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Predicting the Financial Vulnerability of U.S. Public Charities: A Test of the Tuckman-Chang Model

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Predicting the Financial Vulnerability of U.S. Public Charities:

A Test of the Tuckman-Chang Model

by

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Dedication

I dedicate this dissertation to my husband

Kevin Graves

and our daughter

Kelly Graves.

Their love, support, grace, and patience were unwavering through my doctoral journey. I love you and am so thankful for you.

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But Moses' hands grew weary, so they took a stone and put it under him, and he sat on it while Aaron and Hur held up his hands, one on one side, and the other on the other side. So his hands were steady until the going down of the sun.

Exodus 17:12 ESV

I did not travel my doctoral journey alone. Many were a part of this journey and provided support for which I am incredibly grateful. My husband Kevin encouraged me through every class, provided a shoulder for me to cry on when I did not think I could continue going, and took on so much so that I could have the space and time to work. Our daughter Kelly has been my biggest cheerleader and the best assistant a DBA student could have. She provided hours of typing assistance, kept me organized, and provided music and entertainment when it was needed. I pray that God blesses her fully in all of her future academic endeavors. My parents, Jack and Dian Caldwell, were also a huge source of encouragement through the entire process and celebrated the small milestones along the way.

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Abstract

Charitable organizations are significant contributors to the U.S. economy, and Americans invest billions of dollars into these organizations through their donations. Without these organizations, additional pressure would be placed on governmental agencies to provide certain services or those services would not be provided at all, indicating that these organizations' long-term survival is necessary. In 1991, Tuckman and Chang published the seminal work on the financial vulnerability of nonprofit organizations and presented a model that describes a financially vulnerable organization. Subsequent studies of this model indicate that the model is predictive; however, those studies did not utilize an actual financial shock. This study tests the predictive ability of the Tuckman-Chang model by applying it to charitable organizations that survived and did not survive the Great Recession, an economic event that negatively affected the charitable sector. Charitable organizations listed in the 2006 IRS Statistics of Income Exempt Organizations Sample File (SOI), hosted by the National Center for Charitable Statistics (NCCS) Data Archive, were compared to those listed in the 2011 IRS SOI File. The organizations listed in both files were considered to have survived the Great Recession and those not listed in the 2011 IRS SOI File were considered to have not survived the Great Recession. The Tuckman-Chang model was applied to all organizations listed in the 2006 SOI file to classify them as financially not-at-risk, at-risk, and severely-at-risk. A second model was developed by adding the debt ratio to the original Tuckman-Chang model. It was applied to the organizations listed in the 2006 SOI file, resulting in a new list of organizations classified as not-at-risk, at-risk, and severely-at-risk. Binary logistic regression was utilized to test the relationship between the classifications of financially

at-risk and financially severely-at-risk and organization survival of the Great Recession. Regression results indicate that both models can predict the survival of a charitable organization.

Keywords: charitable organizations, non-profit organizations, not-for-profit, financial vulnerability, Great Recession

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Chapter 1 - Introduction

Statement of the Research Problem

It would be a rare occurrence for an individual to not encounter a nonprofit organization during their lifetime due to the prominent role these organizations play in the U.S. economy. These organizations may take the form of a school, hospital, religious congregation, or membership association. They provide a multitude of services that affect large groups of people in our society.

In 2016, approximately 1.54 million nonprofit organizations were registered with the International Revenue Service (IRS), the governmental entity tasked with granting tax-exempt status (NCCS Project Team, 2020). The number of organizations registered does not include certain organizations that are not required to register with the IRS, namely religious congregations and organizations that receive $5,000 or less in annual gross receipts (Boris & Steuerle, 2006). The IRS grants automatic tax-exempt status to religious congregations.

The nonprofit sector, defined by Boris and Steuerle (2006) as "those entities that are organized for public purposes, are self-governed, and do not distribute surplus revenues as profits" (p.67), has grown over the past ten years (NCCS Project Team, 2020). This sector contributed an estimated $1047.2 trillion to the U.S. economy in 2016, composing 5.6 percent of the country's Gross Domestic Product. Public charities, those classified under Section 501(c)3 of the Internal Revenue Code (IRC), make up the largest category in the nonprofit sector. These organizations accounted for just over 75 percent of the sector's total assets. Financial data aside, nonprofit organizations also contribute to the economy's wages and the workforce (Bridgeland et al., 2009).

Bowman (2002) highlighted four legal distinctions between for-profit organizations and nonprofit organizations. The first distinction is that nonprofit organizations do not have owners; therefore, they do not raise capital funds in the equity market. The organization's earnings may not be distributed for the benefit of others and must be used in relation to the purpose and mission of the organization. The second distinction, specifically for public charities that may receive donations that provide a tax benefit to the donor, is that donors can restrict the use of donated assets. Third, nonprofit organizations are not subject to involuntary bankruptcy, though they may file on a voluntary basis. The fourth distinction is that nonprofit organizations may sell bonds at tax-exempt rates.

Zietlow et al. (2018) also pointed out that nonprofit organizations have governance structures that preclude self-interest and personal financial gain and that the organizations are exempt from paying federal income taxes. They are also entities with a public service mission. Michalski et al. (2018) indicated that nonprofit organizations are entities with activities that realize their social value-adding mission. They state, "The main difference between nonprofit organizations and for-profit businesses is an economical calculation and the financial motivation of the staff, capital providers, and the whole group of stakeholders" (p. 530).

Americans also substantially invest in nonprofit charitable organizations. In 2019, these organizations received $449.64 billion, with the largest percentage of giving coming from individuals (Giving USA, 2020). The top three types of organizations receiving donations are those that are focused on religion, education, and human services. The total giving in 2019 increased by almost 3 percent from 2018 (inflation-adjusted).

Though nonprofit organizations are a contributing factor to the U.S. economy and are substantially invested in by the American public, a vast majority of nonprofits are small to midsize organizations (Bridgeland et al., 2009). In 2009, 75 percent had annual budgets of less than $500,000, while only 4 percent had budgets over $10 million (Gordon et al., 2013).

Nonprofit organizations are not immune to economic struggles. The bursting of the "dot.com" bubble in 2000 and the terrorist attacks on September 11, 2001 negatively affected them (Keating et al., 2005). Economic conditions impact the financial health of nonprofit organizations in a variety of ways. These include a decrease in individual giving affected by a decline in personal income and employment rates, a decline in corporate profits reducing corporate donations, a negative impact on endowment earnings from declines in the stock and bond markets, and a contraction in government contracts and grants.

The Great Recession also negatively impacted the nonprofit sector (Reich & Wimer, 2012). Total charitable giving fell during the recession (Brooks, 2018) along with other forms of organization revenue (Dietz et al., 2014). Costs also increased as the demands for services increased (Bridgeland et al., 2009). The Great Recession provided a "perfect storm" of impacts that stressed nonprofit organizations (Salamon et al., 2009).

Purpose of Study

In 1991, Tuckman and Chang published their seminal article on the financial vulnerability of nonprofit charitable organizations. They presented four financial metrics that are descriptive of financially vulnerable charitable organizations: low equity balance, concentration of revenue sources, low administrative costs, and low operating margins.

Organizations were labeled financially at-risk if they are in the bottom quintile for any one metric and financially severely-at-risk if they are in the bottom quintile for all four metrics. Their model has become the direct and indirect subject of empirical tests since its introduction. The results of the testing indicate that the model can predict the financial vulnerability of nonprofit charitable organizations. However, multiple definitions of financial vulnerability have been used in testing.

Tuckman and Chang (1991) defined a financially vulnerable nonprofit organization as one that "is likely to cut back its service offerings immediately when it experiences a financial shock" (p. 445). Other definitions include adverse shifts in financial health (Keating et al., 2005), failure to meet the organization's mission (Tevel et al., 2015), reduction in program expenditures for three consecutive years (Greenlee & Trussel, 2000), a 20 percent decrease in net assets over three years (Trussel, 2002), and insolvency for two consecutive years (Searing, 2018). These definitions point to a crux in financial vulnerability: the nonprofit organization's ability to withstand a financial shock. A financial shock may be an economic downturn, the loss of a major donor, or a lawsuit (Trussel et al., 2002; Tuckman & Chang, 1991). However, to my knowledge, prior testing of a nonprofit charitable organization's financial vulnerability has not included an actual financial shock.

An actual financial shock that affected the charitable sector was the Great Recession that occurred from December 2007 to June 2009. Charitable organizations experienced a decrease in donations during that time (Brooks, 2018; Giving USA, 2008). They also experienced declines in government funding, endowments, and other investments (Morreale, 2011; Reich & Wimer, 2012; Salamon et al., 2009). It is evident

that the Great Recession had a negative impact on the charitable sector; however, to my knowledge, there is minimal research on the relationship between the Great Recession and the financial vulnerability of nonprofit charitable organizations.

The purpose of this quantitative study was to pull together each of the elements discussed. It was to empirically test the predictive ability of Tuckman and Chang's (1991) model of financial vulnerability for nonprofit charitable organizations using the Great Recession as an actual financial shock to the charitable sector.

Significance of Study

The origins of the U.S. tax-exempt sector predate the formation of the government (Arnsberger et al., 2008). Charitable organizations were formed to confront a variety of issues at that time. Public charities continue to serve the public good for religious, philanthropic, scientific, literary, or educational purposes. The overarching significance of this study is to provide information that will support the longevity of these organizations.

This study contributes to the vast literature on nonprofit organizations. It also adds to the literature on the financial vulnerability of charitable organizations by testing the predictability of Tuckman and Chang's (1991) model of financial vulnerability using an actual financial shock that affected charitable organizations. This study also contributes to studies on the Great Recession by further examining its relationship to the financial vulnerability of charitable organizations.

This study provides the management of nonprofit charitable organizations with a group of financial metrics that can be used in strategic decision-making and in assessing the financial health of the organization. The use of these metrics may allow management

of nonprofit organizations to make strategic decisions that may allow the organization to fulfill its mission and programs for an extended period. Management's use of the information in this study may allow charitable organizations to be prepared for inevitable financial shocks, thus, resulting in the continuation of public charities that serve the public good. As Denison and Beard (2003) noted, "Without the nonprofit sector, public agencies would be forced to provide more services or community needs would simply go unmet" (p. 24).

Overview of Research Question and Hypotheses

This research study sought to determine if the seminal model of nonprofit charitable organization financial vulnerability developed by Tuckman and Chang (1991) predicts certain nonprofit organizations' demise due to a financial shock. Therefore, this study sought to answer the following question: *Does the Tuckman and Chang model of financial vulnerability accurately predict a charitable organization's survival of a financial shock?* The associated null and alternative hypotheses were:

> **H_{O1}:** A charitable organization's financial vulnerability has no effect on the organization's ability to survive a financial shock.
>
> **H_{A1}**: More financially vulnerable charitable organizations are less likely to survive a financial shock than charitable organizations that are not financially vulnerable.

This study also sought to determine if the predictive ability of the Tuckman-Chang model is increased by adding the debt ratio to the model. The associated null and alternative hypotheses were as follows:

H_{O2}: Debt does not affect a charitable organization's financial vulnerability or its ability to survive a financial shock.

H_{A2}: Charitable organizations that are more financially vulnerable due to debt are less likely to survive a financial shock than charitable organizations that are not financially vulnerable.

Definitions of Terms

The following list of terms and acronyms are used in this study.

- Administrative costs: The expenses associated with the management and general activities of the nonprofit organization. FASB Accounting Standards Update No. 2016-14 defines management and general activities as "Supporting activities that are not directly identifiable with one or more program, fundraising, or membership-development activities" (p. 11).
- Charitable sector: Those entities that are organized for public purposes, are self-governed, and do not distribute surplus revenues as profits" (Boris & Steuerle, 2006, p. 67). Also referred to as the nonprofit sector.
- Financial vulnerability: The definition of financial vulnerability for this study is if the nonprofit organization cannot survive a financial shock. Additional definitions are discussed in Chapter 2.
- Financially at-risk: A charitable organization is listed in the bottom quintile of at least one of the four financial metrics in the Tuckman-Chang model of financial vulnerability or of at least one of the five financial metrics in the extended Tuckman-Chang model.

- Financially not-at-risk: A charitable organization is not listed in the bottom quintile of any of the four financial metrics in the Tuckman-Chang model of financial vulnerability or any of the five financial metrics in the extended Tuckman-Chang model.
- Financially severely-at-risk: A charitable organization is listed in the bottom quintile of all four financial metrics in the Tuckman-Chang model of financial vulnerability or of all five financial metrics in the extended Tuckman-Chang model.
- Form 990: Form 990 is the *Return of Organization Exempt from Income Tax* required to be filed with the IRS by most organizations exempt from income tax under Internal Revenue Code section 501(a). Organizations with gross receipts of $50,000 or less may file Form 990-N. Organizations with gross receipts less than $200,000 and total assets at the end of the tax year less than $500,000 may file Form 990-EZ. Tax-exempt organizations deemed to be private foundations must file Form 990-PF.
- Great Recession: The Great Recession was an economic crisis that occurred from December 2007 to June 2009, resulting from issues within the housing market that spread to the financial sector (Hurd & Robwedder, 2010).
- IRC: This is an acronym used to identify the Internal Revenue Code.
- IRS: This is an acronym used to identify the Internal Revenue Service, the U.S. tax administrative agency.

- NCCS: This is an acronym used to identify the National Center for Charitable Statistics. The NCCS provides a variety of databases containing information about the nonprofit sector.
- NTEE: This is an acronym used to identify the National Taxonomy of Exempt Entities. The NTEE system was developed in the mid-1980s and provides a "mixed notation (letters and numbers) organization classification system of 630 centile level codes, collapsible into 26 major groups, collapsible into 10 major categories" (National Center for Charitable Statistics, p. 16). The ten major categories are used in this study.
- Net assets: The residual interest in the assets of an entity that remains after deducting its liabilities (FASB, 2008). For nonprofit organizations, net assets are the difference between the organization's assets and liabilities and are divided into two classes based on the presence or absence of donor-imposed restrictions: net assets without donor restrictions and net assets with donor restrictions.
- Public charity: An organization that is considered tax-exempt under Internal Revenue Code 501(c)3. These organizations are organized for exclusively charitable purposes including religious, charitable, scientific, literary, and educational purposes. They may also receive donations that may provide a tax benefit to the donor.
- Tax-exempt: The Internal Revenue Service may grant tax-exempt status to certain organizations that file an application with the IRS and meet the tax-exempt definitions in IRC Section 501(a). These organizations are exempt from federal income tax and may be exempt from other state and property taxes.

Limitations and Assumptions

This research study is subject to certain limitations and assumptions. This study includes only nonprofit public charities classified as tax-exempt under IRC Section 501(c)3 and does not include private foundations or other organizations that are tax-exempt under other IRC sections. This limitation reduces the ability to generalize the results of this study across the entire nonprofit/tax-exempt sector.

Public charities are further classified into one of the ten major groups or subsectors using the National Taxonomy of Exempt Entities (NTEE) system. Each subsector and organization within each subsector may vary in size, purpose, and geographical location. Macroeconomic conditions may have a different effect on each subsector. This study does not isolate one subsector for testing but includes all subsectors listed in the data file. Table 1 presents the ten NTEE Core Code major groups.

Table 1

NTEE Core Codes Major Groups

Code	Category
AR	Arts, culture, and humanities
ED	Education
EN	Environment
HE	Health
HU	Human services
IN	International, foreign affairs
MU	Mutual/Membership benefit
PU	Public and societal benefit
RE	Religion
UN	Unknown, unclassified

The National Center for Charitable Statistics (NCCS) maintains databases utilizing information from the IRS Form 990 required to be filed by U.S. tax-exempt organizations. This study's primary data source is the IRS Statistics of Income Exempt Organizations Sample (SOI) File, which contains information from a weighted sample of tax-exempt organizations that report a Form 990. However, the SOI File may not be representative of the entire nonprofit sector. Due to the IRS's minimum filing threshold, tax-exempt organizations with gross receipts less than $25,000 are not required to file. Further, churches and similar organizations are not required to file. Consequently, these organizations may not be included in the SOI File unless they elected to file and may not be represented in this study.

It is also possible that Form 990s filed with the IRS may include inaccurate and erroneous information. However, studies show that the information from Form 990 filings may be relied upon for research purposes (Froelich & Knoepfle, 1996; Froelich et al., 2000).

To adequately test the predictability of the Tuckman-Chang model of financial vulnerability using the Great Recession as a financial shock, we must look for organizations that existed prior to the start of the Great Recession and remain in existence after the Great Recession. Nonprofit organizations are not subject to involuntary bankruptcy (Bowman, 2002) and may cease to exist for various reasons. An assumption of this study is that the organization ceased to exist, thereby not surviving the Great Recession, if it is not listed in the 2011 SOI File, though the organization may not be listed for other reasons

This study utilized a binary logistic regression analysis to examine a relationship between the Tuckman-Chang model of charitable organization financial vulnerability and an organization's survival of a financial shock. It is assumed that this correlational analysis method is appropriate for this study because it allows for an examination of a relationship between the study's variables.

Chapter 2 – Literature Review

This chapter provides information on Tuckman and Chang's (1991) seminal work on nonprofit organization financial vulnerability. It also discusses the empirical testing and indirect testing of the Tuckman-Chang model as well as the definitions of financial vulnerability used in those studies. Finally, this chapter discusses the impact of the Great Recession and the use of debt on nonprofit charitable organizations.

Financial Vulnerability Models

The financial vulnerability of nonprofit charitable organizations has been the source of testing since its introduction by Tuckman and Chang (1991). This section describes the Tuckman and Chang model, empirical testing of that model, and the development of additional models.

Tuckman and Chang Model

In their seminal article, Tuckman and Chang (1991) defined a financially vulnerable nonprofit organization as one that "is likely to cut back its service offerings immediately when it experiences a financial shock" (p. 445). The underlying idea is that a cut back in service offerings results in a reduction of program offerings and the related expenses. They presented four measures of financial vulnerability that result from the idea that "Financial flexibility is assumed to exist if an organization has access to equity balances, many revenue sources, high administrative costs, and high operating margins" (p. 450). The four measures of financial vulnerability are a low equity balance, a concentration of revenue sources, a low administrative costs ratio, and low or negative operating margins.

Tuckman and Chang (1991) considered equity an important factor of financial vulnerability for four reasons. An adequate equity balance increases the organization's ability to borrow any necessary capital. Any unrestricted liquid assets represented in the organization's equity can be converted to cash to cover any lost short-term revenue. Any long-term assets represented in equity could eventually be sold if the loss of revenue persists. Finally, a nonprofit can alter its services to allow for the use of any restricted equity.

Tuckman and Chang (1991) noted that charitable organizations may be affected by unstable revenue, especially if the organization's primary funding comes from donations due to the donors' inconsistent nature and any economic impact on donations. Due to the potential instability of revenue, the authors posited that a charitable organization with diversified revenue sources is less financially vulnerable than those without diversified revenue sources. Revenue concentration was measured using a Herfindahl Index employing five sources of nonprofit revenue. The index measures one if there is only one revenue source; conversely, organizations with diversified revenue sources will have an index moving towards zero.

Tuckman and Chang (1991) also posited that an organization with lower administrative costs may be less able to withstand financial shocks. They noted that organizations with higher administrative costs that experience revenue loss may reduce administrative costs before reducing or eliminating any program spending. The measure was operationalized as a ratio of total administrative expenses to total expenses.

Finally, Tuckman and Chang (1991) considered nonprofit organizations with higher operating margins to be less financially vulnerable due to the potential surplus

from which they may draw during a time of financial shock. Operating margin was operationalized as the ratio of the net of total revenues and total expenses to total expenses.

Tuckman and Chang (1991) applied descriptive testing of their financial vulnerability measures to a sample of charitable organizations that filed a Form 990 with the Internal Revenue Service in the 1983 tax year. They labeled nonprofits with one measure in the lowest quintile of the sample as "at-risk" and nonprofits with all measures in the lowest quintiles of the sample as "severely at risk."

Empirical Studies of the Tuckman and Chang Model

The Tuckman and Chang (1991) indicators of financial vulnerability have been the subject of direct empirical tests and have been indirectly tested in other studies. This section discusses the testing, extension, and expansion of the Tuckman and Chang model.

Greenlee and Trussel (2000) considered a financially vulnerable charitable organization as one that reduces program expenditures for three consecutive years. They noted that program expenses provide a reasonable proxy of year-to-year changes in program services. They used program expenses instead of net income because programs are the focus of charitable nonprofit organizations. They extended the Tuckman and Chang model by using those financial indicators to identify a charitable organization's financial vulnerability. Their model shows that all measures but equity are significant. The overall model is significant and able to predict with reasonable accuracy if a charity meets the definition of a financially vulnerable nonprofit organization.

Hager (2001) applied the Tuckman and Chang (1991) measures to charitable arts organizations "to determine if the usefulness differs across types of organizations" (p.

377). An organization is determined to be financially vulnerable if it does not provide the IRS Form 990 for three consecutive years. The results of testing indicated that the Tuckman and Chang model predicts these organizations' financial vulnerability and may be used to assess different sectors of charitable organizations.

Trussel (2002) extended the work of Tuckman and Chang (1991) and Greenlee and Trussel (2000) to develop an alternative model that predicts financial vulnerability. He noted that "Financial vulnerability is an organization's susceptibility to financial problems" (p. 17), and he defined a financially vulnerable charity as one that reports a 20 percent decrease in net assets over three years. He removed the equity ratio and the administrative costs ratio used in the Tuckman and Chang model. He included the debt ratio, operationalized as total liabilities over total assets, and the organization's size measured by the natural log of the organization's total assets. The results of his testing indicate that each measure is significant and that the model as a whole is statistically significant and can be used to predict financial vulnerability.

Trussel et al. (2002) developed a financial vulnerability index that nonprofit organizations can use to assess if they are financially vulnerable to a financial shock. They developed the index by using the Tuckman and Chang model without the equity ratio and added the debt ratio and the organization's size and sector. They suggested comparing individual organization results of the financial metrics to industry benchmarks.

Trussel and Greenlee (2004) used the Tuckman-Chang model's financial measures to develop a model to predict if a charitable organization will become financially distressed. They defined a financially distressed charity as "an organization

that has a significant net reduction in its equity balance (i.e., net assets) over a three-year period" (p. 101). They developed two models using two definitions of significant reduction: (1) a 20 percent reduction in net assets over three years and (2) a 50 percent reduction in net-assets over three years. They expanded Greenlee and Trussel's (2000) model by controlling for the organization's size and sector. Both models are significant and able to predict if a charitable organization will become financially distressed. They also noted that the variables of equity, margin, and size are significant and that the variables for revenue concentration and administrative costs are not significant.

Thomas and Trafford (2013) extended the work of Tuckman and Chang (1991) by developing a Charities and Financial Exposure Index (CFEI) using three of the four measures in the Tuckman and Chang model. The removal of the administrative cost ratio allows the CFEI to more accurately predict the charities that are financially vulnerable.

Development of Additional Financial Vulnerability Models

Other studies of financial vulnerability measures were conducted to further explore the use of predictive models of financial vulnerability. Additional testing of nonprofit financial vulnerability also revealed that more than one metric is needed to label a financially vulnerable nonprofit organization. Denison and Beard (2003) used the definitions presented in the literature current at that time to present a three-stage "continuum of vulnerability" (p. 25) that described the symptoms of financial vulnerability and suggests that organizations can move through the stages at different paces.

Bowman (2011) proposed a financial model that provides a set of key financial indicators to assess a nonprofit organization's financial objectives. This model extended

the work of Tuckman and Chang (1991) by considering a more extended period of time. The concepts of financial capacity and financial sustainability are keys to the model. According to Bowman (2011), "The proposed model assumes that (1) a long-run objective is maintaining or expanding services, and (2) a short-run objective is to develop resilience to occasional economic shocks while making progress toward meeting long-term objectives" (p. 39). The ability to meet the long-run objectives was measured by an equity ratio and return on assets. The ability to meet the short-run objective was measured by maintaining the appropriate level of unrestricted net assets to cover spending on operations.

Chickoto-Schultz and Neely (2016) built upon Bowman's (2011) identification of financial capacity and financial sustainability as key financial indicators by looking for characteristics of high financially performing nonprofit organizations, thus providing key predictors of nonprofit financial health. They drew upon Carroll and Stater's (2008) measure of revenue volatility to measure financial stability. The testing results indicated that financially high performing nonprofit organizations (those that exhibit financial capacity and financial stability) maintain overhead costs, receive government grants, and invest in capital assets. The results of testing also "suggest that to grow one's financial capacity, as well as remain financially stable, nonprofits need to generate more revenue as well as utilize their assets and reserves" (p. 2573).

Cordery, Sim, and Baskerville (2013) used the financial vulnerability literature to develop and test three conceptual models of financial vulnerability using amateur sports clubs in New Zealand. Financial vulnerability was defined as follows for the three models:

1. A reduction in program expenditures as a percentage of revenue over three years, based on the research of Tuckman and Chang (1991), Hager (2001), and Greenlee and Trussel (2000).
2. A three-year decline in net assets, based on the research of Trussel (2002), Trussel et al. (2002), and Trussel and Greenlee (2004).
3. A decline in net earnings developed from the research of Hodge and Piccolo (2005), Carrol and Stater (2009), and Keating et al. (2005).

Their testing results indicated that different models were useful for different types of clubs; however, the reduction in net earnings model appeared to be the best prediction model for identifying sports clubs that were financially vulnerable. The testing results also demonstrated that not all prediction models are alike and that models may need to be tailored for the nonprofit industry's subsectors.

Vermeer, Raghunandan, and Forglone (2013) defined a financially distressed nonprofit as one that "has either a deficit in total net assets (fund balance) or a deficit for the current year" (p. 116). They used a logistic regression model to examine the factors associated with an auditor issuing a going concern modified audit opinion. Their testing results indicated that a nonprofit is more likely to receive a going concern modified audit opinion if it is financially stressed, small, has a lower program expense ratio, and a high number of internal control related audit findings.

Additional studies were conducted to test Tuckman and Chang's (1991) model and to compare its predictive ability against Altman's (1968) and Ohlson's (1980) models used to predict bankruptcy of for-profit entities. Keating et al. (2005) tested four financial vulnerability proxies using the Altman (1968), Ohlson (1980), and Tuckman and Chang

(1991) models. The four proxies are insolvency risk, defined as negative net assets; financial disruption, defined as "a 25 percent or greater decline in total revenues during a 12-month period" (p. 11); funding disruption, defined as "a 25 percent decline in total revenues during a 12-month period" (p.11); and program disruption, defined as "a 25 percent or more reduction in allocations to program expenses during a 12-month period" (p. 12). Their testing results indicated that each may be used as a proxy for financial vulnerability. The Ohlson model was found to have the highest explanatory power for each measure. However, the Ohlson model was not significant in Tevel, Katz, and Brock's (2015) study.

Tevel et al. (2015) tested the predictive values of the Ohlson (1980) model, Tuckman and Chang's (1991) model, and a practitioners' model based on rating information used by the UK New Philanthropy Capital and the Israeli Midot. The Tuckman and Chang model was found significant in predicting the financial vulnerability of charitable organizations. The researchers performed additional testing to "generate a more parsimonious Tuckman and Chang model" (p. 2509). The additional testing results indicated that two measures are the strongest predictors: management costs reported in administrative expenses and revenue concentration. Their study also noted that organization size measured by net assets is correlated to financial vulnerability.

Gordon et al. (2013) used discrete hazard models to compare and test the financial vulnerability models of Altman (1968), Ohlson (1980), Tuckman and Chang (1991), and one developed using financial indicators recommended by the Internal Revenue Service. They defined a financially distressed organization as insolvent, measured by total liabilities exceeding total assets. They controlled for the fiscal year and sub-industry

group. Their testing results indicate that all of the Tuckman and Chang variables are significant and that the IRS model has the lowest explanatory power of the models tested. The results also indicate that financial vulnerability differs considerably across broad nonprofit industry sectors and that the arts sector has the highest rate of insolvency.

Gordon et al. (2013) also developed and tested a composite model based on the significant variables from the tested models and variables suggested from the literature. The composite model consisted of eleven variables, ten of which were significant. With the idea that the use of eleven variables may be cumbersome for users of nonprofit financial statements, they moved forward with developing a parsimonious model of financial vulnerability. The parsimonious model parallels the for-profit Dupont model but includes variables for profitability, measured as two preceding years with a deficit; asset turnover, measured by net assets divided by total revenue; and leverage, measured by dividing net assets by total assets. This model significantly outperformed traditional models.

Focusing on nonprofit human service organizations and higher education institutions, Prentice (2016a) expanded the financial vulnerability models and revenue volatility by examining the effects of environmental factors on a nonprofit's financial health. The environmental factors are gross domestic product (GDP), state product (SP), median household income, and competition and niche by measuring the organization's revenue share at the regional, state, and national level. Eight accounting variables and two revenue variables were included in the testing.

The testing results indicated that economic factors impacted both nonprofit sectors included in the study, though only GDP was statistically significant for both.

Regarding the accounting variables, only the measure of net income over total assets was statistically significant. Neither of the revenue variables was significant. Prentice (2016a) concluded that environmental variables influence nonprofit financial health and that "… the utility of the accounting variables is in demonstrating that it is essential for nonprofit managers to maintain asset reserves that go beyond current fiscal year income" (p. 904).

Prentice (2016b) presented research that considers the number of financial measures to capture the accounting constructs of liquidity, solvency, margin, and profitability. The testing results indicated that the organization's subsector has minimal effect and that measures should not be combined to create indexes. Prentice (2016b) suggested that nonprofit researchers should make the financial measure, not concepts, the elements of interest.

Andres-Alonso, Garcia-Rodriguez, and Romero-Merion (2016) analyzed the traditional variables used to define financially vulnerable nonprofit organizations in prior studies. The traditional variables are deduction in net assets, reduction in program expenses, and reduction in revenue. The study's results indicated that a reduction in net assets is the traditional variable that best defines financial vulnerability. However, the authors noted that "it needs to be supplemented, as it does not include all the aspects of this complex concept" (p. 2557). The results of the study indicate that looking at just one variable will alter which nonprofits are vulnerable. Therefore, they expanded the definition of financial vulnerability into a proposed three-dimensional model that assesses operational vulnerability, measured by a variation in net assets overtime; leverage vulnerability, measured by a ratio of total assets to total debt; and liquidity vulnerability,

measured by the ratio of current assets to current debt. Though not yet tested, they proposed the following definition of financial vulnerability:

> … an organization is classified as "highly financially vulnerable" if it simultaneously meets three different criteria: a large reduction in net assets during the last three years, a low proportion of total assets to debt, and a low ratio of its current assets regarding short-term debt (p. 2558).

Kim (2017) extended the previous studies of financial vulnerability by testing the effect of financial stability and operating efficiency on nonprofit arts organizations' program outcomes. Indicators of financial vulnerability used in prior studies were used as the measures of financial stability. However, Kim (2017) used the administrative cost ratio as a measure of operating efficiency instead of financial stability. Kim (2017) also expanded the testing by calculating four indexes for revenue concentration and considering if a nonprofit is donative in nature. Audience attendance was the measure of program outcome. The results of testing indicated that revenue diversification has a positive impact on program outcomes. There is a negative relationship between program outcomes and reliance on donations and an increase in operating margin. Operating efficiency and equity do not have a significant effect on program outcomes. According to Kim (2017), "The results show that not all financial attributes that are supposed to enhance a nonprofit's fiscal health improves program performance" (p. 543). However, it is logical to consider the impact of program performance on the organization's financial health.

Searing (2018) used two financial vulnerability definitions when examining vulnerable nonprofits that recovered in two years. The nonprofits definitions were (1)

when liabilities exceed assets for two consecutive years, and (2) when net assets decrease by more than 25 percent annually for two consecutive years. Searing (2018) considered financial vulnerability measures by examining vulnerable nonprofit organizations that recovered in two years. The measures used were equity, surplus margin, revenue concentration, size, and age, with controls for year and sector effects. The results of the study indicate a relationship between the equity ratio and revenue diversification and the ability to recover financially. There was also support that a higher surplus margin will result in financial recovery. Organization age and size have minimal impact.

Defining Financial Vulnerability

The underlying consideration of financial vulnerability is assessing if a nonprofit organization can withstand a financial shock. Examples of a financial shock include an economic downturn, the loss of a major donor, or a lawsuit (Tuckman & Chang, 1991; Trussel et al., 2002). Keating et al. (2005) noted that the four proxies for financial vulnerability are "measures of dramatic adverse shifts in financial health, all of which relate to the ability of a nonprofit organization to carry out its mission" (p. 11). Tevel et al. (2015) also noted that financial vulnerability is "an organization's susceptibility to financial problems" (p. 2502), which could result in the reduction or discontinuation of services and the subsequent failure to meet the organization's mission.

The accounting principle going concern considers an entity's ability to continue operations. It assumes the ongoing use of assets and payments of debts during normal operations. According to FASB Accounting Standards Update No. 2014-15, "U.S. auditing standards and federal securities law require that an auditor evaluate whether there is substantial doubt about an entity's ability to continue as a going concern for a

reasonable period of time not to exceed one year beyond the date of the financial statements being audited" (p. 1). It also notes that management should evaluate any conditions or events that raise a concern about the organization's ability to continue as a going concern.

The FASB statement also notes that substantial doubt about an entity's ability to continue as a going concern exists "when relevant conditions and events, considered in the aggregate, indicate that it is probable that the entity will be unable to meet its obligations as they become due within one year after the date that the financial statements are issued (or available to be issued)" (p. 2). Conditions and events (among others) that FASB ASU No. 2014-15 suggests to include are current financial conditions, obligations, funding, and other adverse conditions and events. The Accounting and Audit Guide for Not-for-Profit Entities provides examples of events and conditions that may impact a nonprofit entity's ability to continue as a concern. The examples include:

- Insufficient unrestricted revenues to provide supporting services;
- High ratio of fundraising expenses to contributions or a low program ratio;
- Interfund borrowing;
- Activities that could jeopardize tax-exempt status;
- Violations of laws;
- External events that could affect donors motivations to continue to contribute;
- Decreases in revenues contributed by repeat donors; and
- A loss of major funding sources (p. 42).

Substantial doubt about an organization's ability to continue as a going concern indicates that an organization may not exist in the near future or may be vulnerable to a

financial shock, thus reflecting the overall idea of the financial vulnerability of an organization. The definition of financial vulnerability for this research study is whether or not the nonprofit organization has the ability to survive a financial shock. A recent financial shock that had a significant impact on nonprofit organizations and included many examples from the Accounting and Audit Guide is the Great Recession.

Financial Vulnerability and the Great Recession

The Great Recession occurred from December 2007 to June 2009 and is considered a result of issues within the housing market that spread to the financial sector (Hurd & Robwedder, 2010). The Great Recession's impact felt greater than other recessions due to shocks felt in the housing, stock, and labor markets.

Tzifakis et al. (2017) presented a case study of the impact of an economic crisis on nonprofit organizations in Greece. They noted that individual donations to nonprofits decreased in proportion to total funding and absolute numbers after the crisis. Their case study also described how Greek nonprofit organizations implemented new strategies after the crisis to increase financial strength, including reducing operating costs and an attempt to diversify income sources.

Nonprofit organizations in the United States show similar reactions to economic downturns. The U.S. nonprofit sector was stretched in the economic downturn of the Great Recession (Reich & Wimer, 2012). Salamon et al. (2009) surveyed a sample of U.S. nonprofits in April 2009. Of those responding, 80 percent reported some level of financial stress from September 2008 to March 2009, with 40 percent of those respondents indicating the stress to be "severe" or "very severe." The researchers noted that a "perfect storm" of impacts contributed to the stress: declining revenues, increased

costs, declining endowments, and decreased cash flow due to restricted credit and government payment delays (p. 1). Adding to the stress is an increase in demand for nonprofit services during a recession (Bridgeland et al., 2009).

The external economic environment has an effect on a nonprofit's financial health, as noted in a study conducted by Lin and Wang (2016). They performed testing that considered organizational strategies and characteristics that helped charitable organizations to survive the Great Recession. They considered fundraising efforts, the Tuckman and Chang (1991) indicators of financial vulnerability, and the organization's debt. The testing results indicate that external funding relationships, higher operating margin and equity ratio, and lower debt ratio and administrative cost ratio may improve a charity's ability to survive a financial crisis.

Charitable organizations were more likely to experience a decline in revenue than to close during the recession period (Dietz et al., 2014). There were declines in federal, state, and local government funding (Morreale, 2011; Salamon et al., 2009). Endowments fell (Salamon et al., 2009), and foundations and bequests suffered from losses in the stock market and other investments (Reich & Wimer, 2012). However, program income held up better than other revenue sources, despite a decline (Salamon et al., 2009).

Recessions also affect giving to charitable organizations. Total charitable giving fell an average of 2.7 percent during recessions that occurred before the Great Recession (Giving USA, 2008). Individual charitable giving peaked in 2005 before the Great Recession and declined rapidly from 2007 to 2009 (Brooks, 2018). Studies on charitable giving during the time of the Great Recession indicate that the recession's negative impact on individual income, wealth, and homeownership resulted in a decline in

donations to charitable organizations (Brooks, 2018; Marx & Carter, 2014; Meer et al., 2016; Osili et al., 2019).

Financial Vulnerability and Debt

Taking on debt may be a sensitive activity for many nonprofit organizations. However, the organization's management must choose to finance expenditures out of current financial resources or through borrowing (Denison, 2009; Lam et al., 2020). Nonprofits take on debt to cover a temporary shortage in cash flows (Bowman, 2015; Charles, 2018) and to finance capital (Bowman, 2015; Charles, 2018; Yan et al., 2009). Other reasons for incurring debt include taking advantage of an opportunity or refinancing existing debt (Charles, 2018).

Tuckman and Chang (1993) presented two categories of nonprofit borrowing: productive borrowing that "occurs when administrators expect the returns from borrowed funds to exceed the costs of borrowing them" (p.349) and problematic borrowing that "occurs when administrators borrow funds even though they expect that the returns from the use of these funds will be less than their cost" (p.349). Examples of productive borrowing include short-term bridge loans, program expansion, and taking advantage of leverage.

Lam et al. (2020) noted two advantages of nonprofit organizations taking on debt. The advantages include obtaining quick capital at a relatively low cost and the maintenance of organization programs. Mitchell and Calabrese (2018) also noted that many nonprofits may lack sufficient funds to survive financial shocks and that debt may be an "important (if imperfect) vehicle for maintaining program continuity during economic downturns" (p.7).

Though debt financing has advantages and opportunities, it also increases the organization's financial risk (Denison, 2009). Taking on debt commits future cash flow to pay that debt (Charles, 2018). Fixed interest payments could result in deficits if revenues are less than expected (Denison, 2009) and reduce future program outputs (Bowman, 2015). Other borrowing risks include financial distress (Denison, 2009) and the likelihood of dissolution (Lu et al., 2020).

Bowman (2015) encouraged nonprofit management to consider that they are not risking their assets when borrowing but are risking the public's assets and that they should assess and reduce that risk. Lam et al. (2020) stated, "To some stakeholders, nonprofit debt service represents an unacceptable diversion of resources away from current programs, calling into question the organization's legitimacy" (p.147). A study conducted by Calabrese and Grizzle (2012) showed the effect of debt on donations.

Calabrese and Grizzle's (2012) study considered how donations are affected by the existence of debt on the nonprofit's financial statements. The results of their testing indicated a crowding-out effect; that increased borrowing results in decreased donations. However, liquidity issues may increase donations. Testing results showed that unsecured debt has no effect or a positive effect on donations and that secured debt crowds out future donations. Calabrese and Grizzle (2012) stated, "Donors may view the use of this debt as problematic for nonprofits because it ties up future cash flows and revenues to service the debt rather than provide current and future programmatic output" (p.244).

The use of debt generally raises concern about solvency (Yan et al., 2009). Studies indicate a negative relationship between the maintenance of debt by a nonprofit organization and the amount of donations received by that organization (Calabrese &

Grizzle, 2012; Homonoff et al., 2020). The decrease in donations may have a negative impact on nonprofit financial health. Yan et al. (2009) also noted, “When the internal revenue components interact with the external macro-environment, such as trends in the business cycle, it causes the fluctuation of revenue streams, which is financial risk” (pgs. 55-56). In other words, the risk from debt increases when there is an outside factor, such as the Great Recession.

Predictive tests of the bankruptcy of for-profit organizations include measures of debt. Beaver (1966) tested specific ratios’ ability to predict the failure of for-profit firms. Testing results indicate that the ratio of cash flow to total debt had the strongest ability to predict the failure of for-profit firms. According to Beaver (1966), “The cash-flow to total-debt ratio has the ability to correctly classify both failed and nonfailed firms to a much greater extent than would be through random prediction” (p. 101). The ratio of net income to total assets had the second strongest ability, and the ratio of total debt to total assets had the third strongest predictive ability. Other ratios included in the testing were working capital to total assets, the current ratio, and the no credit interval.

Altman (1968) and Ohlson (1980) also tested certain metrics that predict the bankruptcy of for-profit firms. Altman’s (1968) testing results included a liquidity ratio, which is working capital divided by total assets; and a ratio of solvency, which is the market value of equity divided by the book value of total debt. Both are considered statistically significant in the bankruptcy prediction model. Ohlson’s (1980) testing resulted in three factors that are statistically significant in predicting bankruptcy. The factors are the organization’s size based on assets, total assets, and working capital to total assets.

There are few studies on debt's effect on a nonprofit organization's financial health. However, some studies show that debt has a negative impact on the total amount of donations received by a charitable organization (Calabrese & Grizzle, 2012). Trussel (2002) modified the Tuckman and Chang (1991) financial vulnerability model by including the debt ratio, which is total liabilities over total assets. Results of Trussel's testing showed that the debt ratio was statistically significant in predicting financial vulnerability.

Vermeer et al. (2013) used the debt ratio as a measure of a nonprofit organization's financial difficulties. The testing results indicated that nonprofits that are smaller, maintain minimal surplus, and have lower cash flows from operations are financially distressed and more likely to dissolve.

Zietlow et al. (2018) argued that liquidity is key to financial sustainability and that only looking at solvency is a deficient view. They defined liquidity as "being able to meet present and future draws on cash without impairing the mission or programs of the organization, incurring significant expenses, or diminishing the financial health of the organization" (pgs. 30-39). An organization is solvent when its assets exceed its liabilities, resulting in positive net assets for nonprofit organizations. They also noted that a fundamental objective of liquidity management is to ensure solvency and to maintain "a liquidity target adequate to protect the organization and its mission against seasonal and cyclical cash shortfalls and to build a financial resources base for future programs and facility expansion" (p. 42).

Smith (2010) studied the effect of debt on an organization's liquidity and profitability. The debt ratio variables used in the study are as follows: total liability ratio,

operationalized as total liabilities over total assets; financial debt ratio, which is financial debt over financial capital; outside debt ratio, calculated as all outside debt divided by financial capital; taxable debt ratio, operationalized as the sum of loans from insiders and mortgages divided by financial capital; and tax-exempt debt-ratio, which is the total of tax-exempt bonds over financial capital. The testing results indicated that debt is negatively related to the organization's age, liquidity, and profitability. It is noted that a change from the 25th to the 75th percentile in liquidity results in a 15 to 16 percentage point drop in the financial debt, outside debt, and taxable debt ratios and a 13 percentage point drop in the total liabilities ratio. This testing shows that debt has a negative influence on an organization's liquidity.

Tirumalsety and Gurtoo (2019) studied the impact of the financial debt ratio on the financial performance of 207 social enterprises in India. The study's financial performance measures were return on fixed assets, return on equity, and return on capital employed. The study's results showed that only the return on capital employed has a statistically significant and negative relationship with the financial debt ratio. The authors note that a "negative influence of the financial debt ratio on returns on capital employed indicates repayment of loans, as well as capital to the lenders, may cause a strain on the efficient utilization of capital to achieve the dual goals of social enterprises" (p. 15).

Lam et al. (2020) tested the impact of return on assets, liquidity, maintenance of an endowment or quasi-endowment, and the organization's size (measured by the natural log of total revenue) on the debt ratio. Return on assets is the only one with statistical significance, and it has a negative relationship with the debt ratio. In other words, higher levels of profitability result in lower levels of debt (Denison & Beard, 2003).

Chapter 3 – Method

This chapter discusses the method used to answer the research question and test the hypotheses noted in Chapter 1 using the information discussed in Chapter 2. Information provided in this section includes the research design, data, measures, and method used.

Research Rationale and Design

The Tuckman and Chang (1991) model of financial vulnerability was the subject, directly and indirectly, of multiple empirical tests the results of which indicate that the model is statistically significant in predicting a nonprofit organization's financial vulnerability. However, those studies neither applied a standard definition of financial vulnerability, nor considered an actual financial shock. Nonprofit charitable organizations may experience financial pressure during the time of an economic shock. As such, the nonprofit sector may benefit from further understanding of these financial metrics.

This research study is quantitative in nature and utilized a binary logistic regression model. A logistic regression model is distinguished from a linear regression model by the outcome or dependent variables that are dichotomous rather than continuous (Hosmer et al., 2013). This study utilized a binary logistic regression model similar to the model used by Trussel and Greenlee (2004). Their model has the form

$$p(i,t) = \frac{1}{1 + e^{-\beta x(i,t)}}$$

where p(i,t) is the probability that charity *i* will be financially distressed in period *t*, x(i,t) is a vector of the charity's attributes to be measured, and β is a vector of unknown parameters to be estimated.

Research Question and Hypotheses

The aim of this study was to determine if the Tuckman-Chang model of financial vulnerability can predict an organization's survival using an actual financial shock. Though prior studies indicate that the Tuckman-Chang model is statistically significant and can accurately predict a nonprofit organization's financial vulnerability, none of those studies took into consideration an actual financial shock, which is an underlying aspect of financial vulnerability. The most recent and impactful financial shock is the Great Recession. With this in mind, the research question and associated null and alternative hypotheses for this study were:

RQ: Does the Tuckman and Chang model of financial vulnerability accurately predict a charitable organization's survival of a financial shock?

H_{O1}: A charitable organization's financial vulnerability has no effect on the organization's ability to survive a financial shock.

H_{A1}: More financially vulnerable charitable organizations are less likely to survive a financial shock than charitable organizations that are not financially vulnerable.

Denison and Beard (2003) noted that "support for a broader definition [of financial vulnerability] necessitates the use of the Tuckman-Chang measures plus the Trussel debt ratio" (p. 29). As noted in Chapter 2, Trussel (2002) extended the work of Tuckman and Chang (1991) by removing the equity ratio and administrative cost ratio and adding the debt ratio. The model was considered statistically significant. This study intended to determine if the debt ratio's inclusion improves the predictive ability of the

Tuckman-Chang model. Additional null and alternative hypotheses for this study were as follows:

H_{O2}: Debt does not affect a charitable organization's financial vulnerability or its ability to survive a financial shock.

H_{A2}: Charitable organizations that are more financially vulnerable due to debt are less likely to survive a financial shock than charitable organizations that are not financially vulnerable.

Data

This study utilized the 2006 IRS Statistics of Income Exempt Organizations Sample File (SOI), hosted by the National Center for Charitable Statistics (NCCS) Data Archive. The SOI files were weighted sample files of organizations filing a Form 990 or 990-EZ and included information reported by those organizations on Form 990 or 990-EZ (National Center for Charitable Statistics, n.d.). The data file used for this study was the 2006 SOI 990 C3 file containing Form 990 information for a weighted sample of organizations that are tax-exempt under IRC section 501(c)3 and that filed a Form 990 during 2006.

The 2006 SOI file contained information for 15,941 organizations that are tax-exempt under IRC Section 501(c)3. Data-cleaning procedures were performed to ensure more accurate testing. Table 2 provides a list of the data cleaning attributes used, the number of organizations removed because of the data-cleaning attribute, and the number of remaining organizations used in this testing.

Table 2

Summary of Population and Data Cleaning

Beginning population size	15,941
Less observations with exact duplicate of EIN	0
Less observations with missing sector	0
Less observations that are not public charities	28
Less observations with negative value for contributions, dues, government grants, and program revenue	8
Less observations with a negative or zero value for total revenue	29
Less observations with a negative or zero value for total expenses	47
Less observations with negative values for beginning total assets, ending total assets, beginning total liabilities, or ending total liabilities	35
Final population size	15,794

Measures

The following section discusses the dependent and independent variables used in this study.

Nonprofit Organization Survival (Dependent Variable)

The dependent or outcome variable for this study was whether or not the charitable organization survived the Great Recession. The 2006 SOI file represents the charitable organizations that filed a Form 990 for the year before the Great Recession began. The EINs listed in the 2006 SOI file are compared to the EINs listed in the 2011 SOI file. Any 2006 EINs not found in the 2011 EINs are considered to belong to organizations that did not survive the Great Recession, though an organization may not appear on the list for other reasons, such as loss of public charity status, failure to file, or

falling below the filing thresholds (Dietz et al., 2014). This process results in a dichotomous dependent variable. Following convention, dummy variables of 0 and 1 were assigned to organizations that are considered not to have survived the Great Recession and those that did survive the Great Recession, respectively.

Determination of the Independent Variable to Test Hypothesis 1

Tuckman and Chang's (1991) study classified nonprofit organizations as at-risk if they were in the bottom quintile for any one of the four financial metrics, which are defined below. An organization was classified as severely-at-risk if it was in the bottom quintile for all four metrics. For this study, the four financial metrics were calculated for each organization listed in the 2006 SOI file. The organizations were then sorted by the metrics and labeled not-at-risk if the organization is not in the bottom quintile for any metric, at-risk if it is in the bottom quintile for any one metric, and severely-at-risk if it is in the bottom quintile for all four metrics. The organizations were assigned the dummy variables 0, 1, and 2, respectively.

The following defines the four financial metrics and how they are operationalized for this study.

Net Assets (NA). Tuckman and Chang (1991) referred to this metric as an equity ratio. However, the technical term for a nonprofit's equity is net assets, which is the difference between its assets and liabilities. Tuckman and Chang (1991) operationalized this ratio as total equity over total revenue. For this study, the net asset ratio is calculated as total net assets over total revenue. This metric is expected to have an inverse relationship with financial vulnerability.

Revenue Concentration (RC). Tuckman and Chang (1991) used a Herfindahl Index to measure revenue concentration. A similar index is used for this study and is formulated as

$$\sum (\frac{Revenue\ Source}{Total\ Revenue})^2$$

This study utilized six categories of revenue sources: contributions, program revenue, portfolio income, dues, government grants, and other revenue. In its current form, this metric has a positive relationship with financial vulnerability. This study followed Thomas and Trafford (2013) by revising the metric as

$$1 - \sum (\frac{Revenue\ Source}{Total\ Revenue})^2$$

to make it comparative to the other metrics. The metric was expected to have an inverse relationship with financial vulnerability.

Administrative Costs (AC). Tuckman and Chang (1991) used administrative expenses to total expenses ratio as a metric for financial vulnerability. This study used the same ratio. It was expected to have an inverse relationship with financial vulnerability.

Operating Margin (OM). The operating margin is a measure of the organization's surplus (Tuckman & Chang, 1991), and operationalized as

$$\frac{Revenue - Expenses}{Expenses}$$

It is expected to have an inverse relationship with financial vulnerability.

Determination of the Independent Variable to Test Hypothesis 2

A debt ratio is not used in the Tuckman-Chang model. This study extends the Tuckman-Chang model by including a debt ratio as a fifth financial metric. Trussel (2002) and others used the standard debt ratio, operationalized as total liabilities over

total assets, when testing the financial health of a nonprofit organization. This study used the same ratio, and it was expected to have an inverse relationship with financial vulnerability.

The data used to determine the independent variable to test the first hypothesis was expanded to include the debt ratio as a fifth financial metric. The debt ratio was calculated for each organization listed. The organizations were then sorted to determine which were in the bottom quintile. The organizations not in the bottom quintile for any of the financial metrics were labeled not-at-risk, in the bottom quintile for any one of the five financial metrics was labeled at-risk, and in the bottom quintile for all five financial metrics was labeled severely-at-risk. These organizations were given the dummy variables 0, 1, and 2, respectively. Table 3 provides a summary of the financial metrics used in this study.

Table 3

Financial Metrics with Corresponding Measures

Financial Metric	**Measure**
Net Assets (NA)	$\frac{Net\ assets}{Total\ revenue}$
Revenue Concentration (RC)	$1 - \sum(\frac{Revenue\ Source}{Total\ Revenue})^2$
Administrative Costs (AC)	$\frac{Administrative\ expense}{Total\ expenses}$
Operating Margin (OM)	$\frac{(Total\ revenue - total\ expenses)}{Total\ expenses}$
Debt Ratio (DR)	$\frac{Total\ liabilies}{Total\ expenses}$

Data Analysis

The purpose of this study was to test the predictability of the Tuckman and Chang (1991) model of financial vulnerability using an actual financial shock, the Great Recession. Binary logistic regression analysis was used to test both null hypotheses of this study. After cleaning the data set, all measures were prepared for data entry.

The first hypothesis was tested by applying the four financial metrics of the Tuckman-Chang model to the data listed in the 2006 SOI File to determine which organizations are not-at-risk, at-risk, and severely-at-risk. The EINs of these organizations were compared to the EINs listed in the 2011 SOI File. Organizations with an EIN listed were considered to have survived the Great Recession and received the variable of 1. Organizations with an EIN not located in the 2011 SOI File were considered not to have survived the Great Recession and received the variable of 0. These represent the variables used to test the first hypothesis. These variables were loaded into the statistical software package for testing. Descriptive statistics and results of the testing are discussed in Chapter 4.

A debt ratio was added to the Tuckman-Chang model's four financial metrics to test this study's second hypothesis. A new list was prepared of organizations labeled not-at-risk, at-risk, or severely-at-risk if they are not in the bottom quintile for any metric, in the bottom quintile for any one metric, or in the bottom quintile for all metrics, respectively. The EINs of the organizations in this list were compared to the EINs listed in the 2011 SOI File. If the EIN was located, then the organization was considered to have survived the Great Recession and was assigned the variable of 1. If the EIN was not located, then the organization was considered to have not survived the Great Recession

and was assigned the variable of 0. These represent the variables used to test the second hypothesis. These variables were loaded into the statistical software package for testing. Descriptive statistics and results of the testing are discussed in Chapter 4.

Chapter 4 – Results

This study's objective was to test the predictive ability of the Tuckman and Chang (1991) model of financial vulnerability using the Great Recession as a financial shock to the charitable sector. This study also considered the impact of debt on a charitable organization's financial vulnerability by adding the debt ratio to the Tuckman-Chang model of financial vulnerability. The following research question and hypotheses were presented and tested:

RQ: Does the Tuckman and Chang model of financial vulnerability accurately predict a charitable organization's survival of a financial shock?

H_{O1}: A charitable organization's financial vulnerability has no effect on the organization's ability to survive a financial shock.

H_{A1}: More financially vulnerable charitable organizations are less likely to survive a financial shock than charitable organizations that are not financially vulnerable.

H_{O2}: Debt does not affect a charitable organization's financial vulnerability or its ability to survive a financial shock.

H_{A2}: Charitable organizations that are more financially vulnerable due to debt are less likely to survive a financial shock than charitable organizations that are financially vulnerable.

This chapter discusses the results of testing and presents the descriptive statistics of the data and additional findings.

Descriptive Statistics

The 2006 SOI File, hosted by the National Center for Charitable Statistics Data Archive, was the primary data source for this study. The SOI files contain the Form 990 information for a weighted sample of organizations filing Form 990 with the IRS. The 2006 SOI File contained information for 15,941 charitable organizations (see Table 4). The data cleaning procedures resulted in 15,794 organizations used in this study. Of the total organizations included in the testing, 10,817 are considered to have survived the Great Recession, and 4,977 are considered not to have survived the Great Recession. Table 4 summarizes basic information about organizations that did and did not survive the Great Recession.

Table 4

Composition of Sample

	Number	Percent
Charities included in the testing	15,794	100.00
Charities that survived the Great Recession	10,817	68.49
Charities that did not survive the Great Recession	4,977	31.51

Table 5 presents a more detailed view of the number of organizations by subsector that survived or did not survive the Great Recession.

Table 5

NTEE Subsectors, Survival Rates in the Great Recession

Subsector	Survived		Did Not Survive	
	Number	Percent	Number	Percent
Arts, culture, and humanities	696	63.85	394	36.15
Education	2470	76.92	741	23.08
Environment	286	62.31	173	37.69
Health	3249	75.05	1080	24.95
Human Services	2638	60.69	1709	39.31
International	169	71.01	69	28.99
Mutual benefit	62	72.09	24	27.91
Public and social benefit	1041	63.24	605	36.76
Religion	205	52.97	182	47.03
Unknown	1	100.00	0	0.00

The first hypothesis was tested by classifying charitable organizations as not-at-risk, at-risk, and severely-at-risk based on their performance in the four financial metrics in the Tuckman and Chang (1991) model of charitable organization financial vulnerability. There were 6,883 organizations classified as not-as-risk, 8,868 organizations classified as at-risk, and 43 organizations classified as severely-at-risk. The second hypothesis was tested by adding a fifth financial metric to the Tuckman-Chang model. Organizations were reclassified based on their performance in the five financial metrics, resulting in 6,298 organizations labeled as not-at-risk, 9,463 organizations

labeled at-risk, and 33 organizations labeled severely-at-risk. Table 6 summarizes this information.

Table 6

Classifications of Risk among charitable organizations, Hypothesis One and Two

	Number	Percent of Total
Hypothesis 1 Classifications		
Not-at-risk	6,883	43.58
At-risk	8,868	56.15
Severely-at-risk	43	0.27
Hypothesis 2 Classifications		
Not-at-risk	6,298	39.88
At-risk	9,463	59.92
Severely-at-risk	33	0.20

The inclusion of the debt ratio for hypothesis two testing had a noticeable effect on the organizations' financial vulnerability classification. The number of organizations classified as at-risk increased for hypothesis two testing due to the debt ratio's inclusion. There were 585 organizations classified as not-at-risk for hypothesis one but classified as at-risk for hypothesis two because they were in the bottom quintile of the debt ratio only. The number of organizations classified as severely-at-risk decreased for hypothesis two testing because ten organizations were not in the bottom quintile for the debt ratio, though they were in the bottom quintile for the other four ratios.

Regression Results

Using SPSS, binary logistic regression analysis was used to test the predictive ability of the Tuckman-Chang model of financial vulnerability. This section discusses the results of the testing.

Results for Hypothesis One

The first hypothesis of this study examined the Tuckman-Chang model's predictability using the Great Recession as an actual financial shock. Table 7 provides the predicted values of organization survival based on the full model. The full model correctly predicted 68.5 percent of organization survival or nonsurvival.

Table 7

Classification of Table[a, b] Hypothesis One

	Predicted Survival of the Great Recession		
Observed	Did not survive	Survived	Percent Correct
Did not survive	0	4,977	.0
Survived	0	10,817	100.0
Overall Percentage			**68.5**

a. constant is included in the model

b. The cut value is .500

The predictor variable was the organization's classification of not-at-risk, at-risk, or severely-at-risk. A test of the full model versus a model with intercept only was statistically significant, $x^2(2) = 353.467, < .001$, as shown in Table 8. Based on this information, the Tuckman-Chang model is a significant improvement in fit over the null model.

Table 8

Omnibus Test of Model Coefficients, Hypothesis One

		Chi-square	df	Sig.
Step 1	Step	353.467	2	.000
	Block	353.467	2	.000
	Model	353.467	2	.000

Statistical Test of Predictors. The Wald chi-square statistic tests the statistical significance of the individual regression coefficients. In Table 9, the at-risk organizations and the severely-at-risk organizations are represented by the dummy variables 1 and 2, respectively. The first dummy variable is a comparison of those at-risk (coded 1) and not-at-risk (the reference category coded 0). The negative coefficient suggests that the at-risk category organizations were less likely to survive than those in the not-at-risk category. Being at-risk is a negative and significant ($b = .658$, s.e. = .036, $p < .000$) predictor of the probability of a charitable organization not surviving a financial shock. The odds ratio (OR) indicates that becoming financially at-risk increases an organization's odds of not surviving a financial shock by a factor of .518. In other words, an organization that meets the definition of being financially at-risk is two times more likely not to survive a financial shock

Similarly, the second dummy variable compares the severely-at-risk group (coded 2) to the not-at-risk group (coded 0). The negative coefficient suggests that the severely-at-risk category organizations were less likely to survive the Great Recession than those in the not-at-risk category. Being severely-at-risk is a negative and significant ($b = -1.123$, s.e. = .30b, $p < .001$) predictor of the probability of a charitable organization not

surviving a financial shock. The OR indicates that becoming financially severely-at-risk increases an organization's odds of not surviving a financial shock by a factor of .325. In other words, a charitable organization that meets the definition of being financially severely-at-risk is three times more likely not to survive a financial shock.

Goodness-of-Fit. The Hosmer and Lemeshow Test is a test of goodness-of-fit, with results presented in Table 9. This test yielded a $\boldsymbol{x^2(1)}$ of .000 and was insignificant ($p > .05$). The test results indicate the model fits the data well.

Table 9 also presents R^2 indices as defined by Cox and Snell and Nagelkerke. For binary logistic regression, these are referred to as pseudo R^2 values but may be interpreted similarly. Based on these values, the explained variation in the dependent variable of organization survival based on the Tuckman-Chang model ranges from 22 percent to 31 percent.

Table 9

Binary Logistic Regression Predicting Organization Survival Based on Financial Vulnerability Classification, Hypothesis One

Predictor	B	s. e.	Wald	df	Sig.	Exp(B)
Not-at-risk (0)			342.794	2	.000	
At-risk (1)	-.658	.036	337.378	1	.000	.518
Severely-at-risk (2)	-1.123	.306	13.431	1	.000	.325
Constant	1.169	.028	1701.918	1	.000	3.220
Goodness-of-fit test	x^2	df	Sig.			
Hosemer and Lemeshow	.000	1	1.000			
Cox & Snell R^2 = .022						
Nagelkerke R^2 = .031						

Results for Hypothesis Two

The second hypothesis of this study the extended Tuckman-Chang model's predictability by adding the debt ratio and using the Great Recession as an actual financial shock. Table 10 provides the output for a model that includes only the intercept. Given the base rates for the two outcomes and no other information, organizations that did not survive the Great Recession would be correctly classified 68.5 percent of the time. The results are the same as those for hypothesis one.

Table 10

Classification of Table[a, b] Hypothesis Two

Predicted Survival of the Great Recession			
Observed	Did not survive	Survived	Percent Correct
Did not survive	0	4,977	.0
Survived	0	10,817	100.0
Overall Percentage			**68.5**

a. constant is included in the model
b. The cut value is .500

The predictor variable was the organization's classification as not-at-risk, at-risk, or severely-at-risk based on the results of five financial metrics. A test of the full model versus a model with intercept only was statistically significant, $x^2(2) = 299.106$, p < .001, as shown in Table 11. Based on this information, the Tuckman-Chang model extended by adding the debt ratio is a significant improvement in fit over the null model.

Table 11

Omnibus Test of Model Coefficients, Hypothesis Two

		Chi-square	df	Sig.
Step 1	Step	299.106	2	.000
	Block	299.106	2	.000
	Model	299.106	2	.000

Statistical Test of Predictors. The statistical significance of the individual regression coefficients was tested using the Wald chi-square statistic. In Table 12, the at-risk and the severely-at-risk organizations are represented by the dummy variables 1 and 2, respectively. The first dummy variable is a comparison of those at-risk (coded 1) and not-at-risk (the reference category coded 0). The negative coefficient suggests that the at-risk category organizations were less likely to survive than those in the not-at-risk category. Being at-risk is a negative and significant ($b = -.616$, s.e. = .036, $p < .001$) predictor of the probability of charitable organization not surviving a financial shock. The OR indicates that being financially at-risk increases an organization's odds of not surviving a financial shock by a factor of .540. In other words, an organization that meets the definition of being financially at-risk is almost two times more likely not to survive a financial shock than an organization that is financially not-at-risk.

Similarly, the second dummy variable compared the severely-at-risk group (coded 2) to the not-at-risk group (coded 0). The negative coefficient suggests that the severely-at-risk category organizations were less likely to survive the Great Recession than those in the not-at-risk category. Being severely-at-risk is a negative and significant ($b = -1.105$, s.e. = .350, $p = .002$) predictor of the probability of a charitable organization not

surviving a financial shock. The OR indicates that becoming financially severely-at-risk increases an organization's odds of not surviving a financial shock by a factor of .331. In other words, a charitable organization that meets the definition of being financially severely-at-risk is three times more likely not to survive a financial shock than an organization that is financially not-at-risk.

Goodness-of-Fit. The results of the Hosmer and Lesmeshow Test of goodness-of-fit are shown in Table 12. This test yielded a $\boldsymbol{x^2}(1)$ of .000 and was insignificant ($p > .005$). The test results indicated that the model for hypothesis two fits the data well.

Table 12 also presents R^2 indices as defined by Cox and Snell and Nagelkerke. For binary logistic regression, these are referred to as pseudo R^2 values but may be interpreted similarly. Based on these values, the explained variation in the dependent variable of organization survival based on the Tuckman-Chang extended model ranges from 19 percent to 26 percent.

Table 12

Binary Logistic Regression Predicting Organization Survival Based on Financial Vulnerability Classification, Hypothesis Two

Predictor	B	s. e.	Wald	df	Sig.	Exp(B)
Not-at-risk (0)			289.146	2	.000	
At-risk (1)	-.616	.036	285.125	1	.000	.540
Severely-at-risk (2)	-1.105	.350	9.987	1	.002	.331
Constant	1.165	.030	1549.787	1	.000	3.207
Goodness-of-fit test	x^2	df	Sig.			
Hosemer and Lemeshow	.000	1	1.000			
Cox & Snell R^2 = .019						
Nagelkerke R^2 = .026						

Supplemental Analysis and Results

Additional testing was performed to further examine the relationship between the financial vulnerability classifications of not-at-risk, at-risk, and severely-at-risk and charitable organization survival of the Great Recession. Testing was also performed to examine the relationship between the financial metrics used in the Tuckman-Chang model and the financial vulnerability classifications. This section describes the testing performed and the results of testing.

One-way Analysis of Variance (ANOVA), Hypothesis One

A one-way between subjects ANOVA was conducted to compare the effect of the financial vulnerability classifications as defined by Tuckman and Chang (1991) on an organization's ability to survive a financial shock. Table 13 presents the descriptive statistics and Table 14 shows the results of testing.

Table 13

ANOVA, Hypothesis One Descriptive Statistics

Classifications	Number	M	SD
Not-at-risk	6,883	.76	.425
At-risk	8,868	.63	.484
Severely-at-risk	43	.51	.506

* The main difference is significant at the 0.05 level.

As shown in Table 14, the results of the test demonstrate that financial vulnerability classification has a significant effect on organizational survival at the $p < .05$ level for the three classifications ($F(2, 15791) = 177.815$, $p < .001$).

Table 14

ANOVA, Hypothesis One Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	75.076	2	37.538	177.815	.000
Within Groups	3333.574	15791	.211		
Total	3408.649	15793			

Because a statistically significant result was found in this test, the Tukey HSD post hoc test was computed (Table 15). This test compares the not-at-risk and at-risk conditions and the at-risk and severely-at-risk conditions. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the not-at-risk classification ($M = .76$, $SD = .425$) was significantly different from the at-risk classification ($M = .63$, $SD = .484$) and the severely-at-risk classification ($M = .51$, $SD = .506$). However, the severely-at-risk classification did not significantly differ from the at-risk classification.

Table 15

Post Hoc Test – Tukey HSD, Hypothesis One

Dependent variable: Did not survive the Great Recession = 0; Survived the Great Recession = 1				
(I)Hypothesis 1	(J) Hypothesis 1	Mean Difference (I-J)	Std. Error	Sig.
0	1	.138 *	.007	.000
	2	.251*	.070	.001
1	2	.113	.070	.239

Note: (I) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2. (J) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2

* The main difference is significant at the 0.05 level.

One-way Analysis of Variance (ANOVA), Hypothesis Two

The debt ratio was added to the Tuckman-Chang model of financial vulnerability resulting in the use of five financial metrics to classify charitable organizations as not-at-risk, at-risk, and severely-at-risk to test the second hypothesis of this study (see Table 16).

Table 16

ANOVA, Hypothesis Two Descriptive Statistics

Classifications	Number	M	SD
Not-at-risk	6,298	.76	.426
At-risk	9,463	.63	.482
Severely-at-risk	33	.52	.508

A one-way between subjects ANOVA was conducted to compare the effect of these modified financial vulnerability classifications on an organization's ability to survive a financial shock. As shown in Table 17, the results of the test indicate that there

was a significant effect of classification on organizational survival at the $p < .05$ level for the modified classification ($F(2, 15791) = 149.296$, $p < .000$).

Table 17

ANOVA, Hypothesis Two Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	63.258	2	31.629	149.296	.000
Within Groups	3345.391	15791	.212		
Total	3408.649	15793			

As shown in Table 18, post hoc comparisons using the Tukey HSD test indicated that the mean score for the modified not-at-risk classification ($M = .76$, $SD = .426$) was significantly different from the modified at-risk classification ($M = .63$, $SD = .484$) and the modified severely-at-risk classification ($M = .52$, $SD = .508$). However, the modified severely-at-risk classification did not significantly differ from the modified at-risk classification.

Table 18

Post Hoc Test – Tukey HSD, Hypothesis Two

Dependent variable: Did not survive the Great Recession = 0; Survived the Great Recession = 1				
(I) Hypothesis 1	(J) Hypothesis 1	Mean Difference (I-J)	Std. Error	Sig.
0	1	.128 *	.007	.000
	2	.247 *	.080	.006
1	2	.119	.080	.301

Note: (I) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2. (J) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2

* The main difference is significant at the 0.05 level.

Multinomial Logistic Regression

A multinomial logistic regression was performed to model the relationship between the hypothesis one financial metrics used to classify the charitable organizations as not-at-risk, at-risk, and severely-at-risk and membership in those three groups. A separate multinomial logistic regression was also performed to model the relationship between the hypothesis two financial metrics used to classify the charitable organizations and membership in those groups. The model for hypothesis one is a significant improvement over the null model, x^2 (8, N = 15794) = 1798.009, Nagelkerke R^2 = .143, p < .001. The model for hypothesis two was also a significant improvement over the null model, x^2 (10, N = 15794) = 3194.219, Nagelkerke R^2 = .245, p < .001. As shown in Table 19, significant unique contributions were made by all financial metrics.

Table 19

Likelihood Ratio Tests

	Model for Hypothesis 1			
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log of Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	21060.016	679.511	2	.000
Net Assets Ratio	20414.837	34.332	2	.000
Revenue Concentration	21943.293	1562.788	2	.000
Administrative Cost Ratio	20446.014	65.509	2	.000
Operating Margin Ratio	20454.671	74.166	2	.000

	Model for Hypothesis 2			
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log of Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	20337.767	1849.304	2	.000
Net Assets Ratio	18737.704	249.241	2	.000
Revenue Concentration	19712.077	1223.614	2	.000
Administrative Cost Ratio	18531.165	42.703	2	.000
Operating Margin Ratio	18558.901	70.439	2	.000
Debt Ratio	20031.496	1543.033	2	.000

For both models, the reference group was those organizations classified as financially not-at-risk. Accordingly, each predictor has two parameters, one for predicting membership in the financially at-risk group rather than the not-at-risk group and one for predicting membership in the financially severely-at-risk group. The parameter estimates are shown in Table 20.

Table 20

Parameter Estimates Contrasting the Not-At-Risk Group versus Each of the Other Groups

Model for Hypothesis 1				
Predictor	**NAR vs**	**β**	**OR**	**Sig.**
Net Assets Ratio	AR	.011	1.011	.000
	SAR	-.009	.991	.064
Revenue Concentration	AR	-2.448	.086	.000
	SAR	-2.432	.088	.000
Administrative Cost Ratio	AR	-.004	.996	.234
	SAR	-4.148	.016	.000
Operating Margi Ratio	AR	.002	1.002	.067
	SAR	-3.021	.049	.000

Model for Hypothesis 2				
Predictor	**NAR vs**	**β**	**OR**	**Sig.**
Net Assets Ratio	AR	.052	1.054	.000
	SAR	.019	1.019	.084
Revenue Concentration	AR	-2.117	.120	.000
	SAR	-2.103	.122	.000
Administrative Cost Ratio	AR	-.006	.994	.118
	SAR	-3.880	.021	.000
Operating Margin Ratio	AR	.005	1.005	.017
	SAR	-3.411	.033	.000
Debt Ratio	AR	-2.331	.097	.000
	SAR	-2.331	.097	.000

Two financial metrics in the hypothesis one model had a significant parameter for comparing the not-at-risk group with the at-risk group. For each one standard deviation decrease in the Net Assets Ratio, the odds of being in the not-at-risk group rather than the at-risk group are multiplicatively decreased by 0.99. For each one standard deviation increase in Revenue Concentration, the odds of being in the not-at-risk group rather than the at-risk group are multiplicatively increased by 11.63.

Three of the predictors in the hypothesis one model had significant parameters for comparing the not-at-risk group to the severely-at-risk group. For each one standard deviation increase in Revenue Concentration, the Administrative Cost Ratio, and the Operating Margin Ratio, the odds of being in the not-at-risk group rather than the severely-at-risk group are multiplicatively increased by 11.36, 62.50, and 20.41, respectively.

Four financial metrics in the hypothesis two model had a significant parameter for comparing the not-at-risk group with the at-risk group. For each one standard deviation decrease in the Net Assets Ratio and the Operating Margin Ratio, the odds of being in the not-at-risk group rather than the at-risk group are multiplicatively decreased by .95 and 0.99, respectively. For each one standard deviation increase in Revenue Concentration and the Debt Ratio, the odds of being in the not-at-risk group rather than the at-risk group are multiplicatively increased by 8.33 and 10.31, respectively.

Four of the predictors in the hypothesis two model had significant parameters for comparing the not-at-risk group to the severely-at-risk group. For each one standard deviation increase in Revenue Concentration, the Administrative Cost Ratio, the Operating Margin Ratio, and the Debt Ratio, the odds of being in the not-at-risk group

rather than the severely-at-risk group are multiplicatively increased by 8.20, 47.62, 30.30, and 10.31, respectively.

Using the logistic model for hypothesis one to make such predictions results in 59.4 percent correct prediction. Table 21 shows that correct predictions were more frequent for the financially at-risk-group (69.7 percent) and the financially not-at-risk group (46.5 percent) than the financially severely-at-risk group (4.7 percent). Table 21 also shows that using the logistic model for hypothesis two to make such predictions results in 66.8 percent correct prediction. Correct predictions were more frequent for the financially at-risk-group (75.4 percent) and the financially not-at-risk group (54.3 percent) than the financially severely-at-risk group (6.1 percent).

Table 21

Correct Predictions Based on Logistic Model, Hypothesis One and Two

Model for Hypothesis One Predicted				
Observed	**0**	**1**	**2**	**Percent Correct**
0	3198	3685	0	46.5%
1	2681	6185	2	69.7%
2	0	41	2	4.7%
Overall percentage	37.2%	62.8%	0.0%	59.4%
Model for Hypothesis Two Predicted				
Observed	**0**	**1**	**2**	**Percent Correct**
0	3420	2878	0	54.3%
1	2326	7136	1	75.4%
2	0	31	2	6.1%
Overall percentage	36.4%	63.6%	0.0%	66.8%

ANOVA Comparing Metrics of Financial Classifications

An ANOVA was conducted to compare the effects of the financial metrics on the financial vulnerability classifications used to test hypothesis one. Table 22 presents the descriptive statistics.

Table 22

Descriptive Statistics Comparing Metrics of Financial Classifications, Hypothesis One

		Number	M	SD
Net Assets	0	6883	2.885	15.828
Ratio	1	8868	5.119	53.498
	2	43	-3.156	16.555
	Total	15,794	4.123	41.451
Revenue	0	6883	.328	.194
Concentration	1	8868	-.080	8.101
	2	43	-.233	.770
	Total	15,794	.097	6.075
Administrative	0	6883	.864	.070
Cost Ratio	1	8868	.837	6.353
	2	43	.519	.232
	Total	15,794	.848	4.761
Operating	0	6883	.796	13.585
Margin Ratio	1	8868	25.215	1326.225
	2	43	-.183	.213
	Total	15,794	14.504	993.855

The results, presented in Table 23, show that the Net Assets Ratio ($F(2, 15791) = 6.296$, $p = .002$) and Revenue Concentration ($F(2,15791) = 8.825$, $p < .001$) have a significant effect on the organization's financial vulnerability classification as not-at-risk, at-risk, or severely-at-risk at the $p < .05$ level. The Administrative Costs Ratio (F(2,

15791) = .166, p = .847) and the Operating Margin Ratio (F(2, 15791) = 1.174, p = .309) do not have a significant effect on an organization's financial vulnerability classification.

Table 23

ANOVA Results Comparing Metrics of Financial Classifications, Hypothesis One

		Sum of Squares	df	Mean Square	F	Sig.
Net Assets Ratio	Between Groups	21620.394	2	10810.197	6.296	.002
	Within Groups	27113387.18	15,791	1717.015		
	Total	**27135007.57**	**15,793**			
Revenue Concentration	Between Groups	650.770	2	325.385	8.825	.000
	Within Groups	582217.894	15,791	36.870		
	Total	**582868.665**	**15,793**			
Administrative Costs Ratio	Between Groups	7.539	2	3.769	.166	.847
	Within Groups	357944.938	15,791			
	Total	**357952.477**	**15,793**			
Operating Margin Ratio	Between Groups	2320010.940	2	1160005.470	1.174	.309
	Within Groups	1.560E+10	15,791	987726.168		
	Total	**1.560E+10**	**15,793**			

A Tukey HSD post hoc test was computed to further examine the relationship between financial vulnerability classifications (see Table 24). Post hoc comparisons indicated that the mean score for the Net Assets Ratio for charitable organizations classified as not-at-risk (M = 2.885, SD = 15.828) was significantly different from those classified as at-risk (M = 5.119, SD = 53.498) but not significantly different from those classified as severely-at-risk (M = -3.156, SD = 16.555). There was no significant difference between those classified as at-risk and those classified as severely-at-risk.

Post hoc comparison also indicated that the mean score for revenue concentration of charitable organizations classified as not-at-risk (M = .328, SD = .194) was significantly different from those classified as at-risk (M = -.080, SD = 8.101) but not significantly different from those classified as severely-at-risk (M = -.233, SD = .770). There was no significant difference between those classified as at-risk and those classified as severely-at-risk.

Post hoc comparison further shows there is no significant difference in the mean score for the Administrative Cost Ratio of charitable organizations classified as not-at-risk (M = .864, SD = .070), at-risk (M = .837, SD = 6.343), and severely-at-risk (M = .519, SD = .232). It also shows there is no significant difference in the mean score for the Operating Margin Ratio of charitable organizations classified as not-at-risk (M = .796, SD = 13.585), at-risk (M = 25.215, SD = 1326.225), and severely-at-risk (M = -.183, SD = .213).

Table 24

Post Hoc Test – Tukey HSD Metrics of Financial Classifications, Hypothesis One

Dependent Variable	(I) Hypothesis 1:	(J) Hypothesis 1:	Mean Difference (I-J)	Std. Error	Sig.
Net Assets	0	1	-2.234*	.665	.002
Ratio		2	6.041	6.339	.607
	1	2	8.275	6.334	.392
Revenue	0	1	.408*	.097	.000
Concentration		2	.561	.929	.818
	1	2	.153	.928	.985
Administrative	0	1	.027	.076	.932
Cost Ratio		2	.345	.728	.884
	1	2	.317	.728	.900
Operating	0	1	-24.419	15.965	.277
Margin Ratio		2	.979	152.032	1.000
	1	2	25.398	151.927	.985

Note: (I) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2; (J) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2

* The main difference is significant at the 0.05 level.

An ANOVA was also conducted to compare the effects of the financial metrics on the financial vulnerability classifications used to test hypothesis two (see Table 25).

Table 25

Descriptive Statistics Comparing Metrics of Financial Classifications, Hypothesis Two

		Number	M	SD
Net Assets Ratio	0	6298	3.043	16.532
	1	9463	4.869	51.798
	2	33	-4.166	18.847
	Total	15,794	4.123	41.451
Revenue	0	6298	.332	.194
Concentration	1	9463	-.058	7.843
	2	33	-.255	.853
	Total	15,794	.097	6.075
Administrative Cost	0	6298	.863	.069
Ratio	1	9463	.839	6.150
	2	33	.527	.232
	Total	15,794	.848	4.761
Operating Margin	0	6298	.822	14.141
Ratio	1	9463	23.661	1283.863
	2	33	-.220	.231
	Total	15,794	14.504	993.855
Debt Ratio	0	6298	.783	.184
	1	9463	-.308	72.626
	2	33	-.502	1.284
	Total	15794	.127	56.218

As presented in Table 26, the test results show that the Net Assets Ratio ($F(2, 15791) = 4.334$, $p = .013$) and Revenue Concentration ($F(2, 15791) = 7.857$, $p < .001$) have a significant effect on the organization's financial vulnerability classification as not-at-risk, at-risk, or severely-at-risk at the $p < .05$ level. The Administrative Cost Ratio

(F(2, 15791) = .120, p = .887), the Operating Margin Ratio (F(2, 15791) = 1.002, p = .367), and the Debt Ratio (F(2, 15791) = .714, p = .490) do not have a significant effect on an organization's financial vulnerability classification.

Table 26

ANOVA Results Comparing Metrics of Financial Classifications, Hypothesis Two

		Sum of Squares	df	Mean Square	F	Sig.
Net Assets Ratio	Between Groups	14886.417	2	7443.209	4.334	.013
	Within Groups	27120121.16	15,791	1717.442		
	Total	**27135007.57**	**15,793**			
Revenue Concentration	Between Groups	579.440	2	289.720	7.857	.000
	Within Groups	582289.225	15,791	36.875		
	Total	**582868.665**	**15,793**			
Administrative Costs Ratio	Between Groups	5.439	2	2.719	.120	.887
	Within Groups	357947.038	15,791	22.668		
	Total	**357952.477**	**15,793**			
Operating Margin Ratio	Between Groups	1979529.906	2	989764.953	1.002	.367
	Within Groups	1.560E+10	15,791	987747.730		
	Total	**1.560E+10**	**15,793**			
Debt Ratio	Between Groups	4512.360	2	2256.180	.714	.490
	Within Groups	49908430.68	15,791	3160.562		
	Total	**49912943.04**	**15,793**			

A Tukey HSD post hoc test was computed to further examine the relationship between financial vulnerability classifications (see Table 27). Post hoc comparisons indicated that the mean score for the Net Asset Ratio for charitable organizations classified as not-at-risk (M = 3.043, SD = 16.532) was significantly different from organizations classified as at-risk (M = 4.869, SD = 51.798) but not significantly different from those classified as severely-at-risk (M = -4.166, SD = 18.847). There was no significant difference between those classified as at-risk and those classified as severely-at-risk.

Post hoc comparisons also indicated that the mean score of Revenue Concentration for charitable organizations classified as not-at-risk (M = .332, SD = .194) was significantly different from organizations classified as at-risk (M = -.058, SD = 7.843) but not significantly different from those classified as severely-at-risk (M = -.255, SD = .853). There was no significant difference between those classified as at-risk and those classified as severely-at-risk.

Post hoc comparison further shows there is no significant difference in the mean score for the Administrative Cost Ratio of charitable organizations classified as not-at-risk (M = .864, SD = .070), at-risk (M = .837, SD = 6.343), and severely-at-risk (M = .519, SD = .232). It also shows there is no significant difference in the mean score for the Operating Margin Ratio of charitable organizations classified as not-at-risk (M = .796, SD = 13.585), at-risk (M = 25.215, SD = 1326.225), and severely-at-risk (M = -.183, SD = .213).

Table 27

Post Hoc Test – Tukey HSD Metrics of Financial Classifications, Hypothesis Two

Dependent Variable	(I) Hypothesis 1	(J) Hypothesis 1	Mean Difference (I-J)	Std. Error	Sig.
Net Assets	0	1	-1.83 *	.674	.018
Ratio		2	7.21	7.23	.579
	1	2	9.036	7.23	.424
Revenue	0	1	.390 *	.099	.000
Concentration		2	.588	1.06	.844
	1	2	.198	1.06	.981
Administrative	0	1	.023	.077	.952
Cost Ratio		2	.335	.831	.914
	1	2	.312	.830	.925
Operating	0	1	-22.839	16.162	.334
Margin Ratio		2	1.043	173.460	1.000
	1	2	23.881	173.309	.990
Debt Ratio	0	1	1.091	.9142	.457
		2	1.285	9.812	.991
	1	2	.194	9.803	1.000

Note: **(**I) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2; (J) Hypothesis 1: Not-at-Risk = 0; At-Risk = 1; Severely-At-Risk = 2

* The main difference is significant at the 0.05 level.

Chapter 5 – Discussion

In 1991, Tuckman and Chang published the seminal article that considered the financial vulnerability of nonprofit organizations. They presented a model comprised of four financial metrics that can assess if a nonprofit organization is financially vulnerable. The four financial metrics are:

- The net asset ratio,
- Revenue concentration,
- The administrative cost ratio, and
- The operating margin ratio.

This model was the direct and indirect subject of empirical testing, indicating that the model predicts financial vulnerability. However, prior testing did not use an actual financial shock. An actual financial shock that negatively affected the charitable sector was the Great Recession from December 2007 through 2009. This study's objective was to test the predictability of the Tuckman-Chang model by considering the following research question: Does the Tuckman and Chang model of financial vulnerability accurately predict charitable organization survival of a financial shock?

This study used binary logistic regression analysis to explore this question. The results of this analysis indicate that the Tuckman-Chang model of financial vulnerability can predict if a nonprofit organization will survive a financial shock. In other words, nonprofit organizations classified as financially at-risk or financially severely-at-risk are more likely not to survive a financial shock than organizations that are not financially at-risk. Because of these results, we reject the null of the first hypothesis. The ANOVA results indicated a significant difference in a charitable organization's survival of a

financial shock between the financial vulnerability classification groups; thus, providing further support that the Tuckman-Chang model can predict if a charitable organization will survive a financial shock. This study's results align with the results of prior studies of the Tuckman-Chang model discussed in Chapter 2.

The second objective of this study was to consider the effect of debt on financial vulnerability. To test the second hypothesis, the Tuckman-Chang model was expanded by adding the debt ratio. The testing results indicated that the extended model accurately predicts which organizations will survive a financial shock and that a relationship exists between the financial vulnerability classifications that include the debt ratio and the organization's survival of a financial shock. These results align with the study presented by Trussel (2002). Because of these results, I reject the null of the second hypothesis.

There are few studies on debt's effect on a charitable organization's financial vulnerability, though measures of debt are included in predictive tests of for-profit organizations (Altman, 1968; Beaver, 1966; Ohlson, 1980). Though this study's results indicate that the Tuckman-Chang model extended by adding the debt ratio is a predictive model of charitable organization financial vulnerability, the results do not indicate that the debt ratio strengthens the explanatory nature of the model. This result is evident when comparing the F value of the one-way between-subjects ANOVA for hypothesis one ($F(2,15791) = 177.815$, $p < .001$) and the F value of the one-way between-subjects ANOVA for hypothesis two ($F(2,15791) = 149.296$, $p < .001$). The decrease in the F value of the tests indicates that adding the debt ratio does not strengthen the model's explanatory nature.

The predictive ability of the Tuckman-Chang model of nonprofit organization financial vulnerability as noted in this study is consistent with prior literature and research (Greenlee and Trussel, 2000; Hager, 2001; Thomas and Trafford, 2013; Trussel, 2002; Trussel and Greenlee, 2004). This study adds to the literature by using an actual financial shock to the nonprofit sector to test the Tuckman-Chang model's predictive ability.

Additional testing was performed to consider the relationship between the financial metrics used in the Tuckman-Chang model and the financial vulnerability classifications. The administrative cost ratio, operating margin ratio, and the organization's revenue concentration have a strong relationship with the financially severely-at-risk classification. There is not a strong relationship between the net assets ratio and financially severely-at-risk classification.

Likewise, there was a strong relationship between being financially-at-risk and the net assets ratio, the debt ratio, and the organization's revenue concentration. However, the administrative costs ratio does not have a strong relationship with being financially at-risk. The operating margin ratio does not have a strong relationship with being financially at-risk as defined by the Tuckman-Chang model. However, the relationship is strengthened when the model is extended by adding the debt ratio. The change in the relationship may be due to the impact of debt on the organization's amount of donations (Calabrese and Grizzle, 2012; Homonoff et al., 2020) and on the organization's overall profitability (Lam et al., 2020).

Finally, additional testing was performed to evaluate the relationship between the Tuckman-Chang model's financial metrics plus the debt ratio and the organizations'

survival of the Great Recession. Only the administrative cost ratio had a significant relationship with organization survival, though it had mixed results with its relationship with financial vulnerability classifications. The administrative cost ratio is also widely used as an efficiency ratio. The results of this study could add to the literature about the use of this ratio and its effectiveness as a measure of financial vulnerability.

Implications

The results of this study have potential implications for stakeholders of the charitable sector, including but not limited to those who oversee and govern nonprofit organizations, current and potential donors, lenders, charitable organization consultants, and the public at large. The charitable sector is a large contributor to the U.S. economy, and many benefit from the services provided by these organizations. The board of directors and organization management can implement decisions that improve the organization's financial health and longevity by utilizing a matrix of financial measures that can predict a charitable organization's survival of a financial shock.

Current and potential donors and lenders may use the financial vulnerability models to determine in which charitable organizations they should make a financial investment. Current and potential donors may use these financial metrics to assess a charitable organization's financial health and use that information for donation decision-making. Donors may elect to improve the charity's financial health by increasing the amount given, or donors may choose to give to organizations that exhibit financial stability. Lenders may use the models to assess the risk of loaning money to the organization.

Accounting practitioners and those who consult with nonprofit organizations generally rely on ratios and other financial metrics to assess the financial health and performance of organizations. The results of this study indicate that the Tuckman-Chang model can assess the financial vulnerability of a charitable organization and its ability to survive a financial shock. Practitioners must remain aware that assessment of only the metrics does not provide full information. The metrics must be assessed together and compared to other charitable organizations to develop a comprehensive analysis.

Nonprofit organization management and those who audit those organizations could use the Tuckman-Chang model or the extended model to evaluate the organization's ability to continue as a going concern. Many of the conditions and events suggested in FASB ASU No. 2014-15 and examples provided in the Accounting and Audit Guide for Not-for-Profit Entities are represented in the model's financial metrics. Management's use of this model could allow them to make strategic decisions to strengthen the organization's financial health. Auditors could use this model as a test for the going concern assumption and provide support for the issuance of a going concern modified audit opinion.

Limitations and Further Research

Certain limitations are inherent in this study. First, this study includes data only from organizations deemed public charities and exempt from federal income taxation under Internal Revenue Code Section 501(c)3. The nonprofit industry is vast and contains many other organizations that are tax-exempt under other IRC Sections. Furthermore, the charitable sector contains a variety of subsectors. Each subsector may respond to a financial shock in different ways. With this in mind, this study's results may not be

generalizable across the entirety of the nonprofit industry or the charitable sector. Hagar (2001) applied the Tuckman-Chang model to charitable arts organizations, and Prentice (2016a) applied an expanded model to nonprofit human service organizations and higher education institutions. The results of both studies indicate that the Tuckman-Chang model can be applied to organizations in these charitable subsectors; however, an actual financial shock was not utilized in either study. A binary logistic regression analysis should be used to determine if the Tuckman-Chang model can be used to assess the financial vulnerability of organizations tax-exempt under other IRC sections and in other charitable subsectors.

The data set used for this study was compiled from the Form 990 information filed with the IRS. Not all charitable organizations are required to file a Form 990. These organizations include those with annual gross receipts less than $25,000 and religious congregations. These organizations may respond to a financial shock differently than those included in the data set. The financial vulnerability literature would benefit from studies of smaller charitable organizations and religious congregations.

The Tuckman-Chang model classified nonprofit organizations as financially at-risk if they were in the bottom quintile for one financial metric and financially severely-at-risk if they were in the bottom quintile for all four financial metrics. Classifications are not given to the organizations in the bottom quintile of two or three financial metrics. Further research to test the relationship between being in the bottom quintile for two or three of the financial metrics and the organization's ability to survive a financial shock would provide more information on viable application of the Tuckman-Chang model and add to the financial vulnerability literature.

Conclusion

At the time of this writing, the world has been subject to the coronavirus (COVID-19) pandemic, which has affected the health of many individuals and the economy. Such an economic shock could have a negative impact on the financial stability of charitable organizations. Many of these organizations provide services that support the public good. The demise of these organizations could result in certain needs going unmet. The results of this study provide strength to prior studies by indicating that the Tuckman-Chang model of nonprofit financial vulnerability can predict whether or not a charitable organization can survive a financial shock. The use of this model for strategic decision-making by nonprofit organization management can promote these organizations' longevity, resulting in the continuation of a vast array of charitable services.

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