, 2013; Brigham & Ehrhardt, 2008). The capital structure of a firm is determined by a combination the use of debt and equity such that the value of the firm can be determined as follows: V_t = debt + market equity, where V_t is the market value of the firm at a specific time, the debt is based on the book value of short- and long-term debt, and equity is based on the current market value of outstanding common stock and preferred stock (Brigham & Ehrhardt, 2008).

Discriminant Analysis. Discriminant analysis is a quantitative model that uses data to determine the outcome based on grouping (Burksaitiene & Mazintiene, 2011). In the prediction of the likelihood of a corporation's bankruptcy, the linear model of discriminant analysis uses the same concept. In this case, the model incorporates specific financial characteristics and ratios to determine the probability of bankruptcy (Burksaitiene & Mazintiene, 2011).

Financial distress. This is a business failure where the firm is no longer operating as a going concern (Bhunia & Sarkar, 2011; Sormunen & Laitinen, 2012). Amman and Hotchkiss (2006) indicated that for a company to be in financial distress, it would have had consecutive financial losses in the past several years. Molina and Preve (2012) defines financial distress as a situation where the firm's debt "coverage ratio is less than one for two consecutive years or if it is below 0.80 in any given year" (p. 190). Beaver, et al. (2011) defined financial distress as "the inability of a company to pay its financial obligations as they mature" (p. 101). In such situation, the company is formally experiencing financial difficulties such that its cash inflows are insufficient to meet its debt obligations (Bhunia & Sarkar, 2011).

Financial leverage. The capital structure of a company is the combination of the use of debt and equity in the financing of a company's operations, including long-term assets (Attaoui & Poncet, 2013; Brigham & Ehrhardt, 2008). The more debt a company has, the more likelihood it may not be able to service debts in a satisfactory manner in order to avoid possible bankruptcy (Palenu & Healy, 2008). A company must therefore decide on what is the most efficient use of its debt capacity versus the use of equity (Palenu & Healy, 2008).

Going concern. When a company is no longer a going-concern, it may be assumed the company was in a financially distressful condition (Kordestani, Biglari, & Bakhtiari, 2011). Under the going-concern assumption, a firm will keep operating as long as the business is viable (Sormunen & Laitinen, 2012). The going-concern assumption gives investors confidence (Gibson, 2012) in order to continue investing in the firm (Gibson, 2012). In this regard, the going-concern assumption does not consider the possibility that the company may experience financial hardship that may actually make it difficult for the firm to stay in business (Gibson, 2011). The going-concern is one of the assumptions that determine the qualities of financial statement items such as assets and liabilities (Sormunen & Laitinen, 2012).

Internal growth rate. The internal growth rate is the rate a company is able to support without using external funds to finance growth in assets or other types of long-term investment (Cornett, et al., 2012). The internal growth rate helps a firm determine the limit of its growth based on internally generated funds (Cornett, et al., 2012). The retained earnings of a firm determine the amount of internally generated funds available to the firm (Cornett, et al., 2012). The more a retained earning a firm has, the higher the internal growth rate (Cornett, et al., 2012).

Liabilities (debts). The liabilities are claims to assets or debts of firm that must be paid back. They include accounts payable (purchase of inventory or supplies on credit), notes payable (short-term loans), unpaid employee salaries and wages, unpaid taxes, and long-term debts such as bonds (Cornett, et al., 2012). In addition to the assets and liabilities, the equity of a firm represent the net asset. It is simply the difference between the assets and the liabilities. However, it can also be calculated independently to

include common stocks, additional paid-in capital, and retained earnings. Common stocks are the shares issued the firm while the additional paid-in capital consist of the amount paid by the stockholders' above the ordinary cost of the shares.

Market value of equity. This is the current value of the firm's outstanding common stock based on the current market price of the outstanding shares. The market value of equity is the market capitalization of a firm (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011).

Private company. A private company is a company that does not sell stock to the general public. For that reason, stock of a private company is not traded in any of the exchanges. Example of a private company is Chrysler Motor Company. While a private company must follow generally accepted accounting principles just like a public company, it is not required to file annual financial report with the Security and Exchange Commission. For that reason, the financial statements of a private company are not available to the general public including researchers.

Profit margin. The profit margin of a company indicates the percentage of total revenue or sales left after paying all normal operating expenses (Cornett, et al., 2012). A high profit margin indicates management efficiency in controlling operating costs (Palenu & Healy, 2008).

Public company. This a company that sells its stock to the general public. Examples of a public company will General Electric and Walmart. The stock of a public company is traded in one of the stock exchanges such as the New York Stock Exchange (NYSE). A public company is required to file reports (financial statements) with the Security and Exchange Commission. Such financial reports are available to the general

public and researchers. The data for this study were extracted from the archived financial reports of public companies.

Retained earnings. Retained earnings are the portion of a firm's net income that is reinvested into the company (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). The degree to which a company retains its earnings is a function of its dividend payout rate (Bhunia & Sarkar, 2011). The higher the dividend payout rate, the less net income it will retain (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Retained earnings are an important component of the Altman's z-score because it measures the overall profitability of a firm over time (Gibson, 2011).

Retention rate. This is a measure of the net profit a company retains after paying all dividends to shareholders (Cornett, et al., 2012). Retention rate is equal to the leftover income after the payment of all dividends divide by net income. Companies retain earnings for future investments such as buying new assets and expansion of existing business. Retention rate play a role in the calculation of sustainable growth rate.

Return on assets (ROA). The return on assets is a quantitative measure of how much each dollar invested asset earned (Cornett, et al., 2012). The ROA is calculated by net income divide by total assets. The more efficient the firm is in controlling costs, the higher its profit. High profits also result in high ROA (Cornett, et al., 2012).

Return on equity (ROE). Return on equity is a quantitative measure indicating the return or yield stockholders earned on their investment (Cornett, et al., 2012). ROE is calculated as net income divide by total equity. ROE measures the percentage return for each dollar in equity.

Solvency. Solvency is the ability of a firm to pay its debt obligations in order to continue operating as a going concern (Gibson, 2011; Sormunen & Laitinen, 2012). When a company is no longer able to sustain its operations financially, it will experience financial distress that may result to formal liquidation reorganization (Gibson, 2011; Sormunen & Laitinen, 2012).

Sustainable growth rate (SGR). The sustainable growth is a criterion variable and it is a ratio level measurement that is calculated using financial statement data. The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). The quantitative measure of sustainable growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Ashta, 2008). Since this a ratio scale measurement, SGR will vary depending on the actual size of each variable used in the calculation.

Total equity. The total equity of a firm represents the ownership or the stockholders' investment in a firm (Cornett, et al., 2012). Total equity is found in the balance sheet and can also be measured as the difference between the total assets and the total liability of a firm.

Total asset turnover. Total asset turnover measures how efficient a company is in utilizing its assets to generate revenue. Total asset turnover is a quantitative measure of total sales divided by the total book value of assets (Cornett, et al., 2012). High sales compared to the asset base of a company indicates efficient utilization of the assets in the overall operation of the company. A low total asset turnover rate indicates the company

may have too many idle assets that can contribute to overall financial distress (Palenu & Healy, 2008).

Working capital. This is the difference between current assets (cash, inventory, marketable securities, accounts receivables, etc.) and the current liabilities (accounts payable, wages payable, taxes payable, etc.) (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). The presence of working capital indicates short-term solvency. In that case, the firm will be able to pay its short-term debt obligations (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011).

Summary

Using different models, financial distress prognostication has substantially increased because of continuing interest to understand why companies face financial hardship. Companies experience different types of financial distress as a result of many factors including unstable micro- and macroeconomic situations, difficulties in securing needed funds for investments, mismanagement of corporate sources, differences in ownership and corporate governance, conflict of interests between managers and owners of corporations, and changes in regulations. A combination of these situations can result to financial distress and in some cases to the demise of companies.

Prior to the advent of the multivariate models, ratios were used in the analysis of the overall financial wellbeing of corporations. The overall intent of financial analysis using ratios is to determine whether a company has met its financial operating goals, highlight areas of possible improvement, and to forecast possible future problems when there is persistent deterioration in certain ratios over time. While financial ratios provide good general information on the overall financial health of companies, they may not

provide a complete picture to suggest financial trouble. Several years of financial ratios and trend analysis are required in other to validate their usefulness. Based on the limitations of financial ratio analysis, several bankruptcy forecasting models have emerged including one-period, univeriate, and the multivariate models such as the Altman's z-score.

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues of a firm. The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings. While firms need to maintain a healthy growth rate in different areas, it is equally important to grow at a rate that the company can sustain without putting their entire operations in a financial trouble. The inability of a company to maintain healthy sustainable growth rate can lead to financial distress.

To investigate the efficacy of using the Altman's z-score in the forecasting of financial distress, the research explored whether there is a change in the probability of experiencing financial distress when a company's sustainable growth rate is higher than the growth rate of its revenues. The research question was investigated using two group design in two phases. In phase 1, the SGR and the growth rate of reported revenues was compared by categorizing (grouping) them as higher or lower. The higher group are those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. Phase 2 involved the

correlation between the values of SGR and the values of Altman's z-score to determine if there is a statistically significant relationship between the two scores.

Chapter 2: Literature Review

The purpose of the literature review was to provide an examination of financial distress studies that will form the foundation for this research. The review started with the documentation process and then progress into a discussion of what financial distress is, the causes, and the types of financial distress. Bankruptcy is a type of financial distress. For that reason, it is common to use bankruptcy and financial distress interchangeably in financial distress research. In addition, the literation review included how financial distress forecasting methods such as financial ratios, Altman's z-score model, multivariate models including the parametric hazard, rolling-logit, and non-quantitative bankruptcy forecasting techniques were developed. The literature review concluded with a discussion of the sustainable growth rate and how it has been used as a planning tool by the managers in both profit and non-profit entities.

Documentation

The search process started with the selection of a research topic. The original topic for this project was "predicting financial distress using sustainable growth rate and Altman's z-score". In order to have a clear understanding of the selected topic and to see the gap that exists in financial distress studies, it was necessary to review several sources including academic books, Internet sources, and peer-reviewed journals. Academic textbooks including Brigham and Ehrhardt (2008), Cornett, et al. (2012) Gitman (2012), and Ross, Westerfield, Jaffe, and Jordan (2011) were reviewed for additional information on the meaning of bankruptcy and financial distress. In addition to the academic textbooks, the history of bankruptcy studies, including the use of ratio analysis (Alman, 1968; Beaver, 1966; Chabotar, 1989; Fitzpatrick, 1932; Smith, 1930; Yap, Yong, & Wai-

Ching, 2010) were reviewed. These articles provided additional information on the application of bankruptcy models and provided a springboard for additional reading and review of literature on bankruptcy and financial distress. Several Internal sources including www.SBA.org and www.uscourts.org were also reviewed for additional information on the selected topic. The Small Business Administration (SBA) website discussed the legal expect of bankruptcy. The U.S. Courts' website provided information on the types of bankruptcy including Chapter 7, 11, and 13. In addition to the bankruptcy information from books and websites, the NCU library link was used to search for articles in the business databases. The NCU library databases were initially used to search for key words and related terms including bankruptcy (Bhunia & Sarkar, 2011), book value of debt (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011), discriminant analysis (Burksaitiene & Mazintiene, 2011), financial distress (Bhunia & Sarkar, 2011), going concern (Sormunen & Laitinen, 2012), solvency (Bardia, 2012; Sormunen & Laitinen, 2012), and so forth. As the research progressed, the databases were used primarily for scholarly articles on bankruptcy and financial distress. The two primary databases used to search for scholarly articles are EBSCOhost and ProQuest. The EBSCOhost database is a combination of several databases including Business Source Complete and over 1,500 peer- and scholarly reviewed business publications (Library.ncu.edu, n. d.). ProQuest provided useful articles on the selected topic and included "scholarly, peer-reviewed journals, trade publications, magazines, and newspapers in the areas of business, psychology, and education. Searchable databases include ABI/INFORM Global, ProQuest Dissertations & Theses, and ProQuest Education Journals" (Library.ncu.edu, n. d., para 27).

Financial Distress

It was important to understand what financial distress was in order to put the entire research in perspective. While there are contrasting views as to how to clearly identify when a firm is financial distressed, academic literature on the subject suggests that it is a growing problem. Financial distress is a business failure where the firm no longer operates as a going concern (Bhunia & Sarkar, 2011; Sormunen & Laitinen, 2012). This view is supported by other researchers, including Amman and Hotchkiss (2006), Molina and Preve (2012), Beaver, et al. (2011).

Amman and Hotchkiss (2006) indicates that for a company to be in financial distress, it would have had consecutive financial losses in the past several years while Molina and Preve (2012) define financial distress as a situation where the firm's debt "coverage ratio is less than one for two consecutive years or if it is below 0.80 in any given year" (p. 190). However, Molina and Preve (2012) argues that financial loss may not necessarily provide a good measure of financial distress since the company may have cash reserve to cover those losses. Instead, coverage ratio provides a specific quantitative measure of a firm's ability to pay its financial commitments or debts (Molina & Preve, 2012). When the cash reserve is no longer available, a firm will find it difficult to meet its current debt obligation (Moline & Preve, 2012). Beaver, et al. (2011) supports the use of coverage ratio as indicated by Molina and Preve (2012) and defines financial distress as "the inability of a company to pay its financial obligations as they mature" (p. 101). In such situation, the company is formally experiencing financial difficulties such that its current cash inflows and cash reserve are no longer sufficient to meet its debt obligations (Bhunia & Sarkar, 2011).

Another view as to when a company is financially distressed is based on the going concern assumption. Under the going-concern assumption, it is presumed that a firm will keep operating as long as the business is viable (Bauer & Agarwal, 2014; Sormunen & Laitinen, 2012). In this regard, the going-concern assumption does not consider the possibility that the company may experience financial hardship that may actually make it difficult for the firm to continue to be financially viable (Gibson, 2011; Sormunen & Laitinen, 2012). Gibson (2012) suggests that the going-concern assumption gives the investor confidence knowing the firm will operate indefinitely. In addition, Gibson (2011) suggests that going concern assumption can only be valid in all situations considering that companies do experience financial and economic changes from time to time. This view is supported by Sormunen and Laitinen (2012) and Bauer and Agarwal (2014). The ability of a firm to continue operating as a going concern may also be hampered by deteriorating assets that may affect the firm's ability to generate sufficient revenue in order to continue operating (Bauer & Agarwal, 2014). Kordestani, Biglari, and Bakhtiari (2011) agrees with Bauer & Agarwal (2014) and suggests that the going concern assumption should be monitored so firms are not over confident in their ability to continue operating.

Factors Contributing to Financial Distress

Inability to generate long-term funds: Companies experience financial distress as a result of many factors, including the inability to raise funds on a long-term basis (Molina & Preve, 2012). Titman, Keown, and Martin (2011) indicates that how much long-term funds a company requires is determined by the company's needs to finance long-term. Long-term assets, such as buildings and machinery, and are generally financed

using long-term debt (Titman, et al., 2011). However, Moline and Preve (2012) suggests that in periods of tight monetary policy, a company's ability to raise funds is greatly diminished. When a company is unable to raise funds on a long-term basis (beyond one year), it is expected that it will not be able to make sustainable long-term investment in assets or expand current operating facilities (Molina & Preve, 2012; Tilman, et al., 2012). In such situation, Molina and Preve (2012) indicated that companies will generally rely on short-term funds. Block, Hirt, and Danielson (2011) and Tilman, et al. (2012) argue that the use of short-term debt as suggested by Molina and Preve (2012). However, the use of short-term funds (debts that a company is required to repay within one accounting cycle or one year) to finance long-term assets may lead to financial disaster because the debts and assets financed are not synchronized (Block, et al., 2011). Lack of synchronization indicates that cash flows from assets financed does not occur at the time when the repayment on the debt used is due (Block et al., 2011). In such case, payment of the debt is due earlier than the actual generation of cash from the assets (Block, et al., 2011). Tilman, et al. (2011) indicated that the use of short-term funds to finance the majority of a company's operation greatly decreases general operating and financial results. Tilman, et al. (2012) suggests that company should only elect to use short-term in situation where long-term funding is unavailable. However, this situation may further drive the company into financial distress because they may not be able to generate sufficient income to pay off the short-term debt (Tilman, et al., 2011).

Financial misappropriation: Financial fraud also contributes to corporate financial distress (Yuhao, 2010). Financial fraud is a situation in which the legal and ethical management of financial resources does not take place (Zahra, Priem, & Rasheed,

2007). Recent cases of financial distress that resulted from financial fraud include Enron, Health South, and Tyco (Choudhary, 2012; Patra, 2010; Shirur, 2011; Yuhao, 2010). These frauds are usually committed at a level of management where internal controls can generally be easily compromised (Hogan, Rezaee, Riley, & Velury, 2008). Hogan, et al. (2008) argues that frauds are usually complicated and are hidden in a nexus of transactions, which are difficult to disentangle. According to Silver, Fleming and Riley (2008), one of the common frauds is financial statement fraud. Albrecht, Albrecht, Albrecht, & Zimbelman (2012) agrees with Fleming and Riley (2008) and indicates that financial fraud can include, but is not limited to, understating or overstating liabilities; omission of materials financial information from financial statements; recognition of unearned revenue; improper use of non-GAAP financial measures; off-balance sheet financial arrangements; misappropriate funds or other resources and much more (Albrecht, Albrecht, Albrecht, & Zimbelman, 2012). Recent research on financial fraud reports that "asset misappropriations account for 91.5% of reported frauds, with a median loss of $150,000" (Silver, et al., 2008, p. 47). In addition, Silver, et al. (2008) indicates that "losses from some of the more recent fraudulent financial reporting schemes aggregate into the billions of dollars (e.g., Enron and WorldCom), and the largest dollar value losses are often committed by a cabal of owners or executives" (Silver, et al., 2008, p. 47). In the case of Enron and WorldCom, the financial fraud led to their financial distress and these companies were eventually liquidated (Patra, 2010; Shirur, 2011; Yuhao, 2010).

General economic conditions: External environmental factors affect the viability of a company at different times (Madrid-Guijarro, Garcia-Perez-de-Lema, & van Auken,

2011). These external factors include macroeconomic issues that are generally beyond the immediate control of a company (Madrid-Guijarro, et al., 2011; Oxelheim & Wihlborg, 2012). Among the macroeconomic factors that may lead to financial distress are interest rate, inflation, monetary policy, and worldwide macroeconomic issues such as oil price and debt crisis (Korol & Korodi, 2010). Ildiko, Zoltán-Krisztian, Orsolya, and Nicoleta (2011) extends Korol and Korodi's (2010) research and classified these macroeconomic variables into different groups including, "cyclical indicators, household indicators, corporate indicators, external sector indicators, price stability indicators and interest rates, loans to private sector and capital market indicators" (p. 207). Earlier research classified macroeconomic factor as exogenous variables (Korol & Korodi, 2010). Such classification is necessary because these macroeconomic variables are prompts for intramural business failure as suggested by (Korol & Korodi, 2010). In addition to Korol and Korodi (2010), some of these macroeconomic indicators have been extensively researched in order to determine how they contribute to the incidence of financial distress (Ali & Daly, 2010; Bonfim, 2008). Lin (2009) performed a statistical analysis on macroeconomic variables using logit technique. Based on the logit results, Lin (2009) concluded that a major factor affecting company failure rate is the overall economic circumstances within which companies are operating. The concloirmusion is consistent with Jin, Bessler, and Leatham (2013) study. They indicated that financial distress of businesses in the U. S. is a result of many macroeconomic factors including "aggregate corporate profits, the producer price index, the interest rate, and stock market performance" (Jin, et al., 2013, page 179).

In addition to the overall economic conditions, Shiller (2011) indicated that the effects of monetary policy can also affect the survival of a firm. Monetary policy by definition is the method through which money supply is controlled (Shiller, 2011). VanHoose (2008) and Shiller (2011) argue that monetary policy affects not only the supply of money, but has a significant effect on interest rate, employment rate, and availability of financial institutions' loanable funds. The incidence of financial distress increases when regulators tighten the monetary policy because there is less money available for loans (Aktas, et al.,, 2010). Since monetary policy affects interest rate as indicated by VanHoose (2008), Aktas, et al. (2010) concludes that tight monetary policy makes borrowing more expensive. Aktas, et al. (2010) and VanHoose (2008) agree that when borrowing becomes more expensive, business investment decreases which results to increase in business closures.

Economies in different parts of the world depend on each other for survival. For this reason, economic crisis in one region generally affects the economies of other regions (Bhattacharjee, Higson, Holly, & Kattuman, 2009). Bhattacharjee, et al. (2009) indicated that "the incidence of bankruptcy is high during years when the economy turned down and after a peak, and lower during upturns" (p. 13). Bhattacharjee, et al. (2009) suggests that the effect of a bad economy in one part of the world is exacerbated because of the interdependency of each country on one another and can contribute and have contributed to financial distress of companies. Aktas, et al. (2010) agrees with Bhattacharjee, et al. (2009) and suggests that the effects of bad economy affect small, medium, and large business. In addition, smaller businesses are particularly vulnerable to bad economic condition because they are most likely to be affected by changes in

consumer demand, tightening of credit by banks, and lack the ability to restructure existing debt (Yallapragada & Bhuiyan, 2011). The combination of these unfavorable macroeconomic conditions lead to increased rates of bankruptcy for smaller businesses (Yallapragada & Bhuiyan, 2011).

Size of the firm: According to Yakkapragada and Bhuiyan (2011), "a small business entrepreneur is defined as an individual who establishes and manages a business for the principal purpose of profit and growth" (p. 117). The U. S. Small Business Administration (SBA) is the leading government agency that determines when a business is identified as a small business. According to the SBA (n. d.), to be classified as a small business, it must be operated as a profit making entity. Depending on the specific industry in which the business operates, the number of employees of a small business can vary from 100 to 1,500 (SBA, n. d.). In addition to using employees, the SBA (n. d.) also uses annual sales to identify small businesses. The total sales used by the SBA varies depending on the industry. Annual sales for small businesses varies from $500,000 for agricultural entities to $17 million for construction firms (SBA, n.d.).

The size of a firm contributes significantly to the firm experiencing financial distress because they are most likely to be priced out of market when the overall economic conditions is bad (Vlad, 2009; Yallapragada & Bhuiyan, 2011). Chan (2012), Vlad (2009) and Yallapragada and Bhuiyan (2011) argue that irrespective of the industry in which the small business is operating, majority of them experience financial distress at different times and the most contributing factor to financial distress for small businesses is lack of financing. In addition to lack of financing, Carter and Van Auken (2006) indicates that there are many other factors contributing to small business failure in the

U.S. and around the world. Carter and Van Auken (2006) indicates that some of these factors include fraud management experience, competition, and government regulation. Based on Malach, Robinson and Radcliffe (2006) and Vlad (2009), the factors identified by Van Auken (2006) correlate with the overall small business failure rate. While these factors can affect medium and large business, Carter and Van Auken (2006), Robinson and Radcliffe (2006) and Vlad (2009) agree that their effects are more pronounced on small business.

Ownership and corporate governance. Corporate governance is a series of strategic actions promulgated and monitored by the governing board of directors of a firm for the purposes of assigning responsibilities to specific individuals or departments within the firm (Young & Thyil, 2013). According to Aras and Crowther (2008) and Young and Thyil (2013) agree that the continued sustainability of firms is largely dependent on the characteristics and the actions of the governing body. Previous research by Fich and Slezak (2008) indicates that the ownership characteristics and the characteristics of the corporate governing body can and have contributed to the success or failure of companies (Fich & Slezak, 2008). Fich and Slezak (2008) used publicly available information of companies in the U. S. to study how governance characteristics a firm affects the firm's ability to avoid bankruptcy. Fich and Slezak (2008) used regression techniques to analyze the characteristics of the board of directors. The findings indicate that a distressed firm's governance characteristic significantly affect its probability of bankruptcy. This conclusion is consistent with Huang and Zhao's (2008) study. Huang and Zhao (2008) examined the relationship between corporate governance and financial distress and concluded that companies are most likely to be financially distressed if there the owners

of the firm are not in the governing body (Huang & Zhao, 2008). The researchers used data of 193 financially distressed listed companies in China from 2000 to 2006 to study the relationship between how a company is governed and financial distress (Huang & Zhao, 2008) using regression analysis. Based on the effects of the internal and external environment of companies, the paper argued that the way in which a company is governed makes a difference as to whether it faces a financially distressful situation or not (Haung & Zhao, 2008). The research concluded that balancing ownership and the governance of a firm can contribute to a reduction in financial distress (Huang & Zhao, 2008).

Conflict of interest between the owners and the managers. Conflict of interest arise as a result of incompatible objectives between owners and the managers of the firm. Burksaitiene and Mazintiene (2011) indicated that when the actions of the managers conflict with the owners' objectives, the firm can experience financial distress. Burksaitiene and Mazintiene (2011) used data on types of managers and owners of public corporations was used to study four types of failure and to examine whether the types of failures are corrected with the characteristics of managers and owners. Using multivariate regression analysis (a variation of Altman's z-score), Burksaitiene and Mazintiene (2011) concluded that the characteristics of managers, and owners, and the general characteristics of the types of failures are highly correlated. Based on the Burksaitiene and Mazintiene (2011) study, when there is a direct conflict between managers and owners, the chance of financial distress increases. The causes of financial distress based on the characteristics of the managers include wrong management decisions and inability of the managers to align corporate policies with appropriate external factors (Burksaitiene

& Mazintiene, 2011). Burksaitiene and Mazintiene's (2011) observation is consistent with the findings of Fich and Slezak (2008) and Huang and Zhao (2008). Conflict of interests within the governing body of a firm has a direct effect on the whether a company is financially distressed or not especially when some members of the governing body align themselves with the company's managers (Fich & Slezak, 2008; Huang & Zhao, 2008).

Conflict of interests as a source of business failure was further examined by other researchers based on the ownership structure and the actual governing body of an entity. In most corporations, shareholders may not necessarily be the managers of a corporation and may not be involved in the day-to-day operations of the entity (Dawson, Watson, & Boudreau, 2010; Heath, 2009; Nyberb, et al., 2010). For this reason, the owners will generally engage the services of others who are competent enough to run the corporation (Dawson, et al., 2010). These managers and employees of the corporation are considered agents. They are appointed for the sole purpose of representing the corporation and the wishes of the owners of the corporation (Dawson, et al., 2010). On the basis of this contractual obligation, Dawson, et al. (2010) argues that conflicts between the owners and the agents can emerge. Dawson's et al. (2010) argument is supported by Laux (2010) and Miller and Sardais (2011). According to Laux (2010), the principals or owners want to maximize their return on investment while the agents would like to extrapolate or take as much resources in the form of compensation from the principal (Miller & Sardais, 2011). For this reason, an agent-principal relationship leads to conflict of interests (Miller & Sardais, 2011). The conflict of interests resulting from an agent-principal relationship can result and have resulted to the financial distress of corporations. Recent cases that

highlights the the views expressed by Dawson, et al. (2010), Laux (2010), and Miller and Sardais (2011) include Enron, Satyam, Adelphia and many others (Heath, 2009, Kristine, Hanne, & Iris, 2009; Yuhao, 2010; Zona, Minoja, & Coda, 2013).

The conflict of interest between agents and the owners of a corporation is an agency theory problem (Kren & Tyson, 2009). This view is supported by other researchers including Dawson, et al. (2010), Miller and Sardais (2011), and Nyberg, Fulmer, Gerhart, and Carpenter, (2010). The agency theory is used to justify why members of the stakeholders' group (i. e., the agents) acts to protect their best interests (Dawson, et al., 2010; Miller & Sardais, 2011; Nyberg, et al., 2010). In this case, there are competing goals between the principal and the agents (Dawson, et al., 2010; Kren & Tyson, 2009; Miller & Sardais, 2011; Nyberg, et al., 2010). The interest of the principal is to maximize return by making a profitable investment. While the agents also have an interest in the overall viability of the entity, they are also interested in increasing their total compensation and other benefits (Kren & Tyson, 2009). In this regard, the principle and the agent must be able to maximize all benefits accruing to them (Nyberg, et al., 2010).

Based on Kren and Tyson (2009) case study, one of the reasons for conflict of interest between the principal and the agent is lack of uniformity of goals. "Lack of goal congruence arises among managers, their superiors, and other stakeholders because managers' value goals of self-interest, such as pay, promotion further career opportunities and leisure time" (Kren & Tyson, 2009, p. 13). In addition to Kren and Tyson (2009), Baeten, Balkin and Van den Berghe (2011) suggests that to control these conflicting of interests between agents and principal, owners must have conditions that make it difficult for agents to act outside the interest of the entity. In that case, the agency theory indicates

that when the limiting conditions are specified in the relationship, self-interest behaviors of agents are generally reduced (Baeten, et al., 2012). Baeten, et al. (2012) concludes that the reduction in the conflict between agents and owners, will reduce the incidence of financial distress emanating from conflicting interests between these entities (agents and owners).

Mergers and acquisition. A merger is a situation when two or more firms combine their resources to form a single entity (Feyi Akinbuli, & Kelilume, 2013). However, mergers and acquisition can contribute to financial distress if such merger is not managed correctly (Feyi Akinbuli, & Kelilume, 2013). According to Feyi Akinbuli and Kelilume (2013), corporate organizations facing difficulties have in recent times often followed or are compelled by regulators to follow the path of extensive reconstruction through mergers and acquisitions, apparently as the only option to liquidate. The result of Feyi Akinbuli and Kelilume (2013) study found evidence to support that mergers and acquisitions are not a prima facie solution to the problem of financial distress in corporate organizations. This is more so when there are more regulation imposed on entities than business driven environment (Feyi Akinbuli, & Kelilume, 2013). While it is possible for a business combination to produce substantive profit, it is also possible for such combination to lead to financial distress because operating efficiency generally take a back sit in the short-run. (Feyi Akinbuli, & Kelilume, 2013).

Types of Financial Distress

Companies experience financial distress as a result of many factors including the inability to raise funds on a long-term basis (Molina & Preve, 2012), macroeconomic

issues, management and employee frauds, conflict of interests, and merger and acquisition (Zona, et al., 2013). Financial distress affects small, medium, and large companies. However, it is more prevalent among small businesses (Carter & Van Auken, 2006). Financial distress can lead to a reduction in the company size, informal reorganization, and restructuring of debts or Chapter 11 bankruptcy (Couwenberg & Lubben, 2011; Heron, Lie, & Rodgers, 2009; Wang, 2012). The most extreme form of financial distress is total liquidation of the entity or Chapter 7 bankruptcy (Weil, 2010).

Informal reorganization. When a company is financially stressed, one of the options is to informally reorganize itself (Sehoon & Sang, 2010). This situation will exist if the owners and management of the company determine that the company is still economically viable despite the current financial situation (Sehoon & Sang, 2010). Wang (2012) and Eraslan, (2008) study is consistent with Sehoon's and Sang's (2010) observation and suggests that financial distress may be as a result of brief interruption in business and can be redeemed with some changes. Wang (2012) and Eraslan, (2008) indicates that such changes need to include informal reorganization. In an information reorganization, the company solicits the cooperation of its creditors for debt forgiveness, reduction in the amount owed, refinancing the entire debt with new terms or an extension of repayment (Eraslan, 2008; Wang, 2012). In such case, creditors are generally willing to work with their debtors (Eraslan, 2008). Fisher and Martel (2009) supports Eraslan's (2008) study and concludes that in the majority of cases, extended repayment plans works for both the company and the creditors because the company is able to continue operating while the creditors are able to recoup some of the debt. In addition, Elkamhi, Ericsson and Parsons (2012) and Singhal and Zhu (2013) indicate that administrative costs such as

legal fees are usually less when a company uses an informal reorganization and reorganization time is also shorter compared to the lengthy procedure associated with formal liquidation

The use of informal reorganization may be preferred based on perceived risks of additional lawsuit (Singhal & Zhu, 2013; Schwarcz, 2011). Singhal and Zhu (2013) and Schwarcz (2011) concluded that in situations where the risk of lawsuit from creditors is high, financially distressed firm will generally opt for a formal bankruptcy procedure through the court. Since informal reorganization is an arrangement between the financially distressed firm and its creditors, it is possible for a "creditor-holdout problem" (Schwarcz, 2011, p. 322) to exit. When this problem exist, some of the creditors may not agree with the settlement outcome and may have a recourse through the court system (Schwarcz, 2011). If there is an indication disagreement between the firm and some of the creditors, the firm will generally go through a formal reorganization based on existing bankruptcy laws (Schwarcz, 2011)

A variation of an informal reorganization is an informal liquidation (Balcaen, Manigart, Buyze, & Ooghe, 2012; Wood, 2011). According to Balcaen, et al. (2011), 44% of bankruptcy situations in Belgium are informal. In this case, the debtors and the owners of the company have determined that the assets of the company are worth more if they company is liquidated as oppose to allowing the company to stay in business (Balcaen, et al., 2011). In an informal liquidation, the firm is assigned to a third party liquidator (Balcaen, et al., 2011). The third party organizes a private sale to formally liquidate or dispose the assets of the company (Balcaen, et al., 2011). Any funds realized from the sale of the assets are used to settle or discharge the debts (Balcaen, et al., 2011).

When this option is used in a financially distressful situation, the company and its debtors avoid lengthy court procedures and all the associated costs (Balcaen, et al., 2011).

Restructuring (Chapter 11 bankruptcy). When a company is financially distressed, one option is restructuring (Carter & Van Auken, 2006). Restructuring is a form bankruptcy under the U.S. bankruptcy laws (SBA, n. d). While there are many chapters in the U.S. bankruptcy laws, Chapter 11 is specifically designed to allow companies that are financially troubled to file a formal petition in a U.S. bankruptcy court (www.uscourts.gov, n. d.). According to Bhattacharjee, et al. (2009), in general, the use of Chapter 11 is advised if the shortage in cash inflows is considered temporary and can be resolved with formal extension of debt repayment, reduction of interest and principal payments, conversion of debt instrument into equity securities, re-negotiation of employee contracts such as salaries and pension benefits, and forgiveness of debt. Examples of companies that recently used Chapter 11 reorganization include, K-Mart, United Airlines, General Motors, and many more (Lehavy & Udpa, 2011; Martin & Schrum, 2010).

The purpose of Chapter 11 is to allow a firm sufficient time to take a closer look at the debt situations of the firm (Bhattacharjee, et al., 2009). During the Chapter 11 reorganization process, creditors' collection actions are automatically halted (Bhattacharjee, et al., 2009). When a firm is financially distressed, reorganization under Chapter 11 bankruptcy may be initiated by creditors or by the management of the firm (Lehavy & Udpa, 2011). When Chapter 11 is initiated by the creditors, the firm is essentially forced into reorganization procedures (Lehavy & Udpa, 2011). However, when the management of the company decided to seek court protection under Chapter 11,

such action is considered voluntary (Balcaen, et al., 2011). Irrespective of who initiated Chapter 11 action, Schwarcz (2011) indicates that Chapter 11 bankruptcy is preferred because the company will avoid "creditor-holdout problem" (p. 322). This problem will exist when there is no agreement among the creditors on how the firm should settle its debt obligations. Bhattacharjee, et al. (2009) and Heron, et al. (2009) agree that if both parties (company and the creditors) reach an agreement under Chapter 11 reorganization, creditors must abide by the stay order issued by the court. In that case, the creditors cannot take further legal actions against the financially troubled firm (Bhattacharjee, et al., 2009; Heron, et al., 2009). While a firm in financial distress can arrange for informal reorganization, Balcaen, et al. (2011), Bhattacharjee, et al. (2009), Heron, et al. (2009) and Lehavy and Udpa (2011) agree that sometimes it is better to use Chapter 11 because it gives the firm a fresh start. In such situation, the researchers concluded that the financial viability of the firm increases because they are longer in debt.

Under the formal bankruptcy such as Chapter 11, the administrative procedure may differ depending on the area of the world in which the firm is located (Bhattacharjee, et al., 2009). In the U.S., the use of Chapter 11 leaves the current management of the firm in charge of the firm during the entire reorganization process (Bhattacharjee, et al., 2009). However, in other areas of the world, this may be different. In the United Kingdon for example, reorganization of a firm is accomplished under the creditors' supervision and the management of the firm is replaced by the creditors (Bhattacharjee, et al., 2009).

Liquidation (Chapter 7). The most extreme form of financial distress is liquidation of the firm using chapter 7 of the U.S. bankruptcy code (Jiménez, 2009). In this situation, the firm is considered insolvent and the firm is technically worth more if

liquidated than staying in business (Balcaen, et al., 2011). The liquidation of a firm in the United States is governed by the rules of Chapter 7 of the Federal Bankruptcy Act (uscourts.gov, n. d.). Based on U.S. bankruptcy laws, chapter 7 bankruptcy liquidation begins with the business entity formally filing a petition with the federal court serving the area in which the business is located (uscourts.gov, n. d.).

History of Financial Distress Prediction

Businesses make decisions based on current and future operating conditions. The use of financial distress studies can contribute to improved financial decisions (Li & Sun, 2013). The first meaningful bankruptcy prediction technique was developed in the 1970s. In his landmark study, Altman (1968) suggests that ordinary financial ratios alone are not enough to allow a possible forecast of bankruptcy (Altman, 1968; Altman & Spivack, 1983). In order to assess the predictive ability of various financial indicators, it is therefore necessary to look into combining ordinary financial ratios with other techniques in order to produce reliable bankruptcy forecast results. This study made a significant contribution to the development of bankruptcy resulting in the Alman's z-score.

Ratio Analysis. Prior the prevalence of formal bankruptcy prediction models, traditional ratios analysis was used to determine the financial health of companies (June, 2012). June (2012) and Monea (2009) defines financial ratios as the relationship between financial statement data. Based on June (2012) and Monea (2009) studies, the most common financial statements used in ratio analysis are the balance sheet and the income statement. In addition, Loughran and McDonald (2011) indicates that other quantitative data may also be factored into ratios in order to highlight any underlying problem that may not be obvious by just looking at the balance sheet and income statement numbers.

Such quantitative data may be obtained from the footnotes to the financial statements. Common examples of financial debt that are generally buried in the footnotes to the financial statements include lease payments and associated terms, contingent liabilities such as past and pending lawsuits, pension obligations, and settlements of previous lawsuits (Loughran & McDonald, 2011).

The intent of financial analysis using ratios is to determine whether a company has met its financial operating goals, highlight areas of possible improvement, and to forecast possible future problems when there is persistent deterioration in certain ratios over time (Smith 1930). Smith (1930) used financial ratios to understand why a group of companies failed. In Smith's (1930) study, financial statements of 29 bankrupt companies were analyzed to determine why they had financial hardship. Several financial ratios were calculated including profit margin, debt ratio, relationship of net worth to assets, working capital, the ratio of current liabilities as a percentage of current assets, accounts receivable as a percentage of assets, the ratio of cash to all assets, and the percentage of inventory to assets. Smith (1930) used Moody's Industrial Manual to select 225 companies including 29 bankrupt firms. A 10-year trend analysis of each of the companies indicated that 45% of the bankrupt firms in the study had several financial difficulties at least six years prior to the actual failure year (Smith, 1930). Smith (1930) concluded that the companies in the study would have survived if they used ratio analysis as a planning tool prior to experiencing financial difficulties.

Continuing the work of Smith (1930), Fitzpatrick (1932) also used ratios analysis to understand the overall financial health of companies including an analysis of how managers interpret and use ratios for planning purposes. Fitzpatrick (1932) the financial

statements of 39 of companies drawn from different industries. Out of the 39 companies included in the study, 20 were bankrupt firms and 19 were financially healthy firms. In contrast to Smith (1930) study, Fitzpatrick (1932) used two-group design in the analysis of healthy and bankrupt firms. The purpose of the study was to compare the two groups based on their financial statement ratios. Fitzpatrick (1932) used 13 different ratios similar to Smith's 1930 study. The ratio analysis in this study indicated that the financial conditions of bankrupt firms deteriorated significantly prior to the year they ceased to be going concerns (Fitzpatrick, 1932). The finding in this study suggests that financial ratios are good indicators of the financial health of a firm and can be used as an effective planning tool for managers (Fitzpatrick, 1932). This conclusion is consistent with Smith (1930) and Beaver (1966) studies.

Continuing Smith (1930) and Fitzpatrick (1932) studies, Beaver (1966) used a sample of 158 firms to analysis the usefulness of financial ratios in financial distress prediction. Out of 158 firms included in this study, 79 were bankrupt firms. The use of both financially healthy and bankrupt firms is similar to Fitzpatrick (1932) study. However, Beaver (1966) used only six different ratios compared to at least 13 ratios using in Smith (1930) and Fitzpatrick (1932) studies. In Beaver (1966) study, the financial ratios included were net profit to assets, debt to assets, working capital, short-term assets to short-term liabilities, the percentage of cash flows to total assets, and cash flows to debt. Beaver (1966) argued that these basic ratios are the key to understanding the overall financial health of a firm. Based on Beaver (1966) study, the short-term asset to short-term liabilities ratios proved to be most useful the in the prediction of financial distress. The study concluded that the short-term assets to short-term liabilities ratio is the

best indication of a firm's current financial situation (Beaver, 1966). This conclusion notwithstanding, Beaver (1966) indicated that ratios are good in the prediction of possible financial problems if there is an existing benchmark or can be carried over several periods. The limitation observed by Beaver (1966) is supported by Chabotar (1989). According to Chabotar (1989), the ratios are not generally a good indication of a firm's financial problems unless they can be compared to previous periods in order to establish trends that could indicate possible financial hardship.

Historically, Smith (1930), Fitzpatrick (1932), and Beaver (1966) are important milestones in the use of ratios to predict the firms' financial distress. These studies are supported by recent research in bankruptcy prediction. Among the most recent studies in the use of ratios analysis are Yap, et al. (2010) and Kirkham (2012). According Yap, Yong, and Wai-Ching (2010), periodic evaluation of a firm's financial health is good because it provides managers with current information on possible financial problems that may not be obvious by simply looking at the raw data contained in financial statements. The use of financial ratio analysis is one way to determine if a firm is financially healthy (Yap, et al., 2010). Yap, et al. (2010) focused on 16 financial ratios that measure a firm's liquidity, profitability, solvency, and efficiency. These ratios are similar to the once in Smith (1930), Fitzpatrick (1932), and Beaver (1966) studies. The financial data of 32 bankrupt firms and 32 healthy firms were analyzed based on 16 selected ratios. The use of both financially healthy and bankrupt firms is similar to Fitzpatrick (1932) and Beaver (1966) studies. As in Fitzpatrick (1932) and Beaver (1966), the purpose Yap, et al. (2010) was to compare the financial performance of the two groups of companies five years prior to the year of study (Yap, et al., 2010). Based

on the analysis of the selected ratios, the result indicated between 88% and 94% predictive accuracy for each of the five years prior to the actual year in which the companies failed. Yap, et al. (2010) indicated that the use of ratios in the prediction of a firm's financial distress must be done in addition to the use of multiple regression. Nonetheless, Yap, et al. (2010) concludes that the use of financial ratios can produce a reasonable prediction provided it is done based on several years of financial data (Yap, et al., 2010). This conclusion is consistent with other studies including Smith (1930), Fitzpatrick (1932), Chabotar (1989), and Beaver (1966). These researchers agree that ratios are good in the prediction of possible financial problems if there is an existing benchmark or need to be done over several periods in order to establish trends that can be used as benchmark.

While Yap, et al. (2010) focused on 16 different financial ratios from the balance sheet and income statements of bankrupt and health firms, Kirkham (2012) used information from the statement of cash flows. Although Yap, et al. (2010) study is important, it does not demonstrate the current cash position of a firm. Cash position of a firm is documented in the statement of cash flows. The statement of cash flow ratios used in this study includes the cash flow ratio, critical needs cash coverage (a combination of net operating cash flows, interest paid, and current liabilities), and the cash interest coverage (a combination of net operating cash flows, interest, and tax) (Kirkham, 2012). Kirkham (2012), argues that these ratios are important in the understanding of the immediate cash needs of a firm because the continuing existence of a firm is determined by the firm's ability to service its debt obligations. As in previous studies such as Smith (1930), Fitzpatrick (1932), Chabotar (1989), Beaver (1966), Yap, et al. (2010), Kirkham

(2012) also concluded that several years of financial ratios are necessary in order to reach a meaningful conclusion as to the usefulness of the ratios in predicting the financial viability of a firm.

The Altman's z-score. The Altman (1968) forms the foundation of modern bankruptcy studies. Altman's (1968) study used publicly available data on listed companies to develop a model for the prediction of an entity's bankruptcy. Based on this study, Altman (1968) indicated that the simple nature of financial analysis using ratios makes it unimportant in academic research. While financial ratios continue to be used in the analysis of the overall financial condition of firms, Altman (1968) suggested that discriminant analysis method that includes the financial statement ratios will produced better statistical result. In its initial test, the Altman (1968) z-score was found to be 72% accurate in predicting bankruptcy two years prior to the event, with a Type II error. In a series of subsequent tests covering several years the model was found to be approximately 80–90% accurate in predicting bankruptcy one year prior to the event, with a Type II error (Altman, 1968).

The Altman's z-score is based on a multiple discriminant analysis concept (Altman, 1968). While the model was originally developed based on data obtained from companies operating in the manufacturing industry, its application and validity has been expanded to other sectors. The factors used in the calculation of the Altman's z-score is based on traditional financial data to include asset turnover, the ability to meet long-term financial obligation, ability to pay current maturing obligations, and profitability analysis (Altman, 1968). Based on these financial quantitative factors of the companies Altman (1968) developed a bankruptcy prediction model such that $Z = 0.012X_1 + 0.014X_2 +$

$0.033X_3 + 0.006X_4 + 0.010X_5$. Based on this model, a quantitative z-score of 1.81 and below suggest that the firm has a high probability of experiencing financial distress while a z-score of 2.99 and above suggest that the firm has a low risk of financial distress (Altman, 1968). Companies that fall between 1.81 and 2.99 are at moderate risk of experiencing financial distress (Altman, 1968). However, such risk can be minimized if financial planning such as increasing sales, controlling expenses, and securing long-term financing is implanted (Altman, 1968).

In Altman's z model, X_1 represents the ratio of working capital to the total book value of assets. Working capital by definition is the difference between current assets and the current liabilities. A positive working capital indicates that the current assets are greater than the current liabilities (Gibson, 2011). The total assets as used in Altman's (1968) study is based on the historical book value of the assets in the balance sheet. The relationship of the working capital and the total assets of a company measures the current liquidity or the ability to meet maturing financial obligations. The second variable (X_2) in Altman's z-score relates to the relationship between retained earnings and the total book value of assets (Altman, 1968). To measure the relationship in the original z-score model (Altman, 1968), retained earnings is divided by the total book value of assets. The more a company is able to retain earnings in the previous years, the higher the value of the X_2 variable (Altman, 1968). A low value of the X_2 variable also lowers the Altman's z-score (Altman, 1968). The X_3 variable in Altman's z-score is calculated by dividing earnings before interest and taxes (EBIT) by the total book value of assets. It measures the productive efficiency of a company's total assets without considering the effects of interest payment on debt and taxes (Altman, 1968). A low value of this value may

indicate the assets are less productive or may have a large asset base that are not fully utilized in the production process. The fourth variable (X4) in the model is calculated by dividing the value of equity by the book value of total debt (Altman, 1968). Equity in Altman's model is measured based on the value of all outstanding stocks, additional paid-in capital and preferred stocks. The value of debt is measured based on the current market value of all debts including current liabilities and long-term debt (Altman, 1968). This variable provides a quantitative measure on how low the total value of assets can decline before the company can become bankrupt or at least begin to experience financial instability (Altman, 1968). Altman's (1968) study indicated that as the value of this decrease, the z-score also decreases. The decrease in this value could be as a result of the total decrease in the value of the company's equity or an increase in total debt relative to the value of the equity (Altman, 1968). This ratio is also a measure of the level of risk the equity holders (stockholders) are bearing based on the total debt obligation of the company. The fifth variable (X_5) measures the relationship between total sales and book value of assets (Altman, 1968). The quantitative result of this variable indicates how much sales are produced per dollar in assets (Altman, 1968). When the value of this variable decreases over time, it indicates the company is not generating sufficient sell relative to the total value of the assets (Altman, 1968). A low value of X5 variable may also indicate that an increase in the total asset base of the company without a corresponding increase in total revenue. A low X5 variable decreases the value of the z-score (Altman, 1968). In that case, the company's chances of financial distress increases (Altman, 1968).

Altman and Spivack (1983) continued the analysis of the Alman's z-score by comparing it to the Value Line Relative Financial Strength System (VLRFSS). The VLRFSS is a classification system that can be used to determine the overall financial viability of a firm. VLRFSS uses the quantitative measures derived from a firm's financial statements (Altman & Spivack, 1983). Such measures include profit, level of debt obligations, size of the firm, and the changes in total market value of the firm based on market price of the stock (Altman & Spivack, 1983). The combination of these quantitative values allows Value Line to rank firms from 1 through 5 (Value Line, n. d.). Where rank 1 indicates safety and low risk; rank 2 indicates that investment in the company is safe, but carries a level of risk that is less compared to most companies; rank 3 indicates moderate risk; rank 4 indicates that investment in the company is less safe and carries a level of risk that is higher compared most companies; rank 5 indicates that investment in the firm is very risky and such firm is mostly likely to experience financial distress (Value Line, n. d.). Altman and Spivack (1983) used data from VLRFSS to do a comparative study on bankruptcy prediction. Altman and Spivack (1983) used two-group design similar to the Altman (1968) study and applied the Altman's z-score to one group and the VLRFSS to another group. The z-score model of bankruptcy classification and the Value Line Relative Financial Strength System classified public corporations according to characteristics of financial health (Altman, 1968; Altman & Spivack, 1983). Altman's z-score (1968) used financial variables to discriminate between bankrupt and non-bankrupt firms, whereas Value Line relates similar types of variables to the observed yields of outstanding debt securities only (Alman & Spivack, 1983). The z-score "uses financial variables to discriminate between bankrupt and non-bankrupt firms, whereas

Value Line relates similar types of variables to the observed yields of outstanding debt securities" (Altman & Spivack, 1983, p. 60). Despite these differences, the result of Altman and Spivack (1983) study revealed that Value Line's scores exhibit a high correlation to z-scores, which have been shown to discriminate well between bankrupt and non-bankrupt firms. Both the Alman's z-score (1968) and Altman and Spivack's (1983) Value Line score correlate well with published bond ratings.

Since the two landmark studies in bankruptcy prediction (Altman, 1968; Altman & Spivack, 1983), there has been several other studies to help businesses understand and apply bankruptcy prediction models and Altman's z-score. While the original z-score (Altman, 1968) was based on manufacturing firms, other studies have expanded its application to other business sectors (Bhunia & Sarkar, 2011). Bhunia and Sarkar (2011) used the z-score model (Altman, 1968) to predict the probability of financial distress in the pharmaceutical industry and produced results similar to those in Altman (1968) study. Based on Bhunia and Sarkar (2011), data from sixty-four private sector pharmaceutical companies were analyzed with sixteen financial ratios were used to build up a model to develop the predictive abilities for the possible financial distress of companies in the pharmaceutical industry. The result indicated that the z-score model has predictive accuracy rates between 88% and 94% for each of the five years prior to actual failure. This study also indicated that the z-score model is as good as other financial distress prediction models such as logit and parametric hazard models (Bhunia & Sharkar, 2011). This finding is consistent with previous studies that used discriminant analysis techniques in bankruptcy prediction. The contribution of this study is that it helps creditors and investors in evaluating the likelihood that a firm within the pharmaceutical industry may

go bankrupt if adequate financial plans are not put in place. This finding is consistent with previous studies that used discriminant analysis techniques in bankruptcy prediction. The result indicates that the z-score model has a high degree of accuracy in predicting bankruptcy several years before the companies actually went bankrupt (Bhunia & Sarkar, 2011). The conclusion indicates that the z-score bankruptcy analytical technique can in fact predict possible bankruptcy of a company.

The result of Bhumia and Sarkar's (2011) research is consistent with the study performed by Apergis, Sorros, Artikis, and Zisis (2011). Apergis, et al. (2011) used publicly available data on corporations that are traded on one of the stock exchanges to investigate the stock price performance of firms that exhibit a large probability of bankruptcy according to Altman's z-score model. Using correlation design, the authors examined the general characteristics of and the financial health of the corporations included in the sample (Apergis, et al., 2011). The finding indicates that stock prices are highly correlated with the z-scores of the companies studied. When the probability of bankruptcy is high using Altman's z-score, stock prices of companies decreased (Apergis, et al., 2011). This study underscores the importance of Altman's z-score bankruptcy prediction (Altman, 1968). In addition, the study allows investors and lenders to be careful in their decision to invest in financially distressed companies (Apergis, et al., 2011). While Agergis, et al. (2011) was not on a particular industry, the results was similar to those produced by Altman (1968), Bhumia and Sarkar (2011), and Agergis (2011). Such consistency in all three studies suggests that the original z-score model (Altman, 1968) can be used in other industries to predict financial distress of companies.

To compare the predictive ability of the benchmark model (i. e., the z-score and other multivariate analysis techniques), Fu (2010) used data sets from small Canadian and U. S. public companies to predict possible financial distress. Both data sets were used in the verification of the working capital and cash flow models in the predicting financial distress for each company, as well as in comparison studies made against the more commonly used logistic regression and multivariate discriminant analysis (MDA) models (Fu, 2010). Using the properties of demand and operational costs, Fu (2010) constructed three discrete Markov dependent stochastic sequences to forecast and measure cash position, working capital and cash flow. Empirical results from the comparative studies show that the proposed approach outperforms both the logistic regression and MDA as well as being robust enough to work even on medium-sized companies (Fu, 2010). This conclusion supports prior study by Hodges, Cluskey, and Lin (2005). Hodges, et al. (2005) suggest that the benchmark bankruptcy models may not capture all the variables to effectively predict financial distress several years prior to the actual financial distressful condition. Bankruptcy predictors such as the Altman's z-score (Altman, 1968; Altman & Spivack, 1983), cash flows (Fu, 2010), and financial ratios (Jiang, 2008) have generally shown a significant deterioration prior to bankruptcy. However, Hodges, et al. (2005) showed that both cash and total assets increased in the three years prior to bankruptcy. This finding is inconsistent with bankruptcy prediction models (Hodges, et al., 2005). The increase in cash and assets indicates that firms in financial distress may be looking for a way to solve their immediate financial problems (Hodges, et al., 2005). However, such desperation, leads managers to be less efficient, which can actually increase the chances of bankruptcy (Hodges, et al., 2005). This conclusion suggests that

there are many factors other than the ones used in z-score analysis technique that can affect small and medium-sized companies. These factors may be difficult to identify due to their complex interaction and the lack of available data to test (Hodges, et al., 2005).

Rolling-logit model. In addition to other models that are used in the study of bankruptcy, rolling-logit is one of the models that have proven to be valuable in bankruptcy prediction. Other bankruptcy models such as the multiple discriminant analysis are based on one-period data set. Lin (2009) argue that a one-period bankruptcy model based on quantitative data alone will generally not have enough predictive power to the useful of the information produced. To overcome this gap, Lin (2009) proposed the use of rolling-logit model that incorporates different types of data set including non-quantitative information. In other to test the predictive ability of the rolling-logit, data from Taiwan's publicly traded companies was used to examine the predictive ability of the four most commonly used financial distress prediction models and thus constructed reliable failure prediction models for public industrial firms in Taiwan during economic crisis (Lin, 2009). Multiple discriminant analysis (MDA), logit, probit, and artificial neural networks (ANNs) methodology were employed to a dataset of matched sample of failed and non-failed Taiwan public industrial firms during 1998–2005 (Lin, 2009). The results indicated that the probit, logit, and ANN models achieved higher prediction accuracy compared to the generalized model such as the Altman's z-score and other ratio-based models. The empirical result of Lin (2009) study "indicated that the rolling-logit model, compared with the benchmark model, exhibited higher overall accuracy. The successful predictive performances were attributed to a recall mechanism in the rolling-logit model, measuring a corporation's risks on the basis of consistent information across

time" (p. 3507). The probit model possesses the best and stable performance (Lin, 2009). Based the probit, logit, and ANN models Lin (2009) and Onofrei and Lupu (2014) indicated that investors, creditors, managers, auditors, and regulatory agencies will be able to predict the probability of business failures accurately. Onofrei and Lupu (2014) studied the predictive power of several financial distress models and concluded that the multiple discriminant and logit analysis were more effective in the prediction of business failure in Romanian firms. "The empirical results indicate that using multivariate analysis by adding market factor to the liquidity, leverage, activity and profitability factors can increase the accuracy of default prediction more than using only four financial factors" (Tserng, Chen, Huang, Lei, & Tran, 2014, page 247). While these results and the applications of logit model is promising, it should be noted that Lin (2009) study had limitation based on the sample and variables used. The sample was drawn primarily from Taiwan's publicly traded firms. However, based on the limited availability of data from these companies, the application of the results in other advanced markets may not produce similar results. For that reason, further research and the use of additional variables may be necessary.

Parametric hazard model. In addition to Altman's z-score (1968), other bankruptcy researchers used other variations of the discriminant analysis techniques in the prediction of corporate financial distress. However, these models including the logit and probit models used one-period financial information (Cheng, et al., 2010). A one-period financial data make the models to be less useful because the characteristics of companies can change over time (Cheng, et al., 2010). For that reason, the use of one-

period financial information is inconsistent with the changing nature of the business environment in which companies operate (Cheng, et al., 2010).

Based on the limitation of the univeriate models, the hazard model was suggested as a better alternative because it incorporates multi-period financial information (Cheng, et al., 2010). Financial distress model such as the Altman's z-score is based on single-period financial data. Since firms go through changes based on their operating characteristics, the predictive ability of a single-period financial distress forecasting model may diminish (Cheng, et al., 2010). In contrast with the rolling-logic, to increase the predictive ability of bankruptcy models, Cheng, et al. (2010) suggests that the parametric hazard model will produce better result. The researchers argue that the parametric hazard model can accommodate variables from multiple periods. Empirical result of Cheng, et al. (2010) suggests that the z-score analysis techniques may be limited in its ability to predict possible bankruptcy and concluded that the flexibility of the hazard model makes is it a better model in the prediction of financial distress. The result of Cheng, et al. (2010) is supported by Cader and Leatherman (2011). Cader and Leatherman (2011) supported the validity of the changing economic conditions of firms in the study of financial distress by looking at characteristics of firms at different points of entities' life-cycle. Cader and Leatherman (2011) research shows that the hazard bankruptcy model allows for multi-period comparative analysis that captures the changing nature of corporates at different time. In addition, based on the research of Bauer and Agarwal (2014), the hazard model was found to be superior to the traditional accounting or ratio based models because it incorporate variables other than accounting data.

In addition to Cheng, et al. (2010) and Cader and Leatherman (2011), Chia-Liang and Kuan-Min (2011) also use the parametric hazard model in the prediction of corporate bankruptcy and the result compares favorably with the other models. Using non-probability purposive sampling (Chia-Liang, & Kuan-Min, 2011), matched 23 bankrupt corporations with 23 non-bankrupt corporations during the period 1999-2005. The empirical results indicated that the parametric hazard model, compared with the benchmark model (i. e., Altman's z-score), exhibits high probability in predicting possible corporate financial distress (Chia-Liang, & Kuan-Min, 2011). This result is consistent with conclusions drawn from Cheng, et al. (2010) and Cader and Leatherman (2011) studies. As in Cheng, et al. (2010) and Cader and Leatherman (2011) studies, Chia-liang and Kuan-Min (2011) supported the validity of including the changing economic conditions of firms in the study of financial distress by looking at characteristics of firms at different points of entities' life-cycle. In addition, Chia-liang and Kuan-Min (2011) also concluded that the hazard bankruptcy model allows for multi-period comparative analysis that captures the changing nature of corporates at different time.

Non-quantitative factors. Bankruptcy forecasting models generally use financial statement data such as ratios in order to determine the likelihood of financial distress (Fich & Slezak, 2008). While quantity information from discriminant and multivariate analysis can be used to determine possible bankruptcy of firms' non-quantitative factors such as the management characteristics are equally important in the determination of the future survival of a firm (Burksaitiene & Mazintiene, 2011; Fich & Slezak, 2008; Huang & Zhao, 2008). Burksaitiene and Mazintiene (2011) used non-financial data to

investigate the financial failure of the firms. Using multivariate regression analysis, Burksaitiene and Mazintiene (2011) examined the characteristics of managers and owners in addition to the general characteristics of the types of failures. The four types of failure observed are the fundamentals of failure, detecting failure, exit of failing company and bankruptcy or recovery (Burksaitiene & Mazintiene, 2011). The causes of failure as observed by the authors are incorrect steps made by management, incorrect steps in the corporate policy and the importance of external factors (Burksaitiene & Mazintiene, 2011). The result is consistent with the findings of other non-quantitative financial distress studies including Fich and Slezak (2008). Fich and Slezak (2008), show that corporate governance can be a major variable in the understanding of financial distress. Fich and Slezak (2008) used publicly available information of companies in the U. S. to study how governance characteristics affect (1) a firm's ability to avoid bankruptcy and (2) the power of financial/accounting information to predict bankruptcy. The findings of Fich and Slezak (2008) study indicate that a distressed firm's governance characteristic significantly affects its probability of bankruptcy. This conclusion is consistent with Huang and Zhao (2008) study. Huang and Zhao (2008) indicate that the characteristics of a financially distressed firm are determined by the general characteristics of the firm's governance. The conclusions reached by Fich and Slezak (2008) and Huang and Zhao (2008) study indicate that more than quantitative information is needed to truly be able to capture all the variables that can lead to financial difficulties of a firm.

Sustainable growth rate

One of a firm manager's goals is to grow the firm in order to maximize the current or market value of the firm (Ashta, 2008). However, growth must be sustainable

in order for companies to strategically benefit from its growth (Raisch & von Krogh, 2007). The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Ashta, 2008; Cornett, et al., 2012; Palenu & Healy, 2008). The quantitative measure of sustainable growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Ashta, 2008). The return on assets (ROA) and the return on equity (ROE) are the two measures that are used to determine how successful the managers are in maximizing the total assets employed and the market value of the equity (Gomes & Schmid, 2010). Growing the firm also depend on the ability of the manager to generate funds for investment or expansion (Cornett, et al., 2012). Funds can either be generated internally or by using a combination of internal and external sources (Gomes & Schmid, 2010). The ability to generate funds internally can be measured quantitatively using the internal growth rate such that the internal growth rate is equal to [(ROA x retention rate)/(1-(ROA x retention rate)] (Ashta, 2008). Internally generated funds are from a firm's savings. The ability to generate funds using a combination of internal and external sources can be measured quantitatively using the sustainable growth rate (Gomes & Schmid, 2010). The sustainable growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Cornett, et al., 2012). Presently, the use of sustainable growth rate is limited to internal planning for the purposes of determining the sustainability of overall growth in sales or assets (Cornett, et al., 2012; Phillips, Anderson, & Volker, 2010). Based on the limitation of Altman's z-score and other ratio-based bankruptcy forecasting methods, the sustainable growth rate

can be a useful tool in determining the financial viability of a firm prior to experiencing financial distress (Lansdrom, et al., 2008).

While the sustainable growth rate provides an overall measure of the growth rate a firm can support, an important dimension is the internal growth rate. The internal growth rate is the growth rate a firm can maintain using only internally generated cash to fund current or future investments (Cornett, et al., 2012; Ross, Westerfield, Jaffe, Jordan, 2011). The internal growth rate is designed to help a firm determine the limit of its growth based on internally generated funds (Cornett, et al., 2012). Internally generally funds are based on a firm's retained earnings (Cornett, et al., 2012). Retained earnings can be compared to savings designed for future use. The more a retained earning a firm has, the higher the internal growth rate (Phillips, et al., 2010). Part of the internal growth rate is the return on assets (ROA). The return on assets is a combination of profit margin and the book value of total assets such that ROA = net profit/total assets (Gardner, et al., 2011). The ROA measures the return per dollar of asset on a company's balance sheet in a particular period (Gardner, et al., 2011). The higher the net profit, the higher the ROA. A higher net income and retained earnings lead to a high internal growth rate. This will suggest the firm is less likely to rely on external funding for expansion or investment (Phillips, et al., 2010).

Sustainable growth rate (SGR) is the growth rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). The Sustainable growth rate of a company is dependent on several factors, including profit margin, return on equity (ROE), and the retention rate of net income. Based on these factors, SGR = [(ROE x

retention rate)/(1-(ROE x retention rate)] (Cornett, et al., 2012). Just like the internal growth rate, the SGR is affected by the retention rate of net income. The higher the retention rate the higher the SGR (Cornett, et al., 2012). In addition to the retention rate of net income, the return on equity (ROE) also affects the SGR (Cornett, et al., 2012). The return on equity is a combination of profit margin and the book value of the common equity such that ROE = net profit/book common stockholders' equity (Phillips, et al., 2010). The higher the SGR, the more funds (internal and external) a firm is able to raise to support current or future growth or investment (Phillips, et al., 2010).

As a planning tool, SGR is used to manage overall growth in sales or total assets (Ashta, 2008). The appropriate application of the SGR can help the management of a firm increase the total value of the firm (Ashta, 2008). In this regard, one of the factors that may affect sustainable growth rate are general economic conditions. General economic conditions that can affect the growth of a firm include consumer demand, interest rate, inflation, monetary policy, and worldwide macroeconomic issues such as oil price and debt crisis (Korol & Korodi, 2010). The more the negative effect these factors have on the revenue of a firm, the lower the profit. A decrease in profit affects the ROE which in turn affects the SGR.

In addition to the general economic conditions that can affect the SGR, other specific quantitative factors that can affect the SGR are efficiency, types of financing, and dividend policy (Phillips, et.al., 2010). Efficiency in the calculation of SGR is measured by the profit margin (Phillips, et.al., 2010). In addition to Phillips, et al. (2010), in order to demonstrate how efficiency, types of financing, and the dividend policy affect the SGR, Kasilingam and Jayabal, (2012) suggest the use of DuPont ROE analysis. The

DuPont ROE analysis is determined by profit margin, turnover of assets, and financial leverage (Kasilingam & Jayabal, 2012). Based on these functional relationships, DuPont ROE analysis is calculated as follows: ROE = profit margin x total assets x equity multiplier. Where profit margin = net income/sales, total asset turnover = sales/total assets, and equity multiplier = total assets/stockholder's equity. A change in any of the variables changes ROE (Ashta, 2008). Since SGR = [(ROE x retention rate)/(1-(ROE x retention rate)], a change in profit margin, total asset turnover, and the equity multiplier affects SGR (Ashta, 2008). Kasilingam and Jayabal (2012) supports Ashta (2008) analysis and indicates that profit margin and total asset turnover measure operating efficiency of the firm. In addition, Kasilingam and Jayabal (2012) concludes that the lack of operating efficiency results in lower operating revenues and profit. Equity multiplier on the other hand measures leverage or the use of debt to finance daily or long-term investments (Kasilingam & Jayabal, 2012). An increase in the use of debt increases debt service expenses which in turn decreases profit and reduces ROE (Ashta, 2008; Kasilingam & Jayabal, 2012).

Based on empirical studies, sustainable growth rate is an important business strategy for many types of businesses (Lansdrom, et al., 2008). Based on Del Matto (2007) study of ski resorts in Ontario, there are several areas where sustainable growth can determine the overall financial health of a company. According to Del Matto (2007), "sustainability in ski resorts requires that there be limits on quantitative growth and, as such, ski resorts must strive towards decoupling improvements in quality and service from further growth and consumption" (p. 89). This indicates that the sustainable growth rate must be managed successfully in order to benefit the company. Lansdrom, et al.

(2008) also reached the same conclusion. According to Lansdrom, et al. (2008), "internal and sustainable growth rate can be used as a measure for risk tolerance" (p. 124). Based on Palenu and Healy (2008) study, corporations must grow at a sustainable growth rate in order to avoid changes in their financial structure. Such changes in most cases, include additional debt that can lead to financial distress. Palenu and Healy (2008) used Wal-Mart and Target to study the factors that can affect the sustainable growth rate of a firm. Using the two corporations, Palenu and Healy (2008) indicate that "several factors affect the firm's ability to generate positive cash flows from operations" (p. 29). Such factors may include the age of the company's assets and changing economic conditions (Palenu & Healy, 2008).

Sustainable growth rate is used as a planning tool (Phillips, et.al., 2010). Phillips, et al. (2010) study used correlation analysis to understand the characteristics of the financial ratios that can be used to determine the sustainable growth rate of small retail companies over the period of 1998 to 2000. These ratios were decomposed into four different categories: liquidity, activity, leverage, and profitability (Phillips, et al., 2010). The finding of this study, indicates that a profitability ratio provided the most significant information because all three components (retention ratio, return on assets, and return on equity) of the sustainable growth rate are tied to profitability. The empirical data from Phillips et al. (2010) also suggests that the ratios can be used in different sectors to manage the overall growth of a company (Phillips, et al., 2010). The study did not provide direct evidence of how the sustainable growth rate can be used in the prediction of possible financial distress of a firm. However, the study concluded that an

unsustainable high growth rate might lead to bankruptcy if adequate financial plan is not in place to support the growth rate (Phillips, et al., 2010).

Study of sustainable growth is not only important in profit-making entities but equally applicable to nonprofit organizations as well (Jegers, 2003). Jegers (2003), indicates that the activity growth of nonprofit organizations is financially constrained by their efficiency, profitability, and capital structure. However, the sustainable growth concept can apply to organizations other than profit-making entities (Kaufman & Woglom, 2008). Kaufman and Woglom (2008) discussed sources of funding and sustainable growth focusing, particularly on not-for-profit entities. Based on Kaufman and Woglom (2008) research, college and university fees have risen in the past decade. However, the return on endowment, one of the major sources of funds for private colleges, have not kept pace with the growth rate of these fees. Kaufman and Woglom (2008) applied general sustainable growth financial model in calculating the growth rate of cost (fees) and returns and conclude that the sustainable growth rate is important in the survival of organizations including not-for-profit entities. The conclusion reached in this study indicates that the differing growth rate of the fees and the returns on endowment may create long-term financial hardship for private colleges and such financial hardship will in turn constrain sustainable grow of these colleges. Kaufman and Woglom (2008) also argue that community colleges should use the sustainable growth rate model to better understand their overall performance and sustained planned growth in order to avoid financial distress and possible bankruptcy. Part of a sustainable growth model is general growth in sales. For community colleges, increase in sales is the same as an increase in student enrollment and increase in sales can lead to a sustainable growth rate that can

help reduce the possibility of financial distress (Jegers, 2003; Kaufman & Woglom, 2008).

All companies strive to grow in order to survive. However, growth must be sustainable in order to strategically benefit from it (Raisch & von Krogh, 2007). The ability to sustain growth is determined by profit margin, dividend policy, capital structure or financial policy, and efficiency in the use of assets as measured by total asset turnover (Ross, Westerfield, Jaffe, & Jordan, 2011). The capital structure of a firm is determined by combining the use of debt and equity such that the value of the firm can be determined as follows: V_t = debt + market equity, where V_t is the market value of the firm at a specific time, the debt is based on the book value of short- and long-term debt, and equity is based on the current market value of outstanding common stock and preferred stock. The theories of capital structure include the irrelevance capital structure position (Modiglian & Miller, 1958), the trade-off theory (Bayrakdaroğlu, Ege, & Yazıcı, 2013), the static trade-off theory (Bayrakdaroğlu, et al., 2013), the signaling theory (Javed Iqbal, Muneer, Jahanzeb, & Saif-ur-Rehman, 2012), and the pecking order hypothesis (Carmen & Diana, 2013). Each one of these theories suggests the optimal structure of each firm depends on the situation of the firm and its debt capacity (Fosberg, 2012). The higher the debt (short- and long-term) an entity has, the greater the chances of financial distress (Fosberg, 2012). This is particularly problematic, especially when growth in revenue is not sustainable (Lansdrom, et al., 2008). While there is no consistency in the application of theory to the understanding of the general capital structure of a firm, it has specific implications in the overall sustainability of growth and financial distress (Lansdrom, et al., 2008). The presence of debt in the capital structure of a firm increases the probability

of financial distress (Fosberg, 2012; Lansdrom, et al., 2008). An increase in long-term debt obligation leads to increase in debt service costs (interest payments, penalty for late payment, and administration cost) and a decrease in profit (Fosberg, 2012). This situation in turns results to several negative situations including decrease in ROE, ROA, and reduction or no dividend payments. In addition to reducing the profit of a firm, increase in debt in the capital structure also affects the credit rating of the firm and its ability to obtain additional external funds (Rad, Locke, & Reddy, 2013). The more debt a firm has in its capital structure, the lower the overall credit rating (Kisgen & Strahan, 2010). Bad credit rating increases financing cost of additional debt, which in turn reduces total profit (Gill, Biger, & Mathur, 2011). Reduction in profit can lead to financial hardship (Gill, et al., 2011) especially when the firm grows at a rate that is not sustainable.

The profit margin and the total asset turnover are important components in the sustainability of growth (Gill, et al., 2011). Profit margin relates to how efficient a firm is generating profit based on the level of total revenue (Gill, et al., 2011). The more efficient the firm is at controlling costs, the higher the profit margin on sells (Gill, et al., 2011). In order to increase the internal funds, the firm will need to increase the profit margin current or future growth (Kasilingam & Jayabal, 2012). The quantitative measure of asset turnover demonstrates efficiency in the use of the asset (Kasilingam & Jayabal, 2012). The higher the asset turnover, the higher the sustainable growth rate (Lansdrom, et al., 2008). In essence, when a firm increases the efficiency in the use of assets, the sustainability of current or future growth in sales or assets also increases (Lansdrom, et al., 2008).

Based on Raisch and von Krogh (2007) article, companies need to grow in order to remain viable. However, Raisch and von Krogh (2007) also pointed out that growth has limitations and also posed challenging problems to managers in the planning process. Raisch and von Krogh (2007) examined Fortune 500 companies and determined that these companies did well within the limits of their growth corridors including sales and profitability. Within these corridors, the companies examined by Raisch and von Krogh (2007) met stockholders' expectations based on planned sustainable growth rate. Companies within the study group that reached their planned sustainable growth rate also exceeded shareholders' expectations. However, the higher the sustainable growth rate, the greater the financial risk (Raisch & Krogh, 2007). This indicates that the sustainable growth rate can be used to predict financial distress. In this regard, firms need to establish minimum and maximum growth rate. According to Raisch & von Krogh (2007) these lower and upper growth boundaries will allow companies to establish a smart growth rate. This finding is consistent with Jiang (2008) study.

Using regression analysis, Jiang (2008) used data from Chinese listed hospitality firms to study how the financial structure of firms affects the sustainable growth rate. The Jiang (2008) study used three methods to measure the financial structure that can affect sustainable growth: total leverage ratio, long-term leverage ratio and short-term leverage ratio. The finding of this study reveals that firms with great profits and the high risk level rely less on debts and may experience long-lasting sustainable growth rate (Jiang, 2008). This study is consistent with previous studies and provided discussion on several issues that can affect sustainable growth including core capabilities, hiring the appropriate personnel with the required knowledge of the core capabilities, ability to anticipate

customers' needs, limiting the use of debt, appropriately measuring the profitability of all products, and reinvest by developing new products (Jegers, 2003; Kaisch & van Krogh, 2007). Jiang (2008) study also revealed that firms with great profits and the high risk level rely less on debts and may experience long-lasting sustainable growth rate.

Summary

Bankruptcy prediction research using different models has flourished in the past ten years. Financial trepidation could happen as a result of changing economic environment such as a decrease in aggregate demand, an increase in the cost of borrowed funds, and changes in government regulation (Aktas, et al.,, 2010; Korol & Korodi, 2010). Irrespective of how a company managed to find itself in a state of financial anxiety, the situation could lead to several consequences including the possibility of bankruptcy. It is therefore important for a firm's manager to understand how bankruptcy models may be used as effective tools in the forecasting of possible financial distressful situations. Past research on bankruptcy prediction used Altman's z-score (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011) to predict possible bankruptcy with good results. However, other methods of bankruptcy predictions such as correlation analysis (Apegis, Sorros, Artikis, & Zissis, 2010), parametric hazard model (Cheng, et al., 2010), rolling-logit model (Chia-Liang & Kuan-Min, 2011), fuzzy logic system (Dainiene & Dagiliene, 2013; Korol & Korodi, 2010), and the working capital and cash flow models (Fu, 2010) are better at predicting bankruptcy.

While the differences in the ability of each model is apparent, each model seems to produce acceptable result based on the objectives and the type of data used by the

researcher. Single model such as ratio analysis of financial statement works well when the focus of the research is understanding the past performance of the firm. However, a review of the literature on bankruptcy prediction indicates that most of these studies are done after the company is already financially distressed. In order to help managers avoid financial distress or avoid bankruptcy, their companies' finances should be analyzed using discriminant analysis and sustainable growth rate prior to the company actually entering into financial distress. Sustainable growth rate is one of the dynamic strategy management tools used by companies to plan and acquire resources in order to continue growing. Since the sustainable growth rate is based on ratios that can be generated using a company's financial statement, it is possible to use the set of ratios to determine possible future financial problem. While the traditional analysis technique such as the DuPont identity can be used to analyze return on equity, it does not incorporate several other factors including liquidity, return on assets, retention ratio, and leverage. These financial indicators can be assessed within the sustainable growth rate model in order to determine the probability of bankruptcy of a firm prior to the firm actually going into bankruptcy. Forecasting the possibility of bankruptcy will serve as a warning to managers so they may consider possible alternatives within their financial planning strategies.

Chapter 3: Research Method

Introduction

Research method is a collection of the processes used in designing, gathering, and analyzing data for the purpose of reaching a conclusion. In this process, correct application of statistical techniques is imperative to the proper analysis of the research questions and hypothesis. The procedure in a scientific research follows the same standard of identifying the problem and formulating the research questions and hypothesis. In addition to correctly identifying the research problem, research question, and appropriate hypotheses, data collection is one of the critical steps in the research process. Data collection is the basic structure in the statistical analysis and may be expressed using quantitative, qualitative, mixed method. In a scientific research, ample data must be accumulated in order to provide useful information and to reach a measurable conclusion.

The purpose of this quantitative study was to investigate the efficacy of using Altman's' z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues. The use of Altman's z-score in the prediction of financial distress is well documented in the literature (Chia-Liang, & Kuan-Min, 2011; Fu, 2010). However, existing financial distress forecasting methods do not consider the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is measured by growth in total revenues (Cornett, et al., 2012). Such growth must be sustainable in order to avoid financial distress. In previous studies, the Altman's z-score and the sustainable growth were considered independent of each other. However, if the

growth in revenues is factored in, the two models are not conceptually independent because the non-sustainability of revenue streams will lead to possible financial distress (Raisch & von Krogh, 2007).

Based on the purpose of this quantitative study this chapter restated the research problem, purpose of the study, the research question, and the hypothesis. In addition, the chapter presented a discussion of the research methods and design. The population and related assumptions, sample, materials, operational definition of variables, data collection, processing, and analysis, limitations and delimitations, and ethical assurances were also be discussed.

Restatement of the Problem. The Altman's z-score and sustainable growth rate can be useful tools in determining financial viability of a firm prior to experiencing financial distress (Lansdrom, Crijns, Laveren, & Smallbone, 2008). While the Altman's z-score has been used in multiple financial distress studies (Chia-Liang, & Kuan-Min, 2011; Fu, 2010), none of them considered the growth dimension of the companies (Fabozzi, et al., 2010; Lin, 2009).

According to Lansdrom, et al. (2008), sustainable growth rate is one of the dynamic strategy management tools used by companies to plan and acquire resources in order to continue growing. The Altman's z-score is one of the bankruptcy models that has proven to be successful in the forecast of financial distress (Bhunia & Sarkar, 2011). However, the problem with Altman's z-score model is that it does not consider whether a firm can be financially distressed or not if the sustainable growth rate of the firm is in fact higher than the growth rate of its revenues. Analyzing and understanding this problem is

important because it will help managers put together better strategic financial plans and grow their firms at a rate that is sustainable in order to avoid financial distress.

Restatement of the Purpose of the Study. The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate its revenues. Based on the nature of this research, the cross-sectional design was used. The cross-sectional design involves the observation of all of a population, or a sample of the population (Pontiff & Woodgate, 2008). The study was completed using sample only and the actual sampling was done after IRB form was completed and approved. The sample for the study was drawn from the 2,869 non-professional U. S. domestic companies listed on the NYSE. Using G-Power statistical analysis and the Survey System (Faul, et al., 2007; Surveysystem.com, n. d.), 339 out of the 2869 non-professional U. S. domestic firms were randomly selected.

Through the use of financial statement data of the sampled companies, the research focused on using the Altman's z-score in the forecasting of financial distress when the sustainable growth rate was higher than the growth rate of reported revenues. The research will be organized in two (2) phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenue were compared by categorizing (grouping) them as higher or lower (higher and lower groups). The higher group are those with higher SGR than the growth rate of reported revenue while the lower group are those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups were compared to determine if a statistical significant

difference exists between them. Phase 2 involved the correlation of SGR with the value of the Altman's z-score for the higher group and the correlation of SGR with the value of the Altman's z-score for the lower group. The purpose of performing the correlation was to determine if there was statistically significant relationship between the SGR and the Altman's z-score.

Restatement of the Research Questions. The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate of its revenues. There are several methods in existence that can allow a researcher in this area to forecast a firm's possible financial difficulty including univariate, multivariate and logit analysis (Zhou & Elhag, n. d.). However, existing financial distress forecasting methods including Altman's z-score method (Altman, 1968) do not consider the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is the percentage increase in the total revenue (Cornett, et al., 2012) and must be sustainable in order to avoid financial distress (Gardner, et al., 2011). The problem statement generated the following research question and hypotheses.

Q1: Using the Altman's z-score bankruptcy model, how does the probability of experiencing finance distress changed when a company's sustainable growth rate was higher than the growth rate of its revenues?

Restatement of the Hypotheses: The following hypothesis were used to test the research question:

$H1_0$. The probability of experiencing financial distress was not significantly

different for companies whose sustainable growth rate was higher than the growth rate in their revenues.

H1a. The probability of experiencing financial distress was significantly different for companies whose sustainable growth rate was higher than the growth rate in their revenues.

Research Methods and Design(s)

Based on the nature of this study, cross-sectional design was used. Cross-sectional is a research method involving the observation of all of a population, or a sample of the population at a specific point in time (Pontiff & Woodgate, 2008). As a descriptive research design, the use of cross-sectional design does not involve the manipulation of variables (Pontiff & Woodgate, 2008). This characteristics of the cross-section design was particularly important because the data for this study were obtained and analyzed as is without manipulation. In addition, this design was most suitable in this study because cross-sectional studies involve special data collection, including questions about the past, but they often rely on data originally collected for other purposes (Pontiff & Woodgate, 2008). In this case, the data used for this study came from the financial statements of the firms included in the study. Publicly available financial statements of a company are used for information purposes. For the purposes of this study, the publicly available financial data of the companies included were used.

The major advantage of the cross-sectional study is that the design is robust and accommodating to available data (Frank, et al., 2009). While some special case studies do require more specific data, for most cross-sectional studies, routinely collected data such as financial statements of companies will be generally sufficien (Frank, et al., 2009). This

allows for a quick and easy data gathering even for a large target population. Valuation of outcomes and threat the entire population can also be accomplished minimal difficulties because the date for the sample is a near-perfect view of the whole (Pontiff & Woodgate, 2008).

The major disadvantage of cross-sectional study is that it does not provide a good basis for causality even when two distinct variables are measured at the same point in time (Pontiff & Woodgate, 2008). This observation is supported by Kolari and Pynnonen (2010). Kolari and Pynnonen (2010) indicate that the correlation between investment returns and event-dated information resulted in over-rejection of the hypothesis even when such events and the returns were measured within the same time frame. In addition, cross-sectional regression test is very likely to either reject a particular model when the model actually predicted the result correctly or accept the model when it in fact false (Murtazashvili & Vozlyublennaia, 2012). In this case, cross-sectional study may indicate a relationship. However, care must be exercised not to oversimplify the relationship (Frank, et al., 2009). In that case, it is possible there may be other confounding factors that may affect the relationship between variables (Rubio & Yagüe, 2009). Additional variables may affect the relationship between the variables of interest but not affect those variables themselves. Such observations are often lost in cross-sectional studies (Rubio & Yagüe, 2009).

The research question for this study was to investigate whether the probability of experiencing finance distress changes when a company's sustainable growth rate was higher than its growth rate in of its revenues. The research question will be investigated using a two group design in two different phases. Phase 1 involved the calculation of the

sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenues were compared by categorizing (grouping) them as higher or lower. The higher group are those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups will be compared to determine whether a statistically significant difference exists in z-score.

Phase 2 involved the correlation between the values of SGR and the values of Altman's z-score to determine if there is a statistically significant relationship between the two scores. Previous studies using Altman's z-score and other methods did not consider the growth rate of reported revenues. For that reason, the correlation between the SGR and the Altman's z-score was never tested (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). This is a major shortcoming in the use of Altman's z-score. In Phase 2, the two-group design was used. One group contained companies with sustainable growth rate higher than their growth rate in reported revenues and another group contained companies with sustainable growth rate lower than their growth rate in revenues.

The values of the original Altman's z-score has a range of 1.81 to 2.99 points (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The range of 1.81 to 2.99 has become the benchmark for financial distress studies when the Altman's z-score model is used. When the z-score is used in the prediction of bankruptcy, a value lower than 1.81 indicates that the company will experience financial distress (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010;

Lin, 2009). A value above 2.99 indicates the firm is relatively safe from a financially distressful situation. Companies that fall between 1.81 and 2.99 are most likely to experience financial distress if appropriate financial planning are not implemented (Altman, 1968). The sustainable growth rate depends on four independent factors: profit margin (operating efficiency), total asset turnover (efficiency in the use of assets), financial leverage (the use of debt versus equity to finance assets), and profit retention (reinvestment of net income into the firm rather than paying it out as dividends) (Palenu & Healy, 2008). The combination of these factors indicates whether the growth in the revenues of a firm that can be sustained without facing a financially distressful situation (Lansdrom, et al., 2008).

Population

The population of interest was all U. S. publicly traded companies on the New York Stock Exchange (NYSE). There was 3,057 U. S. domestic companies listed on the NYSE and includes companies from different industry segments. The table below shows the required standards a company must meet to be considered for listing and trading on the NYSE. In addition to the standards in Table 1, the company must be a going concern (not in a bankruptcy proceeding) or a predecessor of a going concern and meet at least one of the minimum financial requirements listed in Table 1 (NYSE, n. d).

While the total population of U. S. domestic companies traded on the NYSE was 3,057 (NYSE, n. d.), the required sample was drawn from 2,869 non-professional firms. The remaining 188 companies was included in this study because they are professional firms such as banks, insurance companies, law firms, and other professional entities and they do not follow the traditional financial analysis procedures used in other industries

(Gibson, 2011). In addition, most of their financial ratios are not comparable with those of other industries (Gibson, 2011).

Table 1

Minimum Standards for Companies Traded on the NYSE

Listing Standards	Minimum Financial Requirements
Alternative 1: Earning Test	$10 million of aggregate pretax income for the last 3 years and a minimum of $2 million in each of the two most recent years
Alternative 2A: Valuation with Cash Flow	$500 million in global market capitalization; $100 million in revenues (most recent 12-month period); and $25 million of adjusted aggregate cash flow for the most three years
Alternative 2B: Valuation with Revenue	$750 million in global market capitalization and $75 million in revenues for the most recent fiscal year
Alternative 3: Affiliated Company	$500 million in global market capitalization and A minimum of 12 months operating history
Alternative 4: Assets and Equity	$150 million in global market capitalization; $75 million in total assets and $50 million in stockholders' equity.

Source: NYSE (n. d.). Domestic listing standards. Retrieved from https://usequities.nyx.com/listings/list-with-nyse/domestic-listing-standards

Sample

The sample for this study was based on estimated population of 2,869 companies from the NYSE (NYSE, n. d.). Companies included in the sample were drawn using probability sampling method (Gupta & Shabbir, 2008). Using the Survey System (Surveysystem.com, n. d.) and 95% confidence level, the total sample for this research was 339 companies. The sample was randomly drawn using the Stat Trek random number generator (Stat Trek, n. d.). Each firm was assigned a random number ranging from 1 through 2,869. The companies with the corresponding random numbers was included in the study.

Through the use of financial statement data of the companies included in the sample, the research focused on using the Altman's z-score in the forecasting of financial distress when the sustainable growth rate is higher than the growth rate of reported revenues. Based on the Securities Act of 1934, publicly traded companies in the United States are required to report (quarterly and yearly) their financial statements to the Security and Exchange Commission (SEC) (SEC, n. d). The purpose of collecting financial statements as a public record in the United States is to provide information to investors, financial analysts, and researchers (SEC, n. d). Researchers use these publicly available information in the analysis of the financial viability of these companies. While permission was not required to use the financial statements of the companies included in the study, the actual sampling and the collection of data began after receiving appropriate approval from the IRB.

Materials/Instruments

The general nature of this study did not require the development of instruments for the collection of required data. The data were obtained from archived financial statements of the sampled firms. Publicly traded companies traded on any of the exchanges including the NYSE are legally required to periodically submit their audited financial statements to the Security and Exchange Commission (SEC). The SEC is the authorized government agency that monitors the activities of all publicly traded companies in the United States. The audited financial statements submitted to the SEC are available to the general public and can be used without permission from the individual companies or from the SEC. Since the archived financial statements are available for this study, it was not necessary to develop data collection instrument.

Data and purpose. Data were obtained from the archived financial statements of the companies included in the study. In the United States, the financial statements of publicly traded companies are collected for the purpose of providing information to investors, financial analysts, and researchers (SEC, n. d). These financial statements are collected and housed by the Security and Exchange Commission (SEC) in the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) (SEC, n. d.). The same financial statements with all associated data are also available on each public company's website under Investor Relations. Other websites such as Yahoo also gather and maintain financial statements of publicly traded companies for the purpose of making such information available to investors, financial analysts, researchers.

Validity and reliability of the financial statement data. To ensure the validity and the reliability of financial statement data from companies (public and private) in the United States, the preparation of financial statements must follow the generally accepted accounting principles (GAAP) and the reporting standards of the Financial Accounting Standards Board (FASB) (FASB, n. d.). GAAP are rules and pronouncements adopted by the accounting profession to provide guidelines in the measurement and evaluation of accounting records and the reporting of the financial activities of an entity (FASB, n. d.). FASB is a private not-for-profit entity and it is the recognized authoritative body for the promulgation of accounting and auditing standards in the United States. The standards established by FASB is recognized by the American Institute of Certified Public Accountants (AICPA) and by the Security and Exchange Commission (SEC) (AICPA, n. d.; FASB, n. d.; SEC, n. d.) The mission of FASB is "to establish and improve standards of financial accounting and reporting that foster financial reporting by nongovernmental

entities that provides decision-useful information to investors and other users of financial reports" (FASB, n. d., para 3).

In addition to GAAP, the attestation function of the certified public accountants and the SEC also validates the reliability of the financial records of publicly traded firms in the United States (AICPA, n. d.). The attestation function of the certified public accountants (CPA or auditors) provide assurance as to whether the information in financial statements are fairly represented and dependable. The SEC, investors, financial analysts, researchers, and the public at large have come to depend on the opinion of the auditors as a means of establishing the credibility of financial statements of publicly traded companies (Gray, Turner, Coram, & Mock, 2011). Based on the mandate of the Security and Exchange Act of 1934, the SEC is required to validate the authenticity of the financial information submitted by public companies (SEC, n. d.). The SEC is also "responsibility for accounting standards and is responsible for the approval or disapproval of auditing rules put forward by the Public Company Accounting Oversight Board, a private-sector regulator established by the Sarbanes-Oxley Act to oversee the auditing profession" (SEC, n. d., para 42).

Operational Definition of Variables

The key primary variables in this study are sustainable growth rate, Altman's z-score, and the growth rate of reported revenues. These constructs will be operationalized by obtaining a sample from the population of interest, examine their financial statements and then calculate the constructs individually. Calculated values of the variables will be used to test the research hypothesis.

Each of the constructs is a ratio scale measurement (Altman, 1968; Ashta, 2008; Chia-Liang, & Kuan-Min, 2011; Pauline & Healy, 2008; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The data to be use in the calculations of the variables will come from the archived financial statements of public companies only. These are companies that sell their stocks to the general public and are traded in one of the stock exchanges. Public companies are required to file reports (financial statements) with the Security and Exchange Commission. Such financial reports are available to the general public and researchers.

Variable 1: Sustainable growth rate (SGR). The sustainable growth is a criterion variable and it is a ratio level measurement that is calculated using financial statement data. The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). The quantitative measure of sustainable growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Ashta, 2008). Since this a ratio scale measurement, SGR will vary depending on the actual size of each variable used in the calculation. The ratio scale is measured as a percentage that ranges from 0 to 100.

The return on equity is a quantitative measure of the return earned by common stockholders (Gomes & Schmid, 2010). ROE is calculated by net income divided by total common stockholders' equity. The dividend retention rate is the portion of earnings that a company plows back or reinvests in the form of retained earnings (Palenu & Healy, 2008). The dividend retention rate will be calculated based on the financial data of the

companies in the sample. While the retention of earning can be financially prudent, it should be noted that the higher the retention rate, the higher the sustainable growth rate (Palenu & Healy, 2008). Such high sustainable growth rate may be an illusion (Palenu & Healy, 2008). In that case, the high sustainable growth rate may lead to unsustainable investment, including the use of more debt that may actually result in a bankruptcy situation (Palenu & Healy, 2008).

Variable 2: Altman's z-score. The z-score is a criterion variable used in study of corporate financial distress (Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). The data used in the calculation of the z-score are from the financial statements of companies. Its calculation is based on discriminant analysis technique that is widely used in the prediction of corporate bankruptcy (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). The factors used in the calculation of the Altman's z-score is based on traditional financial data to include asset turnover, the ability to meet long-term financial obligation, ability to pay current maturing obligations, and profitability analysis (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Based on these financial quantitative factors of companies, Altman's z-score is a ratio level measurement such that $Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.010X5$. Where X1 = working capital/total assets; X2 = retained earnings/total assets; X3 = earnings before interest and taxes/total assets; X4 = market value of equity/book value of total debt; and X5 = sales/total assets. Based on this model, a quantitative z-score ranges from 1.81 to 2.99. A score below 1.81 suggests that the firm has a high probability of experiencing financial distress while a z-score of 2.99 suggests that the firm has a low risk of financial distress

(Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Scores between 1.81 and 2.99 indicate moderate financial distress risk that can be avoided with appropriate financial planning (Altman, 1968).

Variable 3: Growth rate of revenues. The rate of reported revenue is a criterion variable used to measure the changes in sales (revenues) from one period to another. The variable is a ratio level measurement that it is calculated using financial statement data. It can be defined as the percentage increase in revenues from one period to another. The growth rate of reported revenues is a ratio scale and can be calculated using rate concept of the time value of money concepts (Cornett, et al., 2012; Gardner, et al., 2011) such that G = [(St2/St1)] - 1. Where St2 = the reported revenues in the current year; St1 = the reported revenues in the previous year and G = growth rate of revenue.

Data Collection, Processing, and Analysis

Data for this study were extracted from the financial statements of the companies to be sampled. The financial statements of companies include the balance sheet, the income statement, and the statement of cash flows. Based on the Securities Act of 1934, publicly traded companies in the United States are required to report (quarterly and yearly) their financial statements to the Security and Exchange Commission (SEC) (SEC, n. d). The purpose of collecting financial statements as a public record in the United States is to provide information to investors, financial analysts, and researchers (SEC, n. d). Researchers use these publicly available information in the analysis of the financial viability of these companies and especially in the study of corporate financial distress. To assist the readers in the understanding of the three financial statements and their contents they are briefly discussed in the following paragraphs.

The balance sheet is the financial position of an entity on a specific date and shows a listing of assets, liabilities, and the equity of the owners (Gibson, 2011). Assets are the properties, possessions, or economic resources the business owns (Gibson, 2011). Assets of a firm include tangibles such as cash, market securities, inventory held for resale, accounting receivables (sales on credit), office supplies, equipment, building, and land. In addition to the tangibles, assets also include intangibles such as patents, copyright, intellectual properties such as software developed and owned by the firm (Gibson, 2011).

The income statement shows the revenues (sales) and the expenses of the firm (Gibson, 2011). Revenues are the cash inflows the business generated with one accounting cycle or period. Expenses indicate the outflow of cash within the same accounting cycle of period (Gibson, 2011). The difference between the revenues and the expenses indicates a profit or loss and demonstrate the efficiency or lack thereof. The last component of the income statements shows changes in owners' equity (Gibson, 2011).

An important component of the annual financial report is the statement of cash flows also known as the statement of changes in financial position (Gibson, 2011). The balance sheet shows the ending balances of assets, liabilities and equity. The income statement shows the net income earned or the loss the business incurred. However, the statement of cash flows show the changes in the cash positions of the company. It shows analytical information of the investing and financing activities of the business. It is designed to present changes in the working capital of the firm within an accounting period (Gibson, 2011).

Table 2

List of Variables, Computation, and Data Sources

Variables	Computation	Source of Data
Variable 1: Sustainable Growth Rate (SGR)	SGR = [(ROE x retention rate)/(1-(ROE x retention rate)]. Where ROE (return on equity) = net income/equity; retention rate = leftover income after the payment of all dividends divide by net income	• Net income is from the income statement. • Equity is from the equity section of the balance sheet.
Variable 2: Altman's z-score	Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.010X5. Where X1 = working capital/total assets; X2 = Retained earnings/total assets; X3 = earnings before interest and taxes/total assets; X4 = market value of equity/book value of total debt; and X5 = sales/total assets.	• Working capital is from the balance sheet. • Total assets is from the balance sheet • Retained earnings are from the equity section of the balance sheet • Earnings before interest and taxes is from the income statement • Market value of equity = outstanding stock x current market price of stock. Outstanding stock is listed in the equity section of the balance sheet. • Book value of debt is listed in the liability section of the balance sheet.
Variable 3: Grate rate of reported revenues (G)	G = [(St2/St1)] – 1. Where St2 = the reported revenues in the current year and St1 = the reported revenues in the previous year	Reported revenues (sales) are listed in the income statement.

Through the use of financial statement data of the sampled companies, the research focused on using the Altman's z-score in the forecasting of financial distress when the sustainable growth rate is higher than the growth rate of reported revenues. Table 2 above is prepared to assist readers trace sources of the data to be used in the

calculation of Altman's z-score, the sustainable growth rate, and the growth rate of reported revenues. Additional information on the factors appearing in the calculations are included in the definition of key terms (Chapter 1).

The use of the cross-sectional design for this study will provide a progression of analysis beginning with the basic descriptive statistical information. Such descriptive information include range, mean (average), variance, and standard deviation, mode, median, skew, and kurtosis. A scatter plot also be included to determine linearity in consideration of correlation analysis. Based on the sampled companies, these measures are designed to provide insight into the characteristics of the population of interest. The measures were presented in a comparative format to highlight the differences and similarities between the financial data of the companies included in the study.

One of the basic steps in statistical analysis is to ascertain the normality of the data. In order to determine if the data is normally distributed, a normality test was performed using the Kolmogorov-Smirnov (Field, 2009). When the Kolmogorov-Smirnov (K-S) normality test is performed, if the *p*-value is not significant, it will be concluded that the distribution is normal (Field, 2009). Based on the test results of K-S, the data were not normally distributed. For that reason, it was necessary to use nonparametric statistical tests. The tests were performed using SPSS Statistics Grad Pack 22.0 (IBM, n. d.). Based the quantitative nature of this study, SPSS was most appropriate in the analysis of the data and in the performance of the necessary tests. SPSS can accommodate up to 50 variables and over 1,000 cases (IBM, n. d.). The variables for this study is much smaller with only 339 cases (sample size). SPSS software executes and provides several statistical descriptive data from different types of tests including

parametric tests (IBM, n. d.). The results of both K-S and the non-parametric tests are presented and analyzed in Chapters 4 and 5.

Beyond the basic foundational statistical measures, the analysis progressed to evaluating the relationship between the Altman's z-score, SGR, and the growth rate of revenues. These analytical relationships were organized in two phases. The first step in phase 1 was to calculate sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score using the financial data of the firms in the study. The second step in phase 1 was to categorize the SGR and the growth rate of reported revenues into higher or lower groups. The higher group will be those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups were compared o determine whether a statistically significant difference exists in the z-score. Based on the normality test of Altman's z-score, SGR, and the growth rate of revenues, it was observed that the data were not normally distributed. For that reason, it was necessary to use non-parametric test. In this case, the Mann-Whitney *U* test was used to determine whether a statistically significant difference exists in the z-score.

Previous studies using Altman's z-score and other methods did not consider the growth rate of reported revenues. For that reason, the correlation between the SGR and the Altman's z-score was never tested (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). This is a major shortcoming in the use of Altman's z-score. To investigate this relationship, the second phase 2 of the statistical analysis involved the correlation between the values of SGR and the values of Altman's z-score to determine if there was a statistically significant relationship between the two scores. The correlation

analysis was performed at two different levels. Level 1 was the correlation of Altman's z-score with the SGR of the lower group. Level 2 was the correlation of Altman's z-score and the SGR of the higher group. These two-level analysis was important because it provided evidence as to whether there is a statistical significant relationship between the Altman's z-score the SGR in each group.

Identified tests were performed using SPSS in this study were the Mann-Whitney *U* test and the Spearman correlation (Field, 2009). Mann-Whitney *U* test and the Spearman correlation are non-parametric tests. It was necessary to use Mann-Whitney *U* test and the Spearman because K-S test for normality indicated that the date were not normally distributed. The Mann-Whitney *U* test is used to compare the means from two independent groups (Field, 2009 & Karlowicz, 2010). The purpose of this test was to ascertain if there was a statistically significance difference between the means from two independent groups. The observation tested using Mann-Whitney *U* test was the Altman's z-score of the two groups. In addition, the Mann-Whitney *U* test, the non-parametric Leven's test was used. The Leven's test for equality is design to show whether the variance of the two groups are significantly different. The interpretation of the actual result of independent t-test will be based on the significance level used. In this study, the significance level to be used is .05. In that case, the *p-value* from the independent sample t-test will be compared to the significance level. The significance level of .05 will be used to limit the probability of Type I error as discussed in the Limitation section of this chapter.

The practical application of the Mann-Whitney *U* test was suitable for this study because the sample will be divided into two groups (higher and lower group) based on

specific attributes. In addition, the Mann-Whitney *U* test was also suitable for this study because the data was not normally distributed. The Mann-Whitney *U* test was used to test the research question based on the following hypotheses:

$H1_0$. The probability of experiencing financial distress was not significantly different for companies whose sustainable growth rate was higher than the growth rate in their revenues.

$H1_a$. The probability of experiencing financial distress was significantly different for companies whose sustainable growth rate was higher than the growth rate in their revenues.

The correlation (Vos, 2009) was used to test the relation between Altman's z-score and the sustainable growth rate (SGR). The purpose of Spearman correlation was to ascertain empirical relationship between the two variables and to determine the probability of experiencing financial distress when the SGR is higher than the growth rate of reported revenues. Correlation technique encompasses the relationship between two quantitative variables that are at ratio or interval level. One of the non-parametric techniques is the Spearman correlation (Leal & Mendes, 2013; Vos, 2009). The Spearman correlation quantifies whether two variables are statistically dependent on each other (Leal & Mendes, 2013; Vos, 2009). Since the data was not normally distributed, Spearman correlation was suitable for this study. In addition, Spearman correlation is less sensitive to outliers in the data (Leal & Mendes, 2013; Vos, 2009).

Assumptions

The population for this study was all companies that are traded in the NYSE. It was assumed that each of the companies traded on the NYSE have met specific required

financial standards for listing. In addition to the listing standard of the NYSE, the companies would also met the following standards: they were not in any type of bankruptcy proceeding; they have submitted all required financial statements to the Security and Exchange Commission; and quantitative financial statement data from this population can be analyzed using the cross-sectional design .

In order to be traded on the NYSE, the firm must meet the financial standards. Some of the standard are based on earnings and cash flow tests. For example, a company must meet at least one of the following standards: $10 million of aggregate pretax income for the last 3 years and a minimum of $2 million in each of the two most recent years; $500 million in global market capitalization; $100 million in revenues (from the most recent 12-month period); and $25 million of adjusted aggregate cash flow for the most three years; $750 million in global market capitalization and $75 million in revenues for the most recent fiscal year; $500 million in global market capitalization and a minimum of 12 months operating history; and $150 million in global market capitalization; $75 million in total assets and $50 million in stockholders' equity (NYSE, n. d).

Since this study was to determine the probability of firms experiencing financial distress, it was assumed the firms sampled were not in any bankruptcy proceeding. In other words, the firms were considered to be a going-concern. Under the going-concern assumption, a firm will keep operating as long as the business is viable (Sormunen & Laitinen, 2012). The going-concern assumption gives investors confidence (Gibson, 2012) in order to continue investing in the firm (Gibson, 2012).

Based on the financial laws and regulations of the United States, it was assumed that the population of interest (all companies that are traded in the NYSE) have submitted

the required financial reports to the SEC. The financial statements of publicly traded companies are collected for the purpose of providing information to investors, financial analysts, and researchers (SEC, n. d). These financial statements are collected and housed by the Security and Exchange Commission (SEC) in the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) (SEC, n. d.).

The financial statements of each publicly traded companies on NYSE include the balance sheet, income statement, and the statements of cash flows. Public traded firms are required the same types of information in each of the financial statements. Based on the archival nature of all the three financial statements, there was no issue in obtaining the necessary financial information needed for the calculation of the Altman's z-score, the SGR, and the growth rate of reported revenues.

The data used in this study came from static financial records of publicly traded companies. In selecting the cross-sectional design, the assumption in the design is that there will be no data manipulation (Pontiff & Woodgate, 2008). The design is robust and accommodating to available data (Frank, et al., 2009). While some special case studies do require more specific data, for some cross-sectional studies, routinely collected data such as financial statements of companies is generally sufficient (Frank, et al., 2009).

Based on the nature of this study, parametric tests were originally selected. Parametric tests initially selected for this study were the independent t-test and Pearson correlation. Parametric tests will provide the best statistical information because the variables (Altman's z-score, the sustainable growth rate, and the growth rate of revenues) are measured at the ratio level. Parametric tests assume that the population is normally distributed; data are measured at ratio or interval level; the data is homogeneous; and data

from the population are independent (Balakrishnan, Jamalizadeh, & Sheikhy, 2009; Field, 2009). The normal distribution assumption indicates graph of the data will be symmetrical. In order to determine if the data is normally distributed, a normality test was performed using the Kolmogorov-Smirnov (Field, 2009). When the Kolmogorov-Smirnov normality test is performed, if the *p*-value is not significant, it will be concluded that the distribution is normal (Field, 2009). If the test indicates the distribution is not normal, it will be necessary to use nonparametric statistical tests (Field, 2009; Leal & Mendes, 2013; Vos, 2009). Based on the K-S normality test, it was determined that the data was not normally distributed. For that reason, nonparametric tests were used. The nonparametric tests used are the Mann-Whitney *U* test and the Spearman correlation.

It was also assumed the data from the population is homogeneous. In this case the variance of samples or groups from the same population is similar. To test the equality of the variance in this study, Levene's test was used (Field, 2009). Based on the selected significance level of .05, Leven's test for equality was design to show whether the variance of the two groups are significantly different (Field, 2009). In addition, independence of data obtained from the population was assumed (Field, 2009; Stockhammar & Oller, 2011). This simply means that the financial data of one company are not dependent on what the other companies are doing or did not do. In this case, the financial data of each company are gathered independently as required generally accepted accounting principles and standards (AICPA, n. d.). However, the K-S normality analysis of Altman's z-score and the SGR suggested that their distributions are not normal. For that reason, it was necessary to use non-parametric levene test (Nordstokke & Zumbo, 2010)

Limitations

The purpose of this quantitative study was to investigate the efficacy of using Altman's' z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues of a firm. However, based on the type of financial data and study design, there are some limitations in the study. These limitations include potential errors in the archived financial information; limitations on the use of financial ratios, and the disadvantage of cross-sectional design.

While all publicly traded companies are required to use generally accepted accounting principles (GAAP), errors in data input may not be obvious in financial statements. GAAP are rules and pronouncements adopted by the accounting profession to provide guidelines in the measurement and evaluation of accounting records and the reporting of the financial activities of an entity (FASB, n. d.). However, GAAP errors in the original input that is used to produce the financial statements may not be identified (Konstantinos & Elena, 2011). For example, the omission of inventories (business items held for resale) from the accounting record will affect several parts of the financial statements including the computation of net income, working capital, and total assets (Barton, 2010). Errors such as this affects the quality of financial statement data. To mitigate the effects of input and other accounting errors, only audited financial statements of the sampled firms will be used. The attestation function of the certified public accountants (CPA or auditors) provide reasonable assurance that information in financial statements are fairly represented and dependable (AICPA, n. d.). In addition, under the Sarbanes-Oxley Act of 2002, the board of directors of publicly traded companies in the

United States must also certify to the fairness of the reported financial statements, or face severe financial and prison penalties (Lobo & Jian, 2010).

Financial ratios posed another limitation in the interpretation of the result. Traditionally, financial ratios are used to determine the financial health of companies (June, 2012). By definition, financial ratios are relationships between financial statement data (Monea, 2009). The most common financial statements used in ratio analysis are the balance sheet and the income statement. However, ratios themselves may not provide conclusive evidence of financial distress. Financial ratios may provide good indication of financial problems when several periods of the same quantitative information are compared. For example, the calculation of Altman's z-score involves several financial ratios such as working capital/total assets; retained earnings/total assets; earnings before interest and taxes/total assets; the market value of equity/book value of total debt; and sales/total assets. While these are good financial measures that are used in the calculation of the Altman's z-score, by themselves, they do not provide sufficient information to determine the overall financial performance of a firm. However, if they are evaluated over several periods, possible trends may emerge that may provide a better indication of the financial performance of a firm. This study used one year of financial ratios only. These limitations can be mitigated by analyzing the relationship between different sets of financial ratios within the same time frame.

To mitigate the limitation relating to the use of financial ratios, this study appraised the relationship between the Altman's z-score, SGR, and the growth rate of revenues. The first part of the evaluation was to categorize the calculated SGR and the growth rate of reported revenues into higher or lower groups. The higher group are those

with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups were compared to determine whether a statistically significant difference exists in the z-score. The second part will involved the analysis of the correlation between the values of SGR and the values of Altman's z-score to determine if there is a statistically significant relationship between the two scores. The correlation analysis was performed at two different levels. Level 1 will be the correlation of Altman's z-score with the SGR of the lower group. Level 2 was the correlation of Altman's z-score and the SGR of the higher group. This two-level analysis strategy was important because it provided evidence as to whether there is a statistical significant relationship between the Altman's z-score and the SGR in each group.

A major disadvantage of a cross-sectional study is that it does not provide a good basis for causality even when two distinct variables are measured at the same point in time (Pontiff & Woodgate, 2008; Kolari & Pynnonen, 2010). In addition, the cross-sectional regression test is very likely to either reject a particular model when the model actually predicted the result correctly or accept the model when it in fact fails (Murtazashvili & Vozlyublennaia, 2012). In this case, cross-sectional study may indicate a relationship. However, care must be exercised not to oversimplify the relationship (Frank, et al., 2009) because additional variables may affect the relationship between the variables of interest but not affect those variables themselves. In that case, it is possible there may be other confounding factors that may affect the relationship between variables (Rubio & Yagüe, 2009). Confounding variables that can affect the relationship between variables in financial distress studies will be the operating characteristics of the firms.

Such operating characteristics include but are not limited to the size of the firm as measured by the total value of assets, the industry in which the firm operates, and the cost structure (use of variable and fixed costs) of the firm. This study investigated the efficacy of using Altman's z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues of a firm. (Altman, 1968). These possible confounding variables were not considered in the z-score model (Atman, 1968) and in the calculation of the sustainable growth rate (Jiang, 2008) and the growth rate of reported revenues.

Based on the disadvantage of the cross-sectional study design, Type 1 or Type II error can be committed. Type I error indicates that the null hypothesis is rejected when it is actually true (Berzkalne & Zelgalve, 2013). Type II error is when a researcher falls to reject the null hypothesis when it is in fact false (Berzkalne & Zelgalve, 2013). To mitigate these errors in this study, the significance level will be established at Alpha = .05. The reason for selecting Alpha =.05 is based on the fact that 339 is a large sample since the entire population of interest is only 2,869. Based on the large sample size, the relationship between the effect size, sample, and power is less critical. In addition, an Alpha level above .05 escalates the possibility of a Type II error. Alpha level above .05 may be acceptable in other studies. However, it was important to lessen the possibility of Type I error because incorrectly rejecting the null hypothesis when it was in fact true will produce a deceitful information that could put companies in financially distressful conditions.

In addition to the limitations presented, it is important to discuss validity as it relates to the design of this study. According to Trochim and Donnelly (2008) validity

"can be defined as the best available approximation to the truth of a given proposition, inference, or conclusion" (p. 20). In that case, validity provides an indication as to how well the research was able to measure what the researcher intended to measure based on the design and the methodology of the study (Tachim & Donnelly, 2008). Validity in a research can be external or internal.

External validity is the validity of generalized (causal) inferences in a research usually based on experiments as experimental validity (Cozby, 2009). According to Rune (2012) "external validity refers to the possibility of generalizing the results of research to other contexts than those in which it was made" (p. 272). The data to be used for this study will come from the financial statements of companies of U.S based publicly traded firms that are listed in the NYSE. In the U.S., financial statements of companies are prepared using the generally accepted accounting principles (GAAP). GAAP are rules and pronouncements adopted by the accounting profession to provide guidelines in the measurement and evaluation of accounting records and the reporting of the financial activities of an entity (FASB, n. d.). These rules apply to the contents and presentation of all financial statements applicable to all U.S. based firms, irrespective of whether the company is private or publicly traded. Based on the cross-sectional design that is used in this study, inferences about cause-effect relationships (Pearson & Coomber, 2010) of financial statement data from publicly traded firms possess external validity because such relationships can be generalized from the unique and distinctive settings, procedures and participants to other populations (companies) and conditions (public or private).

Internal validity is the ability of a research instrument to measure what it is purported to measure (Creswell, 2009). That is, does the instrument really measure what

its designer claims it does? The data for this study will be extracted from financial statements that were collected to provide information to investors and other interested parties such as scholars and financial analysts. It is also assumed that all companies (public or private) are consistently following standardized accounting principles as required by the financial laws of the United States (SEC, n. d.). In that case, it is plausible to assume that the data in the archived financial statements will provide accurate information as required by law. Based the nature of this study it is not necessary to development any instrument for the collection of the required data. Data will be obtained from archived financial statements of sampled firms. In that case, instrumentation will not be a threat to internal validity.

Cross-sectional is a research method involving the observation of all of a population, or a sample of the population, at a specific point in time (Pontiff & Woodgate, 2008). The observation of a population or sample at a particular point in time may affect maturation if the research is on living things such as people or animal. Maturation relates to change based on the passage of time between experiments (Michael, n. d.). However, since this research will use archived financial statements, maturation will not be an issue because the financial statements' data remain the same once it is prepared and archived for future reference.

A possible threat to internal validity in this study relates to statistical validity. Statistical validity is the extent to which statistical tests are able to establish the existence of any correlation or relationship between the variables based on the level of significance or alpha used (Dye, Eakman, & Bolton, 2013). Based on the statistical test result, an incorrect interpretation of the relationship between the variables could lead to Type I or

Type II error. Incorrectly accepting the null hypothesis when it is true will lead to Type I error while the incorrect acceptance of the null hypothesis when it is false will lead to Type II error (Banergee, Bhawalder, Chaudhey, & Chitnis, 2009). In this study, Type I error was considered a serious error because such conclusion will lead managers to making wrong financial decisions and will be detrimental to the operation their firms. To reduce the chance of Type I error, this study used significance level of .05. Statistical validity was also strengthened based on homogeneity of the population of interest. The population of interest consists of all U.S. non-financial service firms that are traded on the NYSE. The sample for this study will be drawn from that population. The population of interest is homogeneous because, the requirements for all the companies traded on the NYSE are the same. In addition, since they are considered public companies, they are required to report their financial operations to the SEC based on U.S. accounting standards and regulations (SEC, n. d.). The data of the sampled firms will be drawn from their reported financial statements archived at the SEC. The financial statements of all U.S. non-financial service firms are homogeneous because they present similar information irrespective of the size of the firms and the industry in which they operate.

Delimitations

The purpose of this quantitative study was to investigate the efficacy of using Altman's' z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues of a firm. Based on the review of related literature, the study of financial distress is based on publicly available financial records of companies. For this reason, the delimitations of this study are the

population and use of financial records of companies that are traded in the NYSE. Other delimitations are the use of cross-sectional design and the selection of test statistics.

The population of interest was narrowed to all U. S. publicly traded companies on the New York Stock Exchange (NYSE). While there are other exchanges such as the American Stock Exchange and the over-the-counter exchange (NASDAQ), NYSE has stringent trading and listing requirements. To be traded on the NYSE, a company must be a going concern (not in a bankruptcy proceeding) or a predecessor of a going concern and meet minimum financial requirements based on several revenue and asset tests (NYSE, n. d). Companies from other parts of the world are allowed to register and be traded on the NYSE if they meet the necessary requirements. However, in this study, only domestic (United States) companies were included. The reason for using only domestic companies is that they are governed by the financial laws and regulations of the United States. For that reason, they are required to periodically (quarterly and annually) report their financial records to the SEC. There was 3,057 U. S. domestic companies listed on the NYSE and includes companies from different industry segments. However, the required sample will be randomly drawn from 2,869 non-professional firms. The remaining 188 companies will not be included in this study because they are professional firms such as banks, insurance companies, law firms, and other professional entities and they do not follow the traditional financial analysis procedures used in other industries (Gibson, 2011). In addition, most of their financial ratios are not comparable with those of other industries (Gibson, 2011).

Based on the nature of this study, it was delimited to the use of cross-sectional design. Cross-sectional is a research method involving the observation of all of a

population, or a sample of the population, at a specific point in time (Pontiff & Woodgate, 2008). As a descriptive research design, the use of cross-sectional does not involve the manipulation of variables (Pontiff & Woodgate, 2008). The financial data for this study were obtained and analyzed as is without manipulation. In addition, this design was most suitable in this study because cross-sectional studies involve special data collection, including questions about the past, but they often rely on data originally collected for other purposes (Pontiff & Woodgate, 2008). In this case, the data to be used for this study will come from the financial statements of the firms included in the study. Publicly available financial statements of a company are used for information purposes.

In addition to population, financial data, and the cross-sectional design, another delimitation of this study is the selection of statistical tests. The statistical tests selected for this study were the independent t-test and the bivariate correlation analysis using the Pearson correlation. These are parametric tests. A parametric test is a type of inferential statistical test that is based on the parameters of the population (Joarder, 2013). This study was delimited to the use of parametric tests because the variables are measured at the ratio level and the population is assumed to have a normal distribution. Normal distribution indicates that the data will be symmetrically distributed. In that case, the distribution will be bell-shaped. A Normality test was performed using Kolmogorov-Smirnov the (Field, 2009) as outlined in the Data Collection and Analysis section of this chapter. Based on the result of the K-S normality test, it was determined that the data were not normal. For that reason, nonparametric statistical tests were used instead.

Ethical Assurances

When conducting research, the researchers must ensure they protect individuals from harm, obtain participants' informed consent, and ensure privacy and confidentiality. They must also be honest with professional colleagues. Several steps were taken to ensure the standards are met. The research was conducted in compliance with established standards of ethical research requirements of Northcentral University (NCU). The role of the NCU Institutional Review Board (IRB) is to protect research participants and to guide researchers in conducting quality, ethical research. However, this research will not involve human subject.

The data used in this study are archival (secondary data). They were originally collected for the purposes of meeting regulatory requirements of the Security and Exchange Commission (SEC) of the United States (SEC, n. d). In addition to the regulatory requirements, financial statements of publicly traded companies are collected for the purpose of providing information to investors, financial analysts, and researchers (SEC, n. d). The archived financial statements will come only from the financial records of publicly traded firms that are listed in the NYSE. These financial statements are collected and housed by the Security and Exchange Commission (SEC) in the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) (SEC, n. d.). The same financial statements with all associated data are also available on each public company's website under investor relation. Other websites such as Yahoo also gather and maintain financial statements of publicly traded companies for the purpose of making such information available to investors, financial analysts, researchers. For the reason, it was

not necessary to recruit the companies in order to participate nor was there a need to take permission from them in order to use the archived financial data.

While the names of the executive offices of publicly traded firms are included in the annual financial reports of the firms, their personal information such as age, demography, personal lifestyle, etc. are not included in the annual financial reports. In this case, information on company officials as well as their personal datat are de-identified in the annual financial reports. To maintain complete anonymity and confidentiality, the companies included in the study were not made available in the completed study and were not collected. In addition, the research focused on the financial activities of the organization and not on the company officials. In that case, there was minimal risk to the officials or their employees in using the firms' publicly available financial data. Nonetheless, appropriate approval from the NCU Institutional Review Board (IRB) was obtained before the financial records of the firms included in this study were extracted and used.

Summary

Chapter 3 presented a discussion of the research methods and design. The population and related assumptions, sample, materials, the operational definition of variables, data collection, processing, and analysis, limitations and delimitations, and ethical assurances were also discussed. Based on the research design, the research question was investigated using a two group design in two different phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenues was compared by categorizing (grouping) them as higher or lower. The

higher group was those with higher SGR than the growth rate of reported revenue while the lower group were those with lower SGR than the growth rate of reported revenue. In phase 1, the Altman's z-score of the two groups were compared to determine whether a statistically significant difference exists in z-score. Phase 2 involved the correlation between the values of SGR and the values of the Altman's z-score to determine if there was a statistically significant relationship between the two scores. To accomplish the tasks in Phases 1 and 2 of this study, a sample of 339 was drawn from all publicly traded companies listed on the NYSE. Data for this study were extracted from the financial statements of the sampled companies. SPSS Statistics Grad Pack 22.0 (IBM, n. d.) was used to perform Mann-Whitney *U* test (Field, 2009) and Spearman correlation analysis test (Leal & Mendes, 2013; Vos, 2009).

Based on the type of data and research design, there were some limitations in the study. These limitations include potential errors in the archived financial information; limitations on the use of financial ratios, and the disadvantage of cross-sectional design. Appropriate mitigations are identified and discussed. In addition to the limitations, based on the review of related literature, the study of financial distress is based on publicly available financial records of companies. For this reason, the delimitations of this study are the population and use of financial records of companies that are traded in the NYSE. Other delimitations are the use of cross-sectional design and the selection Mann-Whitney *U* test and Spearman correlation.

While this study did not involve the use of human subject, the research was conducted in compliance with established standards of ethical research and approved by NCU IRB. The data used came from financial records of publicly traded firms that are

listed in the NYSE. These financial statements are collected and housed by the Security and Exchange Commission (SEC) in the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) (SEC, n. d.). The financial data of publicly traded firms are available for use by the general public including investors and academic researchers.

Chapter 4: Findings

Introduction

The purpose of this quantitative study was to investigate the efficacy of using Altman's' z-score in forecasting financial distress when the sustainable growth rate is higher than the growth rate in revenues of the reported revenues. Chapter 4 contains results of the research undertaken for this study. Statistical profile of the sample based on the market value of equity and the book value of assets are provided. Evaluation of the variables using appropriate statistics including normality test results, the Levene's test for homogeneity, Mann-Whitney *U* test, and the Spearman ranked correlation results are included. Chapter 4 concludes with interpretation of the findings.

Profile of Sampled Companies

Finance distress forecast using different models has flourished in the past several years (Shiri & Raftar, 2012). Among the models used in the prediction of financial distress is the Altman's z-score (1968). The Altman (1968) forms the basis of contemporary financial distress research. Altman's (1968) study used publicly available data on listed manufacturing companies. Since the Altman's (1968) studies, the z-score has being used in other industries including Bhunia and Sarkar (2011) research on pharmaceutical companies.

Continuing the diverse application of the Altman's z-score (1968), this study was based on the financial data of publicly traded companies. However, Altman (1968) focused on large manufacturing firms while Bhunia and Sharkar (2011) focused on pharmaceutical companies. The distinguishing characteristics of this study from those of Altman (1968) and Bhunia and Sharkar (2011) is that the financial data used in this study

was drawn from several industrial sectors. In addition, this study made no distinction regarding the size of each firm.

The sample frame for this study was based on estimated population of 3,057 companies from the NYSE (NYSE, n. d.). However, only 2,869 non-professional firms out of the 3,057 U. S. domestic firms was be included. The remaining 188 companies were not included in this study because they do not follow the traditional financial analysis procedures used in other industries (Gibson, 2011) and most of their financial ratios are not comparable with those of other industries (Gibson, 2011). Companies included in this study were randomly drawn using probability sampling method (Gupta & Shabbir, 2008). Using the Survey System (Surveysystem.com, n. d.) and 95% confidence level, the total sample for this research is 339 companies. Each firm was assigned a random number ranging from 1 through 2,869. The companies with the corresponding random numbers will be included in the study. Sample was drawn from different industry and there was no distinction on the size (small, medium, and large). Financial services providers such as banks, insurance companies, brokerage firms were not included in this study because they do not follow the traditional financial analysis procedures used in other industries (Gibson, 2011) and most of their financial ratios are not comparable with those of other industries (Gibson, 2011).

In order to capture the overall profile of the sampled companies, market value of equity and total assets were used. Based on Table 3 below, the average global market value of the sample is $6,369,110,972. The value is well above the minimum of $750,000,000 required for listing on the New York Stock Exchange (NYSE). The median global market value of the sample is $1,555,000,000. This is also well above the

minimum required threshold of $750,000,000. These figures are meaningful to this study because, they indicate the sampled companies met at least one of the trading requirements of the NYSE (n. d.) as follows: $10 million of aggregate pretax income for the last 3 years and a minimum of $2 million in each of the two most recent years; or $500 million in global market capitalization; $100 million in revenues (most recent 12-month period); and $25 million of adjusted aggregate cash flow for the most three years; or $750 million in global market capitalization and $75 million in revenues for the most recent fiscal year; or $500 million in global market capitalization and a minimum of 12 months operating history; $150 million in global market capitalization; $75 million in total assets and $50 million in stockholders' equity.

Table 3

Market Value of Equity and Assets (N = 290. All figures are in U. S. dollars)

Statistics

		Market Value of Equity	Total Assets
N	Valid	290	290
	Missing	0	0
Mean		$ 6,369,110,972	$ 12,120,347
Median		1,555,000,000	2,848,836
Std. Deviation		20,392,025,020	45,680,471
Range		257,338,482,000	685,235,995
Minimum		11,518,000	92,005
Maximum		257,350,000,000	685,328,000
Percentiles	25	412,927,500	991,121
	50	1,555,000,000	2,848,836
	75	4,295,000,000	7,817,329

Results

This segment starts with an introduction of the sample and data collection. A discussion of the descriptive statistics of the sample was also presented. The segment concludes with a discussion of the normality and homogeneity test results.

In past financial distress studies, the Altman's z-score provided a significant basis for possible bankruptcy forecasts. However, each of the studies did not consider the growth component of the firms studied. This study considered the growth rate of a company's revenues as an important element in financial distress. The growth component of a firm is the percentage increase in the total revenues (Cornett, et al., 2012). However, such growth must also be sustained in order for a firm to continue to be viable. For this reason, the study considered the Altman's z-score, the growth of revenues, and the sustainable growth as important variables in the understanding of a financial distress that a firm may experience from time to time.

The cross-sectional design was used in this study. The cross-sectional design involves the observation of the entire population, or a sample of the population (Pontiff & Woodgate, 2008). Since the cross-sectional research design is descriptive, it was not necessary to manipulate the variables (Pontiff & Woodgate, 2008). The data used in this study was archival data that were originally collected as legal requirements as set forth in the laws of the United States (SEC, n. d.). The data came from the financial statements of public companies that are traded in the NYSE.

The total number of companies sampled for the study was 339. However, only 290 produced useable data. In this case, some of the basic information, such as the

financial statements of the firms was not available either because the companies were in the process of filing for bankruptcy protection or file extension for the submission of financial statements to SEC. When companies are in bankruptcy process, their financial information is generally not available to the public (SEC, n. d.). To calculate the Altman's z-score, sustainable growth rate (SGR), and the growth rate of revenues, financial statements must be available in order to extract the required data. In 49 of the cases, such information was not available resulting to only 290 useable financial statements. Based on power analysis (Faul, Erdfelder, Lang & Buchner, 2007) and $r = .41$ (based on Mann-Whitney U test), the sample of 290 companies produced sufficient statistical power to suggest that the removal of 49 companies from the sample did not increase the probability of making Type II error. Figure 1 below indicates that the statistical power associated with the sample of 290 firms is approximately 0.94; suggesting that the probability of committing Type II error is only 6% (Faul, et al., 2007).

Using the financial statement data of the sample of firms, the research focused on using the Altman's z-score in the forecasting of financial distress when the sustainable growth rate is higher than the growth rate of reported revenues. The data gathering was organized in two (2) phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. Phase 2 of this study was the analysis of the data using correlation to determine if there was statistically significant relationship between SGR and the values of Altman's z-score.

The computation of the Altman's z-score is based on discriminant analysis technique that is widely used in the prediction of corporate financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Altman's z-score is a ratio level measurement such that $Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.010X5$. Where X1 = working capital/total assets; X2 = retained earnings/total assets; X3 = earnings before interest and taxes/total assets; X4 = market value of equity/book value of total debt; and X5 = sales/total assets.

The growth rate of revenues measures changes in sales (revenues) from one period to another. The growth rate of reported revenues is a ratio scale and can be calculated using rate calculation procedure of the time value of money concepts (Cornett, et al., 2012; Gardner, et al., 2011) such that $G = [(St2/St1)] - 1$. Where St2 = the reported revenues in the current year; St1 = the reported revenues in the previous year and G = growth rate of revenues.

The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). The quantitative measure of sustainable

growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Ashta, 2008).

After the calculation of each of the variables, the SGR and the growth rate of reported revenues was compared by categorizing (grouping) them as higher or lower (higher and lower groups). The higher group included sampled firms with SGR higher than the growth rate of reported revenue while the lower group included sampled firms with SGR lower than the growth rate of reported revenues. Phase 2 of the study involved the correlation of SGR with the value of the Altman's z-score for the higher group and the correlation of SGR with the value of the Altman's z-score for the lower group. The purpose of performing the correlation is to determine if there was a statistically significant relationship between the SGR and the Altman's z-score.

Table 4

Descriptive Statistics of all Variables using 2012 financial data set (N = 290)

Statistics

		SGR (%)	GrowthRateRev (%)	Z-score
N	Valid	290	290	290
	Missing	0	0	0
Mean		7.20	5.00	6.10
Std. Error of Mean		0.58	0.63	.21
Std. Deviation		9.93	10.72	3.55
Skewness		-.26	-.13	2.60
Std. Error of Skewness		.14	.14	.14
Range		55.65	54.66	33.59
Minimum		-22.72	-24.54	.03
Maximum		32.93	30.13	33.61

Descriptive statistics: Aggregate descriptive statistics analysis includes all three (3) variables used in this study. Descriptive statistics are a good way to develop an understanding of the variables' values. By analyzing the minimum, maximum, mean, and

the range values, the researcher is able to determine if the data set contains missing values or outliers that can lead to injecting a bias into the analysis. Table 4 shows the descriptive statistical values for sustainable growth rate, growth rate of revenues and the Altman's z-score. The information on Table 4 suggests that SGR and the Altman's z-score are not normally distributed. SGR has skewness of -.26 indicating the data is negatively skewed; while Altman's z-score has skewness of 2.60 indicating the data is positively skewed. Excessive skewness of SGR and Altman's z-score is a condition representing non-normality. Growth rate of revenues (GRR) has skewness of -.13. While this figure suggests the data is skewed, it is not as pronounced or obvious as those of SGR and the Altman's z-score. Altman's z-score has a mean of 6.10 and is above the upper threshold of the Altman's z-score. Altman's s-score model has a range of 1.81 to 2.99. An Altman's z-score value lower than 1.81 indicate that the company will experience financial distress (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). A value above 2.99 indicates the firm is relatively safe from a financially distressful situation. Companies that fall between 1.81 and 2.99 are most likely to experience financial distress if appropriate financial planning is not implemented. On the average, the 6.10 (Table 4) suggests that the companies in this study are relatively safe financially (Altman, 1968; Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009).

Altman's z-score and the SGR of the two groups were analyzed to determine whether a statistically significance difference exists. Based on the information on Table 5 below, on the average, the Lower Group has higher Altman's z-score (M = 6.28, SD = 3.91) compared to the Higher Group (M = 5.98, SD = 3.29). The SGR of the two groups

were also different. The Higher Group's SGR (M = 10.58, SD = 8.62) is higher compared to SGR of the Lower Group (M = 2.20, SD = 9.65).

Table 5

Descriptive Statistics by groups: Altman's Z-scores and SGR (N = 173 for higher group; N = 117 for lower group).

Descriptive Statistics

Groups		N	Range	Minimum	Maximum	Mean	Std. Deviation
Higher Group	Altman-Z-Scores	173	26.86	.12	26.98	5.98	3.29
	SGR (%): Higher Group	173	49.14	-16.21	32.93	10.58	8.62
	Valid N (listwise)	173					
lower Group	Altman-Z-Scores	117	33.59	.03	33.61	6.28	3.91
	SGR (%): Higher Group	117	46.22	-22.72	23.51	2.20	9.65
	Valid N (listwise)	117					

Table 6

Normality Test for Sustainable Growth, Growth Rate of Revenues and Altman' Z-score. (N = 290)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
SGR (%)	.086	290	.000	.985	290	.003
GrowthRateRev (%)	.037	290	.200*	.993	290	.154
Z-score	.123	290	.000	.820	290	.000

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Test for normality: One of the basic steps in statistical analysis is to ascertain the normality of the data. In order to determine if the data is normally distributed, a normality test was performed using the Kolmogorov-Smirnov (Field, 2009). Kolmogorow-Smirnov tests whether two distributions differ and may reasonably be assumed to come from the same distribution. When the Kolmogorov-Smirnov (K-S) normality test is performed, if

the *p*-value is not significant, it will be concluded that the distribution is normal (Field, 2009). Table 6 above provides normality test results for sustainable growth rate (SGR), growth rate of revenues (GRR), and Altman's Z-score. Based on Table 6, SGR and the Altman's z-score has $p < .05$. These results indicate that the K-S test is significant and suggest that the distribution is not normal.

Since the normality assumption is violated, plausible alternative was to use non-parametric tests. In this case, the Mann-Whitney *U* test was used in place of the independent t-test; the non-parametric Levene's test for equality of variance was used instead of the regular Levene test; and the Spearman correlation was used instead of the Pearson correlation. Each of these non-parametric test results were presented and discussed.

Homogeneity of variance: It was assumed the data from the population is homogeneous. In that case the variances of sample or groups are from the same population and are similar. To test the equality of the variance in this study, Levene's test for homogeneity was conducted and the result indicates that the Altman's z-score for the Higher Group and for the Lower Group were statistically the same (F (288) = .07, p = .79). In addition, Levene's test for sustainable growth rate (SGR) also indicated that the Higher and the Lower Group were also statistically the same (F (288) = .10, p = .80. Based on .05 significance level, the Levene's tests for homogeneity indicated that the variance of the two groups are not statistically different (Field, 2009) because $p > .05$. However, since the analysis of Altman's z-score and the SGR suggested that their distributions are not normal, it was necessary to use non-parametric levene's test

(Nordstokke & Zumbo, 2010) to either confirm or refute the homogeneity of variance results (Nordstokke & Zumbo, 2010).

The non-parametric Levene's test is designed to be used where the distributions of the data are skewed (Nordstokke & Zumbo, 2010). Since the non-parametric Levene's test is based on ranking of scores, it is more robust compared to the traditional Levene's test of homogeneity of variance (Nordstokke & Zumbo, 2010). In order to run the test, the skewed data (Altman's z-score and the SGR) were ranked using five different steps. Each of the steps was accomplished using SPSS (IBM, n. d.) as follows:

1. Created the ranked data based on the original data;
2. Created the group mean ranks from step 1;
3. Created individual deviations (group mean ranks minus ranked data);
4. Converted the individual deviations to absolute values. This step was necessary because the non-parametric Levene's test will not run if there are negative scores.
5. Ran a One-Way ANOVA of the converted absolute values of the individual deviations. Table 7 below contains result of non-parametric Levene's test results. Tables 8 and 9 contain a partial list of scores based on the five steps above. Only a partial list of the converted values is produced because the actual result was more than fifteen (15) pages.

Based on the non-parametric Levene's test results (Table 7), $p = .89$ for Altman's z-score and $p = .92$ for SGR indicating that the Higher and Lower Groups are statistically the same. The non-parametric Levene's tests suggest the results obtained using the parametric Levene's test results are statistically the same.

Table 7

Non-parametric Levene's test of homogeneity of variance: Altman's z-score and SGR

		Sum of Squares	df	Mean Square	F	Sig.
Z-Score	Between Groups	36.94	1	36.94	.02	.89
	Within Groups	507071.60	288	1760.67		
	Total	507108.54	289			
SGR	Between Groups	16.46	1	16.46	.01	.92
	Within Groups	476958.27	288	1656.11		
	Total	476974.73	289			

Table 8

Partial list of actual ranked z-score

Groups: 1 = Higher Group 2 = Lower Group	Z-Score	Ranked Z-Score	Mean of ranked Z-Score	Absolute difference between ranked and mean of the ranked z-score
1	.87	11.00	143.80	132.80
1	8.11	221.00	143.80	77.20
1	8.62	249.00	143.80	105.20
2	3.26	52.00	148.01	96.01
2	3.89	78.00	148.01	70.01
2	5.73	138.00	148.01	10.01

Table 9

Partial list of actual ranked SGR

Groups: 1 = Higher Group 2 = Lower Group	SGR	Ranked SGR	Mean of ranked SGR	Absolute difference between ranked and mean of the ranked SGR
1	3.45	106.00	173.97	67.97
1	14.03	221.00	173.97	47.03
1	17.69	240.00	173.97	66.03
2	-7.91	22.00	103.40	81.40
2	-18.83	4.00	103.40	99.40
2	3.85	113.00	103.40	9.60

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate of its revenues. This generated the following research question:

Q1: Using the Altman's z-score bankruptcy model, how does the probability of experiencing finance distress change when a company's sustainable growth rate was higher than the growth rate of its revenues?

In addition, Mann-Whitney *U* test was performed on Altman's z-score of the two groups. The Mann-Whitney *U* test is an acceptable counterpart of the independent t-test when the assumptions of normality is violated (Rochon, Gondan & Kieser, 2012). The Mann-Whitney *U* test is a nonparametric test that ranks the data that are not dependent on the differences of median or the mean of the data. Rather it is a spread or distribution of two autonomous groups from the same sample (Rochon, et al., 2012). Mann-Whitney *U* test evaluates the position and the range of the lower group's distribution within the general sample range (Rochon, et al., 2012). Based on this approach and on the size of the sample, Mann-Whitney *U* test has sufficient statistical power to able to detect the differences between the means and the median of the sample (Rochon, et al., 2012).

Table 10

Mann-Whitney U Test for Altman's z-score

Test Statistics

	Altman-Z-Scores
Mann-Whitney U	9827.000
Wilcoxon W	24878.000
Z	-.419
Asymp. Sig. (2-tailed)	.675

The Mann-Whitney *U* test was used to determine if there was difference between the Altman's z-score of the two groups. The results indicated that the Higher Group (*Mdn* = 5.52) was not statistically different from the Lower Group (*Mdn* = 6.10), *U* = 9827, *z* = -.42, *p* = .68, *r* = .03 (Field, 2009; Pallant, 2013). This result suggests that the probability of experiencing financial distress did not change when sustainable growth rate was higher than the growth rate of revenues for companies in this study. This result presented in Table 10 was explored further in Chapter 5.

Table 11

Spearman ranked correlation of the Sustainable Growth Rate (SGR) to Altman's Z-score (N = 173 for the Higher Group, N = 117 for the Lower Group), p>.05 for both groups

Correlations

	1 = Higher Group; 2 = Lower Group			Altman-Z-Scores	SGR (%):
Spearman's rho	1	Altman-Z-Scores	Correlation Coefficient	1.00	.05
			Sig. (2-tailed)	.	.50
			N	173	173
		SGR (%):	Correlation Coefficient	.05	1.00
			Sig. (2-tailed)	.50	.
			N	173	173
	2	Altman-Z-Scores	Correlation Coefficient	1.00	.16
			Sig. (2-tailed)	.	.09
			N	117	117
		SGR (%):	Correlation Coefficient	.16	1.00
			Sig. (2-tailed)	.09	.
			N	117	117

Spearman rank order correlation: The Spearman rank order correlation was used instead of the Pearson correlation. Since the result of the normality tests indicated that the Altman's z-score and the SGR were not normally distributed, it was necessary to use a non-parametric correlation (Bishara & Hittner, 2012). Spearman's rank order correlation provides two important information. It communicates the strength of the

relationship between variables and also provides information on the direction of the relationship based on a two-tail test. A correlation matrix showing the relationship between the sustainable growth rate (SGR) and the Altman's z-score was generated for each of the groups. Table 11 above displays the correlation scores between Altman's z-score and the sustainable growth rate.

Evaluation of Findings

Through the analysis of the data for this study, the results that emerged were not surprising for the most part. While the financial statements of publicly traded companies are collected and classified based on the same accounting standards and procedures, normality of the data was not expected. Based on the composition of the data, normality distributed was not met because there was no distinction as to the size (in terms of revenues, assets, total debt, and market values of equity) of the firms in the sample. This finding is consistent with other studies including Altman (1968), Altman and Spivack (1983), Bhunia and Sarkar (2011), and Burksaitiene and Mazintiene (2011). Revenues, assets, total debt, and market value of equity are the driving force in the calculation of the Altman's z-score model (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). SGR is driven by net income, dividend, assets, and equity; while GRR is driven by revenues (Ashta, 2008; Cornett, et al., 2012). It is possible for the data to meet the normality assumption if the firms in the sample had approximately equal revenues, assets, and market values equity, debt, net income, and dividend. The homogeneity of variances assumes that the variances of the groups are similar. This assumption was confirmed by Levene's test for homogeneity based on the equality of variance (Field, 2009; Stockhammar & Oller, 2011) for each of the variables

and for the two groups. Based on alpha of .05, the Levene's tests suggest that the variances of the Higher and the Lower Groups are not statistically different (Field, 2009; Stockhammar & Oller, 2011). This result was not also surprising since the financial statements data of publicly traded companies are organized using the same standard and are similarly classified regardless of the size of the firm or the industry it operates.

The second step in phase 1 of this study was to categorize the SGR and the growth rate of reported revenues into higher or lower groups. The higher group contains firms with higher SGR than the growth rate of reported revenue while the lower group included firms with lower SGR than the growth rate of reported revenue. The purpose of the grouping was to determine to determine whether a statistically significant difference existed between the Altman's z-score of both groups. In order to address the research question and the hypothesis, the Mann-Whitney *U* test and the Spearman ranked correlation were performed. The Mann-Whitney *U* test and the Spearman ranked correlation are non-parametric tests (Leal & Mendes, 2013; Vos, 2009). It was necessary to use non-parametric tests because two of the variables (the Altman's z-score and the SGR) were not normally distributed.

The quantitative z-score Altman's model ranges from 1.81 to 2.99. A score below 1.81 suggests that the firm has a high probability of experiencing financial distress while a z-score of 2.99 suggests that the firm has a low risk of financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). Scores between 1.81 and 2.99 indicate moderate financial distress risk that can be avoided with appropriate financial planning (Altman, 1968). Calculations of the Altman's z-scores indicated that seven of the companies in the Lower Group had z-scores less than

1.81.While fourteen of the companies in the Higher group had z-scores less than 1.81. In other words, 21 (or 7.24%) out of the 290 sampled firms in this study could experience financial distress.

Restatement of the research question and hypotheses: The following hypothesis was used to the research question:

Q1: Using the Altman's z-score bankruptcy model, how does the probability of experiencing finance distress change when a company's sustainable growth rate is higher than the growth rate of its revenues?

$H1_0$. The probability of experiencing financial distress is not significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

H1a. The probability of experiencing financial distress is significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

Mann-Whitney *U* test: Using descriptive statistics, the Altman's z-scores of both groups indicated that the mean of the higher group ($M = 6.28$, $SD = 3.91$) was greater than the mean ($M = 5.98$, $SD = 3.29$) of the Lower Group. The Mann-Whitney U test (U = 9827, z = -.42, p = .68) indicates that this difference was not statistically significant. This result suggests that the probability of experiencing financial distress for the companies in the study is not statistically different for companies whose sustainable growth rate is higher than the growth rate in their revenues

Correlation: The Spearman ranked correlation is one of the tests used in the analysis of the research question. Spearmen ranked correlation quantifies the relationship

between two numerical variables without differentiating them as whether they are independent or dependent variables. The Spearman ranked correlation ranges from -1.0 to +1.0. The strength (negative or positive) of the Spearman ranked correlation increases as it gets closer to -1.0 or +1.0 (Vos, 2009). A zero Spearman ranked correlation suggests there is no relationship between the two quantitative variables (Leal & Mendes, 2013; Vos, 2009). Spearman ranked correlation (r_s = .05, p = .50) for the Higher Group and (r_s = .16, p = .09) for the Lower Group suggest that the statistical relationship between Altman's z-score of both groups is very weak. In this case, neither were statistically significant at the .05 level.

Summary

The analysis presented in this chapter was based on data from 290 sampled firms. Statistical profile of the sample based on the market value of equity and the book value of assets was presented. Evaluation of the variables using appropriate statistics including normality test results, the Levene's test for homogeneity, Mann-Whitney *U* test, and correlation results were included. Chapter 4 concludes with interpretation of the findings. The descriptive Altman's z-score of the two groups was analyzed to determine whether a statistically significance difference exists. The results indicated that the mean of Altman's z-score for the higher group was greater than the mean for the lower group (p = .68).

Using the Kolmogorov-Smirnov (K-S), normality test results for sustainable growth rate, growth rate of revenues, and Altman's Z-score was performed. These results indicated that the K-S test is not significant and suggest that the distribution was not normal. Since the normality assumption was violated, plausible alternative was to use non-parametric tests. The Mann-Whitney *U* test was used in place of the independent t-

test; the non-parametric Levene's test for equality of variance was used instead of the regular Levene's test; and the Spearman correlation was used instead of the Pearson correlation. Each of these non-parametric test results were presented and discussed. The results of the non-parametric tests indicate that the chance of experiencing financial distress did not change when the SGR is higher than the growth rate of revenues (p = .89 for non-parametric Leven's test).

The Mann-Whitney U test was used to analyze the research question. This result suggests that the probability of experiencing financial distress for the companies in the study was not statistically different for companies whose sustainable growth rate was higher than the growth rate in their revenues. Based on the results of Spearman ranked correlation (r_s = .05, p = .50) the Higher Group and (r_s = .16, p = .09) suggest that the statistical relationship between Altman's z-score of both groups is very weak. In addition the Mann-Whitney U test, the Levene's tests suggest that the variances of the Higher and the Lower Groups are not statistically different. This result was expected because the financial statements data of publicly traded companies are organized using the same standard and are similarly classified regardless of the size of the firm or the industry it operates.

Chapter 5: Implications, Recommendations, and Conclusions

In the field of accounting and finance, the going concern concept postulates that a company will operate for an indefinite period of time (Gilson, 2012). On the bases of this assumption, the extreme possibility of a firm actually shutting down is not considered in the overall strategic plan of most companies. However, the reality is that companies do experience financial difficulties from time to time and some of these financial difficulties may in fact result to financial distress or to a total liquidation of firms (Gibson, 2011; Sormunen & Laitinen, 2012). Financial distress is a business failure where the firm is no longer operating as a going concern (Bhunia & Sarkar, 2011; Sormunen & Laitinen, 2012). For this reason, understanding how to help businesses avoid financially distressful situations continues to interest academic and professional researchers.

In addition to the brief discussion of the problem statement, purpose, method, limitations, and ethical dimensions, Chapter 5 concludes with a discussion of the implications of the research results, recommendations, and conclusion. The implications focused on analyzing the research question and the hypothesis based on the research results reported in Chapter 4. The effects of the use of ratios to interpret the research result was presented. The practical application of the results were presented as they relate to applicable literature and within the context of financial distress studies.

The history of financial distress prediction includes application of numerous statistical tools. Bankruptcy prediction models are more generally known as measures of financial distress. The best known, and most-widely used, multiple discriminant analysis method is the one proposed by Altman (1968). Altman's z-score, or zeta model, combined various measures of profitability or risk (Altman, 1968; Bhunia & Sarkar,

2011; Burksaitiene & Mazintiene, 2011). The data used in the calculation of the z-score are from the financial statements of companies. However, the problem with the Altman's z-score model is that it does not consider whether a firm can be financially distressed or not if the sustainable growth rate of the firm is in fact higher than the growth rate of its revenues.

The purpose of this quantitative study was to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate was higher than the growth rate of its revenues. While several methods including the Altman's z-score can be used in forecasting financial distress (Chia-Liang, & Kuan-Min, 2011; Fu, 2010), none considered the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is measured by growth in total revenues (Cornett, et al., 2012). Such growth must be sustainable in order to avoid financial distress (Cornett, el al., 2012). This study incorporated the growth component of a firm in order to assess the ability of Altman's z-score in financial distress forecasting the sustainable growth rate of a firm is higher than the growth of its revenues. Based on the purpose of this study, the research question addressed was on whether the probability of a company experiencing financial distress changed if the company's sustainable growth rate was higher than the growth rate of its revenues.

The data used for this study is archival data of the financial statements of publicly traded companies listed in the NYSE. For that reason, cross-sectional design was used. As a descriptive research, cross-sectional design was also suitable for this study because it does not involve the manipulation of variables (Pontiff & Woodgate, 2008). This

characteristics of the cross-section design was particularly important because the archived financial statements used for this study were obtained and analyzed without manipulation. In addition, this design is most suitable in this study because cross-sectional studies involve special data collection, including questions about the past, but they often rely on data originally collected for other purposes (Pontiff & Woodgate, 2008). One of the major advantage of the cross-sectional that also made it most suitable for this study is that the design is robust and accommodating to available data (Frank, et al., 2009). While some special case studies do require more specific data, for most cross-sectional studies, routinely collected data such as financial statements of companies was sufficient for this study.

The research question was investigated using a two group design in two different phases. Phase 1 involved the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenues were compared by categorizing (grouping) them as higher or lower. The higher group are those with higher SGR than the growth rate of reported revenue while the lower group are those with lower SGR than the growth rate of reported revenue. The Altman's z-score of the two groups will be compared to determine whether a statistically significant difference exists in z-score. Phase 2 involved the correlation between the values of SGR and the values of Altman's z-score to determine if there was a statistically significant relationship between the two scores.

Based on the type of financial data and study design, there are some limitations in the study. These limitations include potential errors in the archived financial information; limitations on the use of financial ratios, and the disadvantage of cross-sectional design.

The major disadvantage of cross-sectional study is that it does not provide a good basis for causality even when two distinct variables are measured at the same point in time (Pontiff & Woodgate, 2008). This observation is supported by Kolari and Pynnonen (2010). Kolari and Pynnonen (2010) indicate that the correlation between investment returns and event-dated information resulted in over-rejection of the hypothesis even when such events and the returns were measured within the same time frame.

While all publicly traded companies are required to use generally accepted accounting principles (GAAP), errors in data input may not be obvious in financial statements. GAAP are rules and pronouncements adopted by the accounting profession to provide guidelines in the measurement and evaluation of accounting records and the reporting of the financial activities of an entity (FASB, n. d.). GAAP errors in the original input that is used to produce the financial statements may not be identified (Konstantinos & Elena, 2011). To mitigate the effects of input and other accounting errors, only audited financial statements of the sampled firms was used.

Another limitation was on the use of financial ratios. By definition, financial ratios are relationships between financial statement data (Monea, 2009). The most common financial statements used in ratio analysis are the balance sheet and the income statement. However, ratios themselves may not provide conclusive evidence of financial distress. Financial ratios may provide good indication of financial problems when several periods of the same quantitative information are compared. To mitigate the limitation relating to the use of financial ratios, this study examined the relationship between the Altman's z-score, SGR, and the growth rate of revenues within the same time period. For the Altman's z-score, the variable include sales, asset turnover, the ability to meet long-

term financial obligation (leverage), ability to pay current maturing obligations (short-term leverage) and profitability analysis (profit margin, return on assets, and return on equity). On the other hand, variables used in the calculation of the sustainable growth rate are sales, the dividend retention ratio, profit margin, financial leverage, and total asset turnover. These variables are extracted from the same financial statements. In this case, there were two different sets of ratios that measured the overall performance of the firms in this study. The use of two difference sets of ratios provide a better indication of the overall financial performance of a firm (Chia-Liang, & Kuan-Min, 2011; Cornett, el al., 2012; Fu, 2010; Monea, 2009).

When conducting research, the researchers must ensure they protect individuals from harm, obtain participants' informed consent, and ensure privacy and confidentiality. They must also be honest with professional colleagues. While the data for this study was obtained from publicly available information of companies traded on the NYSE, several steps were taken to ensure the standards are met. Companies included in this study were selected using randomly selected numbers that were assigned to each company. The research focused on the financial activities of the organization and not on the company officials. In that case, there was mininal risk to the officials or their employees in using the firms' publicly available financial data. In addition, information on company officials were de-identified in the annual financial reports.

Implications.

The purpose of this quantitative study is to investigate the efficacy of using Altman's z-score in forecasting financial distress of a firm when the sustainable growth rate is higher than the growth rate of its revenues. There are several methods in existence

that can allow a researcher determine possible financial distress of a firm. Such methods include univariate, multivariate, logit analysis, and the Alman's z-score model (Altman, 1968; Zhou & Elhag, n. d.). These financial distress analysis methods do not consider the growth component of a firm (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). The growth component of a firm is the percentage increase in the total revenue (Cornett, et al., 2012) and must be sustainable in order to avoid financial distress (Gardner, et al., 2011). Analyzing and understanding this problem is important because it will help managers put together better strategic financial plans and grow their firms at a rate that is sustainable in order to avoid financial distress. This problem generated the following research question:

Q1: Using the Altman's z-score bankruptcy model, how does the probability of experiencing finance distress change when a company's sustainable growth rate is higher than the growth rate of its revenues?

The research question was investigated using a two group design in two different phases. Phase 1 involves the calculation of the sustainable growth rate (SGR), the growth rate of reported revenues, and the calculation of Altman's z-score. The SGR and the growth rate of reported revenues was compared and categorized as higher or lower. The higher group are those with higher SGR than the growth rate of reported revenue while the lower group are those with lower SGR than the growth rate of reported revenue. Based on the groupings, the Altman's z-score of the two groups was compared to determine whether a statistically significant difference exists in z-score. To determine whether there is a change in the probability of experiencing finance distress when a company's sustainable growth rate is higher than the growth rate of its revenues, the

Mann-Whitney *U* test must be significant. The Mann-Whitney *U* test revealed that the Higher Group (*Mdn* = 5.52) was not statistically different from the Lower Group (*Mdn* = 6.10), *U* = 9827, *z* = -.419, *p* = .68, *r* = .03 (Field, 2009; Pallant, 2013). The Mann-Whitney *U* test suggests that the probability of experiencing financial distress did not change when sustainable growth rate is higher than the growth rate of revenues for companies in this study.

Based on the result of this research, the implication is that a company can experience financial distress in either group. There was no difference between the groups. A firm with higher SGR than the growth rate of revenues (GRR) is no more or less probable to experience financial distress. In that case, higher sustainable growth rate may not necessarily immune a firm from financial distress. The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). Review of the literature indicated that all companies strive to grow in order to survive (Raisch & von Krogh, 2007). However, growth must be sustainable in order to benefit the company financially (Jiang, 2008). As a planning tool, the Mann-Whitney *U* tests for this study suggest that higher sustainable growth rate may not necessarily immune a firm from financial distress. This finding is consistent with that of Raisch and von Krogh (2007). Raisch and von Krogh (2007) pointed out that growth has limitations and also posed challenging problems to managers in the planning process. Raisch and von Krogh (2007) examined Fortune 500 companies and determined that these companies did well within the limits of their growth corridors including sales and profitability. In addition, the higher the sustainable growth rate, the greater the financial risk (Raisch & Krogh,

2007). In this regard, firms need to establish minimum and maximum growth rate. According to Raisch & von Krogh (2007) these lower and upper growth boundaries will allow companies to establish a smart growth rate (Jiang, 2008).

Other studies using sustainable growth rate to determine the financial viability of firms reached produced results similar to the one produced in this study. Based on empirical studies, sustainable growth rate is an important business strategy for many types of businesses (Lansdrom, et al., 2008). According to Lansdrom, et al. (2008), "internal and sustainable growth rate can be used as a measure for risk tolerance" (p. 124). However, sustainable growth rate must be managed successfully in order to benefit the company (Lansdrom, et al., 2008). Palenu and Healy (2008) also suggest that even when a firm has a high sustainable growth rate, it can still experience financial distress if additional long-term debt is incurred beyond what the firm can ordinarily handle. This is particularly problematic, especially when growth in revenue is not sustainable (Lansdrom, et al., 2008).

Phase 2 of the study involved the correlation between the values of SGR and the values of Altman's z-score to determine if there is a statistically significant relationship between the two scores. Previous studies using Altman's z-score and other methods did not consider the growth rate of reported revenues. For that reason, the correlation between the SGR and the Altman's z-score was never tested (Chia-Liang, & Kuan-Min, 2011; Fabozzi, et al., 2010; Fu, 2010; Lin, 2009). This is a major shortcoming in the use of Altman's z-score. Phase 2 used the two-group design. One group contained companies with sustainable growth rate higher than their growth rate in reported revenues and another group contained companies with sustainable growth rate lower than their growth

rate in revenues. Based on this grouping and on the research question, the following hypothesis was tested.

$H1_0$. The probability of experiencing financial distress is not significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

$H1_a$. The probability of experiencing financial distress is significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues.

The purpose of correlation was to ascertain empirical relationship between the Altman's z-scores of the higher and lower group and to determine the probability of experiencing financial distress when the SGR is higher than the growth rate of reported revenues. The Spearman rank order correlation was used to test the correlation. Spearman's rank order correlation provides two important information. It communicates the strength of the relationship between variables and also provides information on the direction of the relationship based on a two-tail test. Spearman ranked correlation (r_s = .05, p = .50) for the Higher Group and (r_s = .16, p = .09) for the Lower Group implies that the statistical relationship between Altman's z-score of the Higher and Lower Groups is very weak. Since $p > .05$, this study failed to reject null hypothesis. This suggests that the probability of experiencing financial distress is not significantly different for companies whose sustainable growth rate is higher than the growth rate in their revenues. There is no relationship between the Altman's z-score and the SGR in the higher and the lower group. This result is consistent with the Mann-Whitney *U* test.

The Mann-Whitney *U* test and the Spearman Correlation suggested there is no statistical difference between the Higher and the Lower Group when the SGR is higher than the GRR. The implication of this result is other factors could contribute to financial distress of a firm. Review of the literature suggested that several factors include, but are not limited to, lack of long-term funds, financial misappropriation, general economic conditions, size of a firm, and conflicts between owners of a firm the managers of the firm can contribute to the financial distress of firms. While these factors are not quantified within the financial statements of a firm, they nonetheless can contribute the financial viability of a firm.

Titman, et al. (2011) indicates that how much long-term funds a company requires is determined by the company's needs to finance long-term. Long-term assets, such as buildings and machinery, and are generally financed using long-term debt (Titman, et al., 2011). However, Moline and Preve (2012) suggest that in periods of tight monetary policy, a company's ability to raise funds is greatly diminished. When a company is unable to raise funds on a long-term basis (beyond one year), it is expected that it will not be able to make sustainable long-term investment in assets or expand current operating facilities (Molina & Preve, 2012; Tilman, et al., 2012).

Financial misappropriation also contributes to corporate financial distress (Yuhao, 2010). Financial misappropriation is a situation in which the legal and ethical management of financial resources does not take place (Zahra, Priem, & Rasheed, 2007). Recent cases of financial distress that resulted from financial fraud include Enron, Health South, and Tyco (Choudhary, 2012; Patra, 2010; Shirur, 2011; Yuhao, 2010). According to Silver, Fleming and Riley (2008), one of the common frauds is financial statement

fraud. Albrecht, Albrecht, Albrecht, & Zimbelman (2012) agrees with Fleming and Riley (2008) and indicates that financial fraud can include, but is not limited to, understating or overstating liabilities; omission of materials financial information from financial statements; recognition of unearned revenue; improper use of non-GAAP financial measures; off-balance sheet financial arrangements; and misappropriate funds (Albrecht, Albrecht, Albrecht, & Zimbelman, 2012).

The general economic conditions can result to financial distress. External environmental factors affect the viability of a company at different times (Madrid-Guijarro, et al., 2011). These external factors include macroeconomic issues that are generally beyond the immediate control of a company (Madrid-Guijarro, et al., 2011). Among the macroeconomic factors that may lead to financial distress are interest rate, inflation, monetary policy, and worldwide macroeconomic issues such as oil price and debt crisis (Korol & Korodi, 2010). In addition to Dah-Kwei and Malcolm (2007), some of these macroeconomic indicators have been extensively researched in order to determine how they contribute to the incidence of financial distress (Ali & Daly, 2010; Bonfim, 2008). Dah-Kwei and Malcolm (2007) performed a statistical analysis on macroeconomic variables using logit technique. Based on the logit results, Dah-Kwei and Malcolm (2007) concluded that a major factor affecting company failure rate is the overall economic circumstances within which companies are operating. In addition, smaller businesses are particularly vulnerable to bad economic condition because they are most likely to be affected by changes in consumer demand, tightening of credit by banks, and lack the ability to restructure existing debt (Yallapragada & Bhuiyan, 2011). The

combination of these unfavorable macroeconomic conditions lead to increased rates of bankruptcy for smaller businesses (Yallapragada & Bhuiyan, 2011).

The size of a firm contributes significantly to the firm experiencing financial distress because they are most likely to be priced out of market when the overall economic conditions is bad (Vlad, 2009; Yallapragada & Bhuiyan, 2011). Chan (2012), Vlad (2009) and Yallapragada and Bhuiyan (2011) argue that irrespective of the industry in which the small business is operating, majority of them experience financial distress at different times and the most contributing factor to financial distress for small businesses is lack of financing.

The governance characteristics of a firm can affect its financial viability. Corporate governance is a series of strategic actions promulgated and monitored by the governing board of directors of a firm for the purposes of assigning responsibilities to specific individuals or departments within the firm (Young & Thyil, 2013). Young and Thyil (2013) also indicated that continued sustainability of firms is largely dependent on the characteristics and the actions of the governing body. Previous research by Fich and Slezak (2008) indicates that the ownership characteristics and the characteristics of the corporate governing body can and have contributed to the success or failure of companies (Fich & Slezak, 2008). Fich and Slezak (2008) used publicly available information of companies in the U. S. to study how governance characteristics a firm affects the firm's ability to avoid bankruptcy. Fich and Slezak (2008) used regression techniques to analyze the characteristics of the board of directors. The findings indicate that a distressed firm's governance characteristic significantly affect its probability of bankruptcy. This conclusion is consistent with Huang and Zhao's (2008) study. Huang and Zhao (2008)

examined the relationship between corporate governance and financial distress and concluded that companies are most likely to be financially distressed if there the owners of the firm are not in the governing body (Huang & Zhao, 2008). In this case, conflict of interest exists between the owners and the managers. Conflict of interest arise as a result of incompatible objectives between owners and the managers of the firm. Burksaitiene and Mazintiene (2011) indicated that when the actions of the managers conflict with the owners' objectives, the firm can experience financial distress. Burksaitiene and Mazintiene (2011) used data on types of managers and owners of public corporations was used to study four types of failure and to examine whether the types of failures are corrected with the characteristics of managers and owners. Based on the Burksaitiene and Mazintiene (2011) study, when there is a direct conflict between managers and owners, the chance of financial distress increases. The causes of financial distress based on the characteristics of the managers include wrong management decisions and inability of the managers to align corporate policies with appropriate external factors (Burksaitiene & Mazintiene, 2011). Recent cases that highlights this problem includes Enron, Satyam, Adelphia and many others (Hanne, Iris, 2009; Heath, 2009, Kristine, Yuhao, 2010; Zona, et al., 2013).These companies had healthy growth rates. However, conflict of interest between managers and owners resulted to their demise (Burksaitiene & Mazintiene, 2011).

Based on the result of this study, another practical application is that the Altman's z-score and the sustainable growth rate are independent. While the data used in the calculation of the Altman's z-score and the sustainable growth rate are obtained from the same financial statements of firms, the result of this study suggests they are not related.

This result is consistent with previous studies. Altman's z-score is generally used in the prediction of financial distress (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). On the other hand sustainable growth rate has been used principally as an internal planning tool (Lansdrom, et al., 2008). The financial statement data used in the computation of both Altman's z-score and the sustainable growth rate are designed to measure the overall financial viability of firms (Altman, 1968; Altman & Spivack, 1983; Bhunia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011; Lansdrom, et al., 2008). In that case, an additional practical application of this study is the understanding of how the Altman's z-score model and the sustainable growth rate can be used together in the prediction of corporate financial distress. This will help firms develop better strategic financial plans but will contribute to a general understanding of how sustainable growth rate can better be synchronized with the growth rate of revenues in order to avoid possible financial distress. This view on SGR is supported by other studies including Ashta (2008); Palenu and Healy (2008); and Phillips, et al. (2010).

The sustainable growth rate is the percentage rate a firm can support based on a combination of external financing (debt) and internally generated funds such as undistributed earnings (Palenu & Healy, 2008). The quantitative measure of sustainable growth rate (SGR) is based on return on equity (ROE) and retention rate such that SGR = [(ROE x retention rate)/(1-(ROE x retention rate)] (Ashta, 2008). Philips, et. al. (2010) provided good analytical study on how sustainable growth rate can be used as a planning tool. Phillips, et al. (2010) study used correlation analysis to understand the characteristics of the financial ratios that can be used to determine the sustainable growth

rate of small retail companies over the period of 1998 to 2000. These ratios were decomposed into four different categories: liquidity, activity, leverage, and profitability (Phillips, et al., 2010). Liquidity is related to retention rate. The more a company is able to retain (save) its earnings, the more cash it will have available (Phillips, et al. (2010). This is an important factor because availability of cash can help firms avoid default on debt repayments (Ashta, 2008). Profitability is related to return on equity (ROE). The higher the ROE, the more profitable a firm is (Ashta, 2008; Philips, et al., 2010). Phillips, et al., (2010), indicates that a profitability ratio provided the most significant information because all three components (retention ratio, return on assets, and return on equity) of the sustainable growth rate are tied to profitability. The empirical data from Phillips et al. (2010) also suggests that the ratios can be used in different sectors to effectively manage the overall growth of a company (Phillips, et al., 2010). The study did not provide direct evidence of how the sustainable growth rate can be used in the prediction of possible financial distress of a firm. However, the study concluded that an unsustainable high growth rate may lead to bankruptcy if adequate financial plan such as sufficient cash at hand is not in place to support the growth rate (Phillips, et al., 2010).

Recommendations

The practical application of this study is that companies, in addition to using Altman's z-score and the sustainable growth rate the prediction of financial distress, it is equality important to understand that none-financial factors can contribute to financial distress of firms. The result of this study suggest that understanding the financial and other factors is important in the overall examination of the financial viability of a firm. The significance of understanding non-financial factors as they relate to corporate

financial distress are well-documented in bankruptcy research. Burksaitiene and Mazintiene (2011) used non-financial data to investigate the financial failure of the firms. Using multivariate regression analysis, Burksaitiene and Mazintiene (2011) examined the characteristics of managers and owners in addition to the general characteristics of the types of failures. The four types of failure observed are the fundamentals of failure, detecting failure, exit of failing company and bankruptcy or recovery (Burksaitiene & Mazintiene, 2011). The causes of failure as observed by the authors are incorrect steps made by management, incorrect steps in the corporate policy and the importance of external factors (Burksaitiene & Mazintiene, 2011). The result is consistent with the findings of other non-quantitative financial distress studies including Fich and Slezak (2008). Fich and Slezak (2008), show that corporate governance can be a major variable in the understanding of financial distress. Fich and Slezak (2008) used publicly available information of companies in the U. S. to study how governance characteristics affect (1) a firm's ability to avoid bankruptcy and (2) the power of accounting information to predict bankruptcy. The findings of Fich and Slezak (2008) study indicate that a distressed firm's governance characteristic significantly affects its probability of bankruptcy. This conclusion is consistent with Huang and Zhao (2008) study. Huang and Zhao (2008) indicate that the characteristics of a financially distressed firm are determined by the general characteristics of the firm's governance. The conclusions reached by Fich and Slezak (2008) and Huang and Zhao (2008) study indicate that more than quantitative information is needed to truly be able to capture all the variables that can lead to financial difficulties of a firm.

Based on the quantitative analysis of the result, the emerging theme of this study suggests that lack of long-term funds, financial misappropriation, general economic conditions, size of a firm, and conflict of interest can be classified into three broad categories: management, competitive advantage, and the operating characteristics of the firm (Jianga, Leeb, & Anandarajan, 2008; Zhu, 2012). Financial misappropriation and conflict of interest are considered management issues; general economic conditions falls under operating characteristics of the firm; while the size of the firm falls under competitive advantage (Agha, Alrubaiee, & Jamhour, 2012).

Traditional financial distress studies have focused primarily on quantitative factors based on past performance. However, the result of this study suggests that a firm can experience financial distress because of other factors. Understanding the management, competitive advantage, and the operating characteristics of a firm may lead to a better financial result and thus may lead to a reduction of the probability of financial distress. These broad categories a related to overall financial viability of a firm as illustrated in figure 2.

The framework listed in figure 2 is a visual conceptualization indicating that financial stability of a firm is more than just the accounting data that is presented periodically. The financial data that indicates how well a company is doing is as a result of the overall management characteristics, its competitive advantage and operating characteristics of the firm (Agha, et al., 2012; Jianga, et al., 2008; Johnson, 2011; Waweru, & Riro, 2013; Zhu, 2012). Waweru and Riro (2013) stated that one of the most important factors that can lead to corporate failure or success the quality of it management. While there are different concepts and theories including on the effect of

management characteristics on the failure or success of a firm, the agency theories highlights some of the basic issues (Waweru & Rio, 2013). This view supports Burksaitiene and Mazintiene (2011) study. When there is a direct conflict between managers (management) and owners, the chance of financial distress increases. The causes of financial distress based on the characteristics of the managers include wrong management decisions and inability of the managers to align corporate policies with appropriate external factors (Burksaitiene & Mazintiene, 2011). Burksaitiene and Mazintiene's (2011) observation is consistent with the findings of Fich and Slezak (2008) and Huang and Zhao (2008). Conflict of interests within the governing body of a firm has a direct effect on the whether a company is financially distressed or not especially when some members of the governing body align themselves with the company's managers (Fich & Slezak, 2008; Huang & Zhao, 2008).

The competitive advantage of a firm contributes the financial stability of that firm (Agha, et al., 2012). Agha, et al. (2012) postulates that competitive advantage of a firm is result of the firm developing fundamental capabilities. According to Amel and Akkari (2012) fundamental capabilities relates to a firm's ability to distinguish its products and services from those provided by other competing firms. Such fundamental capabilities may be in several areas including product pricing, marketing, and customer service (Agha, et al., 2012). Agha, et al. (2012) indicates that these fundamental capabilities can be developed and sustained as a long-run objectives that will help a firm compete effectively.

In addition to characteristics the management and the competitive advantage the operating characteristics of a firm can affect its financial stability (Zhu, 2012). Operating

characteristics of a firm includes the type of industry the firm is operating its core business and availability of long-term financing (Zhu, 2012). Zhu (2012) suggests that some of the operating characteristics of a firm include the structure of costs within the industry. In an industry where the cost of doing business is not properly aligned with revenue, firms operating in that industry are most likely to face financial instability in both short- and long-run situations (Zhu, 2012). Lack of long-term financing can also lead to financial instability. This is particular so in new and small businesses (Carter & Van Auken, 2006; Molina & Preve, 2012).

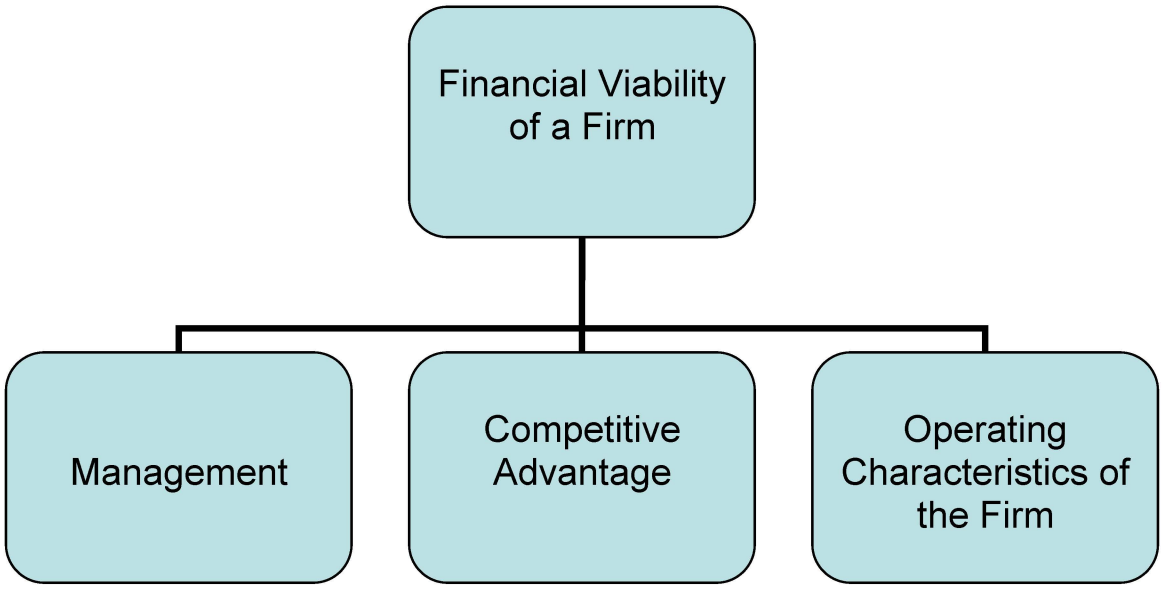

Figure 2: How financial viability of firms is related to other none-quantitative factors.

This study is based on financial ratios calculated from the financial statements of the sampled firms. Traditional financial ratios are generally used to determine the financial health of companies (June, 2012). June (2012) and Monea (2009) defines financial ratios as the relationship between quantitative data found in the financial statements of a companies. The common financial statements used in the calculation of ratios are the balance sheet and the income statement (Monea, 2009). Among the most

recent studies in the use of ratios analysis are Yap,Yong, and Wai-Ching (2010) and Kirkham (2012). The result of this study suggests that periodic evaluation of a firm's financial health is beneficial because it provides managers with current information on possible financial problems that may not be obvious by simply looking at the raw data contained in financial statements (Yap, Yong, &Wai-Ching, 2010). These financial ratios highlights historical information and do not incorporate possible future changes in the finances of the firm (Longhran & McDonald, 2011). This study and previous studies also used financial ratios with the same limitation. In that case, the recommendation is to look for other quantitative information that may not be obvious in financial statements. Loughran and McDonald (2011) indicates that other quantitative need to be considered in financial distress analysis in order to highlight any underlying problem that may not be obvious by just looking at the balance sheet and income statement numbers. Such quantitative data may be obtained from the footnotes to the financial statements. Common examples of financial debt that are generally buried in the footnotes to the financial statements include lease payments and associated terms, contingent liabilities such as past and pending lawsuits, pension obligations, and settlements of previous lawsuits (Loughran & McDonald, 2011).

One of the limitations of this study is that it was based on only one year of financial statements. While the overall results of this study gave good indication of the financial performance of the firms in the study for that particular year, it does not establish trend in the overall performance of each of the firms. Trend analysis of financial ratios will indicated possible changes in financial performance of firms over a period of time (Kirkham, 2012). As in previous studies such as Smith (1930), Fitzpatrick (1932),

Chabotar (1989), Beaver (1966), Yap, et al. (2010), Kirkham (2012), for future research, this study also recommend that several years of financial ratios are necessary in order to have conclusive information usefulness of the ratios in predicting the financial viability of a firm.

Conclusions

When companies fall to identify distressful financial situations they will invariably cease to exist. Understanding of appropriate financial distress forecasting models may prove useful in recognizing financial hardship early and take necessary steps to minimize of avoid it. The results of this study offer useful facts that are theoretically important to researchers in the area of financial distress. In addition, the result of this study also provide practical application that could help management of firms reach important financial and managerial decisions.

In previous studies, it was assumed that the Altman's z-score and the sustainable growth rate are independent (Alman, 1968; Cornett, el al., 2012). This assumption is supported by the result of this study. However, a practical application of this study is the understanding of how the Altman's z-score model and the sustainable growth rate can be used together in the prediction of corporate financial distress. This will help firms develop better strategic financial plans contribute to a general understanding of how sustainable growth rate can better be synchronized with the growth rate of revenues in order to avoid possible financial distress.

In addition, the results of this study suggest that companies can in fact experience financial distress even with health growth rate. In this regard, for the growth to be sustained and be financial beneficial in the long-run, the firm needs to retain sufficient

fund (Palenu & Healy, 2008). The retention rate of profit can contribute to the sustainability of growth (Ashta, 2008). The retention rate measure of the net profit a company retains after paying all dividends to shareholders (Cornett, et al., 2012). Retention rate is equal to the leftover income after the payment of all dividends divide by net income. Companies retain earnings for future investments such as buying new assets and expansion of existing business. Retention rate play a role in the calculation of sustainable growth rate (Cornett, et al., 2012).

Review of the literature suggested that several factors include but not limited to lack of long-term funds (Molina & Preve, 2012), financial misappropriation, general economic conditions (Titman, et al., 2011), size of a firm, and conflicts between owners of a firm the managers of the firm can contribute to the financial distress of firms (Choudhary, 2012; Patra, 2010; Shirur, 2011; Yuhao, 2010). While these factors are not quantified within the financial statements of a firm, they nonetheless contribute the financial viability of the firm. Examination of these factors indicate that they can be classified into three broad categories of management of firms, competitive advantage, and the operating characteristics of firms (Agha, et al.,, 2012). The interaction of these broad categories can lead to financial success or failure of a firm (Agha, et al., 2012). This is an important information because it may help managers make effective planning that could lead to avoiding financial distress.

This study like previous studies was based on the analysis of financial ratios obtained from the financial statements of companies (Altman, 1968; Altman & Spivack, 1983; Cheng, et al., 2010; Kirkham, 2012; Smith, 1930). Periodic evaluation of the financial ratios is necessary to determine the financial viability of a firm (Cheng, 2010;

Kirkham, 2012). However, financial ratios are based on historical information that may not necessarily indicate future financial viability of the firm. For this reason, other additional quantitative information that are not traditionally found in the financial statements need to be considered. Such other quantitative financial information include but not limited to lawsuits, pension obligations, and lease payments. These factors can generally indicate future financial hardships if appropriate steps are not taken to minimize their impact.

This study was limited to 2012 financial statements of the firms included in the sample. For the Altman's z-score, the variable include sales, asset turnover, the ability to meet long-term financial obligation (leverage), ability to pay current maturing obligations (short-term leverage) and profitability analysis (profit margin, return on assets, and return on equity). On the other hand, variables used in the calculation of the sustainable growth rate are sales, the dividend retention ratio, profit margin, financial leverage, and total asset turnover. While these variables were necessary in the understanding determining the financial viability of firms in this study, there were limited to one period financial statement. One period information of financial statement analysis may not provide conclusive information as to the overall financial viability of a firm. While the result of this study provided useful information and added to existing knowledge on financial distress, additional research using more than one year of financial data is recommended in order to confirm the results of this study.

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