ABSTRACT

PRENTICE, CHRISTOPHER RAMSEY. Financial Vulnerability among Human Services and Higher Education Nonprofits: An Analysis of Organizational and Environmental Factors. (Under the direction of Dr. Richard Clerkin.)

The nonprofit sector is vitally important. Nonprofit organizations address unmet needs, foster innovation, and serve as value guardians. The sector is increasingly responsible for important social and economic functions and its survival is crucial for the countless recipients of nonprofit goods and services. Understanding the financial fundamentals necessary for nonprofit survival is the focus of this dissertation. Using the Digitized Data files, which contain IRS Form 990 information for all filing 501(c)(3) organizations from 1998-2003, this dissertation explores two research questions: (1) Can accounting ratios, used to assess nonprofit financial health, be organized into theoretically intuitive and empirically defensible constructs; and (2) What are the organizational and environmental factors that lead to nonprofit financial vulnerability?

In an attempt to answer the first research question, nine commonly used accounting ratios are organized on the basis of previous literature into one of four constructs – solvency, liquidity, profitability, and operating margin. Results from a factor analysis performed on the variables provide clear evidence that accounting ratios, routinely classified as representative of larger constructs, do not relate to one another as expected. The idea that various accounting ratios reliably and accurately measure singular underlying constructs such as solvency or profitability is a widely held and deeply entrenched notion, a notion that clearly needs rethinking in the nonprofit context.
To explore the second research question, two analyses are performed using generalized estimating equations (GEE), one on the human services subsector and one on higher education nonprofits. The results of the GEE analyses yield several noteworthy findings. First, accounting variables are not consistently significant predictors of financial vulnerability. Second, revenue variables are not as clearly related to financial vulnerability as the literature suggests. Third, environmental variables are consistent predictors of financial vulnerability. The findings here suggest that macroeconomic factors (gross domestic product and state product), community factors (median household income), as well as a nonprofit’s financial prominence in their niche (revenue share), can decrease financial vulnerability. Lastly, differences in the results between the subsectors illustrate the importance of conducting research at the level of the subsector and serves as a caution against sector-wide analyses.

This research contributes to the literature in several ways, most notably by incorporating a more open systems approach to the study of nonprofit financial vulnerability with the inclusion of several environmental variables. Future studies should extend the analysis of environmental factors on nonprofit financial vulnerability by exploring these effects in other data and for additional subsectors.
Financial Vulnerability among Human Services and Higher Education Nonprofits: An Analysis of Organizational and Environmental Factors

by

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A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Public Administration

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2013

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DEDICATION

This work is dedicated to my family.

To my wife, Lauren, this degree represents a joint achievement. Your unwavering love and support made this possible.

To my mother, Gigi, I draw strength and inspiration from you. To my sister, Tammy, I am proud to be your big brother. To my father, Laird, you are the rock upon whom we all lean. Lastly, to my brothers Ramsey and Cody, you will forever exist in my heart.

Thank you all.
BIography

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ACKNOWLEDGMENTS

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I also want to thank my fellow Ph.D. students, particularly Christopher Cody. You have each been a sounding board, a source of motivation, and above all else good friends.
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CHAPTER 1: INTRODUCTION

1.1 Introduction

The nonprofit sector is vitally important. Nonprofit organizations address unmet needs, foster innovation, and serve as value guardians. The sector is increasingly responsible for important social and economic functions and its survival is crucial for millions of nonprofit employees and the countless recipients of nonprofit goods and services. Understanding the financial fundamentals necessary for nonprofit survival is the focus of this dissertation.

1.2 The Role of Nonprofits

Three-failures theory (Steinberg 2006) is a demand-side economic approach to understanding why different goods are desired and why different sectors traditionally produce them. It postulates that government, the market, and the nonprofit sector variably fail to provide goods given various pressures or due to inadequacies. For example, the market fails to provide public or common goods due to the lack of profit motive and the focus on maximizing shareholder wealth; government fails to provide private or common goods that fall outside the desires of the median voter; and nonprofits fail to provide public goods given resource insufficiencies and the presence of free riders (2006). Thus government tends to produce public goods, the market tends to produce private goods, and the nonprofit sector tends to produce common goods.

However, three-failures theory is incomplete because the boundaries between what constitutes a public good versus a common good are blurring. Further, the
mechanism controlling how public and common goods are produced and delivered has also changed. The increase in government contracting-out services and the increase in partnerships across sectors have been at the heart of the changing dynamic. Nonprofit and government relationships involve complex interdependencies (Smith & Grønbjerg 2006).

Increasingly, nonprofits are relied upon for the provision of public goods and play a crucial role in a hollow state (Milward & Provan 2000). The hollow state is a metaphor that describes the devolution of power and decentralization of services as government shifts the production and management of taxpayer funded goods and services to third parties (Milward & Provan 2003, 2-3). The shift to third-party government has coincided with and spurred the growth of the nonprofit sector (Salamon 2002). By recent estimates, there are roughly 1.5 million nonprofit organizations, two-thirds of which are charities, an increase of nearly 31% in the overall number of nonprofits and a nearly 61% increase in the number of charities over ten years (Wing et al. 2010).

According to Salamon (2002), government relies heavily on nonprofits to deliver publicly funded services and the “major share of the discretion over the operation of public programs routinely comes to rest not with the responsible government agencies, but with the third-party actors that actually carry the programs out” (2-3). Further, third parties including nonprofits have discretion over the dispersal of public funds (2002, 2). This reliance on nonprofits to act in the place of government makes a
discussion regarding the survivability of nonprofits by focusing on their finances of central importance and leads to the research questions motivating this dissertation.

**Research Questions:**

1. Can accounting ratios, used to assess nonprofit financial health, be organized into theoretically intuitive and empirically defensible constructs?

2. What are the organizational and environmental factors that lead to nonprofit financial vulnerability?

1.3 Nonprofit Finance

According to Bowman (2011a), the long-term financial objective of nonprofit organizations is to maintain or expand services. Accordingly, analyzing the long-term financial capacity and long-term financial sustainability of nonprofits is important. Further, Bowman (2011a) suggests the short-term financial objective of nonprofit organizations is to withstand financial shocks, a concept referred to as resilience. Resilience involves bolstering short-term financial capacity and short-term financial sustainability.

There are ever-changing social, political, and economic forces affecting the nonprofit sector. A nonprofit organization's ability to adapt to these forces requires a strong financial position and can be assessed by analyzing financial indicators (Keating et al. 2005; Hodge 2005; Trussel 2002; Hager 2001; Greenlee & Trussel 2000). Financial indicators that measure an organization's short-term and long-term financial capacity and sustainability theoretically relate to the basic accounting constructs of liquidity,
solvent, operating margin, and profitability. Table 1.1 organizes these constructs accordingly.

Table 1.1: Accounting Constructs related to Bowman's Nonprofit Financial Objectives

<table>
<thead>
<tr>
<th></th>
<th>Financial Capacity</th>
<th>Financial Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Term</strong></td>
<td>Solvency</td>
<td>Profitability</td>
</tr>
<tr>
<td><strong>Short-Term</strong></td>
<td>Liquidity</td>
<td>Operating Margin</td>
</tr>
</tbody>
</table>

Using financial indicators to capture a nonprofit organization’s solvency, profitability, liquidity, and operating margin offers a prognosis regarding the organization’s financial position.

1.4 Nonprofit Financial Vulnerability

For an organization to maintain programmatic services, they must sustain growth equal to or greater than inflation (Bowman 2011a; Anthony & Young 2005) and diversify revenue streams (Keating et al. 2005; Tuckman & Chang 1991). Strategically managing the organization’s finances, given increased competition for limited resources, can only be done by understanding the causes of nonprofit financial vulnerability.

The connection between financial indicators and financial vulnerability should be of interest to a range of parties including researchers, government agencies, potential donors, and nonprofit managers and board members (Trussel 2002). Government agencies set policies and grant and maintain service contracts with
nonprofit partners. Funders including for-profit organizations, foundations, and individual donors allocate resources to fund nonprofit programs (Keating et al. 2005; Trussel 2002). Most importantly, nonprofit managers and board members are responsible for ensuring that nonprofits have adequate financial resources to fulfill its mission through financial oversight and accountability. Hence, an essential nonprofit governance role involves understanding an organization’s financial condition and vulnerabilities (Keating et al. 2005).

1.5 Summary and Preview of Upcoming Chapters

Chapter 1 highlights the significance of the nonprofit sector in a hollow state and provides a statement of the problem. Essentially, it can be summarized as follows: If nonprofits are increasingly entrusted to provide integral public goods, the survivability of the sector is important; and since financial health is at the core of organizational survivability, the factors leading nonprofits to financial vulnerability need to be explored. That premise leads to the research questions motivating this study. First, whether accounting ratios can be organized into fewer conceptually clearer constructs; and second, exploring the organizational and environmental factors leading to nonprofit financial vulnerability. Lastly, Chapter 1 provides a preview of the upcoming chapters and concludes by stating the contributions of this dissertation to nonprofit finance literature.

Chapter 2 is a review of the literature. Chapter 2 discusses the evolution of nonprofit financial vulnerability studies, including the heavy influence of the for-profit
corporate finance literature on its development. It further highlights in what way the
trend in nonprofit financial studies toward an accounting exercise has encumbered the
literature with jargon, making the research largely inaccessible to those without a CPA.
Additionally, Chapter 2 proposes three theoretical frameworks that inform the study of
nonprofit financial vulnerability.

Scholars of finance have proposed that organizations are subject to at least three
types of financial risk: market risk, industry risk, and firm risk (Greenlee & Tuckman
2007, 320). This is corroborated in the corporate for-profit literature by Duffie et al.
(2007) who suggest a firm's financial health has multiple influences over time,
including firm-specific, sector-wide, and macroeconomic variables that influence the
evolution of corporate earnings and leverage (638). Therefore, this paper explores
three theoretical frameworks that serve as a basis for studying these three types of risk
to nonprofit financial vulnerability. Resource dependence theory is traditionally
associated with financial management in nonprofit organizations and will be explored
here. Portfolio theory has also been studied as nonprofit managers making decisions
regarding revenue streams is comparable to investors weighing the risk, volatility, and
reward of investment decisions. Lastly, organizational ecology explains the effect of
environmental variables on an organization's financial vulnerability.

Chapter 3 starts with a discussion of the data used in this study, followed by the
intended method of analysis, and ends with the operationalization of the variables. The
primary source of data for this study comes from the National Center for Charitable
Statistics (NCCS) at the Urban Institute. The data files contain collated information from every 501(c)(3) organization filing a tax return for the years 1998 to 2003. Tuckman and Chang (1991) began a line of inquiry that focused on the financial vulnerability of nonprofit organizations and developed measures for identifying distressed nonprofits. As researchers built upon Tuckman and Chang’s work, they incorporated elements of models used in for-profit bankruptcy prediction literature and the list of predictors expanded. The list became quite extensive and generally included three categories of variables – accounting variables, revenue variables, and control variables – with accounting variables representing a large majority of the predictors. This paper incorporates many of the same variables, but forgoes the exhaustive list of independent financial accounting ratios and in an attempt to answer the first research question suggests fewer underlying accounting constructs (Table 1.1). Minimal inference was required in organizing the accounting ratios into constructs. Authors typically refer to accounting variables as liquidity ratios (e.g., working capital divided by total assets) or operating margin ratios (e.g., net income divided by total revenue). In addition to the accounting constructs, the structural equation model in Chapter 3 includes revenue variables, control variables and several new environmental variables.

Chapter 3 ends with an acknowledgment that the accounting ratios are organized exclusively on the basis of theory and empirical testing is required. Thus, before proceeding with structural equation modeling, an exploratory factor analysis of
the accounting variables is proposed.

Chapter 4 begins with the unexpected results of the exploratory factor analysis performed on the accounting predictors. The results suggest accounting ratios commonly used to assess nonprofit financial health and commonly accepted as representative of larger constructs – solvency, liquidity, profitability, and operating margin – do not relate to one another in theoretically intuitive ways. These findings suggest the answer to the first research question is not as simple as expected and additional exploration is needed.

Given the unexpected results of the exploratory factor analysis, an alternate approach to modeling financial vulnerability is proposed in Chapter 4. The amended approach includes a change in method of analysis, a revision of the hypotheses, a reconceptualization of the dependent variable, and a shift to a more detailed analysis on two subsectors – human services and higher education – as opposed to a sector-wide analysis.

Chapter 5 provides the results of the two generalized estimating equations analyses on human services and higher education. The results suggest accounting ratios are helpful in the prediction of financial vulnerability, but there are fewer statistically significant accounting ratios than expected. The implication derived from the significant accounting variables is that revenue and assets are important to financial health. Additionally, the results suggest there are several significant environmental predictors. The implications of the environmental variables are twofold. First, nonprofits should be
aware of the community and their place within it. Second, wealthier communities build stronger nonprofits.

Chapter 6 concludes with a summary of the dissertation, a discussion of the results, the limitations of the research, and the implications of the findings for future study.

1.6 Contributions of the Dissertation

This dissertation explores nonprofit financial vulnerability and has three main contributions to the literature.

1. Revenue and assets are important to human services and higher education nonprofits. The tendency in the literature to focus on the source of revenue as a means to avoid financial vulnerability overlooks the significance of maintaining strong asset bases.

2. Accounting ratios are not representative of underlying constructs in the way the literature suggests. It is taken as custom that there are several measures of liquidity, solvency, profitability, and operating margin. Though theoretically intuitive, these classifications have gone untested. The results of the dimension reduction analysis performed here suggest the numerous accounting ratios predominantly measure different things and should not be lumped together solely on the basis of a priori knowledge.

3. The environment matters. Accounting-centric models miss important predictors of financial vulnerability and future studies of nonprofit financial vulnerability
should include the effects of environmental factors.
CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Nonprofit organizations typically fail to provide public goods due to resource insufficiencies and the presence of free riders – individuals who consume goods without contributing money or labor. However, through partnerships and contracting-out there has been a shift of public goods from direct government provision to third-party provision; as a result nonprofits are entrusted with producing, managing, and delivering integral taxpayer-funded public goods (Salamon 2002). This shift has resulted in the observation of government as a hollow state (Milward & Provan 2000) and the rapid growth of the nonprofit sector (Salamon 2002; Salamon 1994). Given the reliance of government on nonprofit organizations to provide these goods, a focus on the financial fundamentals undergirding nonprofit survivability is integral. According to Young (2010), “nonprofits are private organizations producing a combination of private and public benefits. As such they must ensure that their financial bottom lines are sound” (500).

Knowing what causes financial vulnerability in nonprofit organizations is an area of interest for multiple parties. Governments, foundations, for-profit corporations, and individuals who provide grants and donations to nonprofit organizations increasingly require financial and programmatic accountability. Clients of nonprofit services, in some cases, rely on nonprofit organizations to provide basic necessities including food and shelter. An organization’s capacity to maintain services without
significant interruption despite financial shocks is of interest to nonprofit management. Fundamental to any of these interests are organizational survival and sustainability. Therefore, exploring which factors can reduce a nonprofit’s susceptibility to financial vulnerability is the purpose of this dissertation.

The two primary research questions addressed by this dissertation are: What are the organizational and environmental factors that lead to nonprofit financial vulnerability and can commonly used accounting ratios be organized into fewer constructs? The purpose of this chapter is to provide the substantive theoretical and empirical background behind nonprofit financial vulnerability and the hypothesized predictors of financial vulnerability. The first section reviews the corporate for-profit literature on predicting bankruptcies that serves as the basis for models of nonprofit financial vulnerability. The second section describes the dependent variable, nonprofit financial vulnerability, in greater detail. Consistent with previous literature, this dissertation suggests four measures for financial vulnerability. The following three sections outline the theoretical frameworks – resource dependence, portfolio, and organizational ecology – and identify the predictors of nonprofit financial vulnerability. This is followed by a discussion of the control variables common in financial vulnerability studies. Finally, the chapter ends with a summary of the proposed hypotheses and a short preview of Chapter 3.
2.2 Bankruptcy

Nonprofit financial vulnerability research grows out of the literature on for-profit bankruptcy prediction. For-profit bankruptcy prediction has been a central area of research for several decades. This area of research has primarily relied on accounting measures (Keating et al. 2005, 4), but more recently, a market-based predictive model has emerged. The accounting models “use composite measures that statistically combine several different accounting variables, with Altman’s (1968) Z-score and an O-Score derived from Ohlson’s (1980) Model 1 being the most popular” (Hillegeist et al. 2004, 5). The accounting-based models are introduced in this section, but are examined in greater detail in section four where I discuss how accounting measures are used in nonprofit research. The market-based approach is based on the models of Black and Scholes (1973) and Merton (1974) and assumes Brownian motion to measure the distance to default (Duffie et al. 2007, 638). In the following section I review the literature and explore the strengths and weaknesses of each approach.

2.2.1 Accounting-Based Prediction

Altman (1968) created a composite Z-Score that relied on accounting-based measures as the predictor variables to model corporate bankruptcy. Altman’s model began with various combinations of 22 variables before being trimmed to the five variables with the highest predictive power, four accounting ratios and one market ratio. When the model was adapted to the nonprofit sector by Keating et al. (2005), the market ratio that measured market value of equity in the numerator was left out due to
the lack of information on the market valuation of nonprofit firms. As an indication of
Altman’s prominence, his 1968 article had 6,612 citations on Google Scholar as of
February 24, 2013.

Ohlson (1980) also created a composite measure, an O-Score, based on
accounting ratios in an effort to predict corporate bankruptcy. Ohlson’s less
parsimonious model consists of nine accounting-based variables. Ohlson’s O-Score, like
Altman’s Z-Score, is calculated using end of fiscal year data. Using logistic
transformation, the measures can be turned into bankruptcy probabilities (Hillegeist
2004, 13). As an indication of Ohlson’s prominence, his 1980 article had 2,735 citations
on Google Scholar as of February 24, 2013.

Despite the prevalence of Altman’s (1968) and Ohlson’s (1980) models,
accounting-based models are not without weakness. Bankruptcy probability estimates
are statements about the likelihood of future events, but the accounting data used in the
measures are from financial statements that are designed to measure past performance
(Hillegeist et al. 2004, 6). As such, these measures “may not be very informative about
the future status of the firm” (2004, 6). Further, “another important deficiency of
accounting-based bankruptcy prediction models is their failure to incorporate a
measure of asset volatility” (2004, 6). Accordingly, Hillegeist et al. (2004) suggest a
market-based approach to modeling bankruptcy probabilities that aggregates
information from other sources in addition to financial statements and estimates asset
volatility (6).
2.2.2 Market-Based Prediction

While market-based bankruptcy prediction is widely used in the for-profit corporate sector, this approach has very limited utility for analyzing financial vulnerability in the nonprofit sector. Nonetheless, the strengths and weaknesses of market-based prediction models are worth noting. In the for-profit sector, option pricing models based on the approaches of Black and Scholes (1973) and Merton (1974) serve as the starting point where the firm’s equity is viewed as a call option on the value of the firm’s assets\(^1\). The call option is left unexercised and the firm bankrupt if at the strike price, the value of the assets is below the face value of liabilities (Hillegeist et al. 2004, 6). Key estimates are made for the asset volatility and market-based leverage ratio in the Black-Scholes-Merton approach to corporate bankruptcy prediction. Essentially, under this approach, “the probability of bankruptcy is simply the probability that the market value of assets is less than the face value of the liabilities” (2004, 9). Further, “bankruptcy is a function of the distance between the current value of the firm’s assets and the face value of its liabilities adjusted for the expected growth in asset values relative to asset volatility,” where estimates are formed for the market value of assets, asset volatility, and the expected return on assets (2004, 9). If one assumes the asset process to be a geometric Brownian motion, then in this approach, “a firm’s conditional default probability is completely determined by its distance to default, which is the number of standard deviations of annual asset growth by which the asset level exceeds the firm’s liabilities” (Duffie et al. 2007, 638).
According to Duffie et al. (2007), distance to default is a volatility-corrected measure of leverage (639).

There are several issues with the market-based approach to bankruptcy prediction. First, it can be common for firms to operate for years in the red yet not be bankrupt, because bankruptcy is a legal rather than financial status. Second, the assumption that the asset process can be modeled as a random walk is precarious given the existence of non-repeating environmental forces; forces that are not random effects, yet feasibly affect the firm’s assets. Third, and most importantly, several variables used in market-based prediction are not found in the nonprofit context. As with the leverage variable in Altman’s (1968) model that measured the market value of equity divided by the book value of total debt (total liabilities), these estimates cannot be simply transferred to the nonprofit sector. The means to measure asset volatility, leverage, and a firm’s market value is considerably more complex in the nonprofit sector, given the absence of organized markets that place an economic value on nonprofit firms (Greenlee & Tuckman 2007, 320). “Nonprofits are not valued in the traditional business sense; they are not privately owned and, thus, are typically not sold in a market. They cannot trade in a stock market and cannot be sold by business brokers. Thus, any valuation methods used are not readily validated” (2007, 320).

Whether future researchers can devise a methodology for assessing the market value of a nonprofit organization will ultimately determine the utility of market-based models. However, while it is conceptually difficult to conceive a market-based model for
measuring probabilities of nonprofit bankruptcy, there is value in assuming a nonprofit organization’s potential for market value. Regardless of whether the financial value can ever be realized through a firm’s sale, “it stands to reason that the value will be altered by developments in the larger society, such as recessions, or changes in the stock market or tax laws” (Greenlee & Tuckman 2007, 321). Acknowledging that macroeconomic variables have the potential to affect the organization is an important component left largely untested in research on nonprofit financial vulnerability, but one that is explored in this dissertation with the addition of variables such as GDP and state product.

2.3 Financial Vulnerability

Bankruptcy prediction is common in for-profit finance literature and has been for several decades, but it is a relatively new concept in the nonprofit sector, first appearing with Tuckman and Chang in 1991. Attempts to identify the most pertinent financial measures for the prediction of financial vulnerability began in earnest with Tuckman and Chang (1991); and has evolved, albeit slowly, over the last twenty years. Tuckman and Chang (1991) measured financial vulnerability as a way of classifying which nonprofit organizations were in danger of bankruptcy. Nonprofit organizations, unlike for-profit organizations, cannot be legally forced into bankruptcy (Keating et al. 2005, 6). Under the U.S. federal bankruptcy code, a 501(c)(3) public charity cannot be forced into involuntary liquidation or reorganization (11 U.S.C.A § 303(a); Simon et al. 2006, 269). As such, there is no nonprofit equivalent to the Business Failure Index
compiled by the US Department of Commerce that identifies bankrupt organizations (Tuckman & Chang 1991, 449). Likewise, current methods to identify bankrupt organizations used in for-profit literature such as Moody’s Default Risk Services’ Corporate Default database and SDC Platinum’s Corporate Restructurings database (Hillegeist et al. 2004, 10) are not available for the nonprofit sector.

While nonprofit organizations, if incorporated in a state or registered with the IRS, are required to notify governmental entities upon dissolution, these statutes are rarely enforced; and nonprofit organizations cease to operate voluntarily or involuntarily for several reasons. Despite the difficulties associated with identifying failed nonprofits, there are notable attempts using varied approaches. The most comprehensive list, compiled by the Internal Revenue Service, includes organizations that failed to file Form 990 for three consecutive years and subsequently had their tax exemption automatically revoked. This so-called dead list (formally known as the Automatic Revocation of Exemption list) has already come under fire for misidentifying active organizations as defunct, with a follow-up study conducted on a small group of Indiana nonprofits suggesting up to two-fifths of the revoked nonprofits are still alive (Grønbjerg et al., 2011). Thus, even where lists have been compiled to identify failed nonprofits, the error rate is considerable and should not be used as a proxy for a bankruptcy list. Further, the data is too coarse to make it clear which organizations dissolved specifically due to financial distress.

Given the limitations of market-based bankruptcy forecasting methods for
analyzing the nonprofit sector, in lieu of analyzing financial metrics that yield the probability of organizational bankruptcy, nonprofit researchers have analyzed accounting measures that provide a probability of financial vulnerability. Financial vulnerability is defined variously as a gradual or sharp decline in revenue, assets, or program expenditure. Studies on financial vulnerability over the last two decades have implemented four proxies for financial vulnerability. They are the indicator variables of financial vulnerability in this dissertation, and are program disruption risk, asset disruption risk, funding disruption risk, and insolvency risk. It is important to acknowledge that in identifying these measures for financial vulnerability, the underlying assumption is that nonprofits’ long-term objective is to maintain or expand services. This assumption also underlies Bowman’s (2011a) model outlined in Chapter 1.

Figure 2.1 shows the proposed indicators of the financial vulnerability construct, tested here using structural equation modeling. Following the figure is a review of the literature where these four indicator variables are tested.
2.3.1 Program Disruption Risk

The integral assumption for this proxy is that the purpose of nonprofit organizations is to provide programs or services and any interruption must be due to financial distress. This is echoed by Keating et al. (2005) when they state that “an organization that reduces the funds it allocates to program expenses is necessarily disrupting or reducing its mission-based services” (12). Tuckman and Chang (1991) defined a nonprofit as financially vulnerable “if it is likely to cut back its service offerings immediately when it experiences a financial shock” (445). They identified criteria that represent financial flexibility (access to equity balances, many revenue sources, high administrative costs, and high operating margins) and developed measures to categorize nonprofit organizations as “at risk” and “severely at risk” of bankruptcy relative to other nonprofits. Their classification was based on the four financial ratios taken from each nonprofit with the results placed into quintiles. They defined as “at risk” any nonprofit with one of four ratios in the lowest quintile; and they defined as “severely at risk” any nonprofit with all four of the ratios placing them in the lowest quintile. Therefore, nonprofits that are “severely at risk” lack financial slack and are assumed to be more vulnerable to financial shocks than organizations with financial flexibility.

Subsequent researchers also used program disruption risk as an indicator of financial vulnerability. Greenlee and Trussel (2000) defined a financially vulnerable charity as one that “reduces program expenditures (deflated by total revenues) in each
of three consecutive years” (203). Measuring decline over three years is common in for-profit finance literature with Gilbert et al. in 1990 defining a financially vulnerable company as one that reports three consecutive years of net losses (Greenlee & Tuckman 2007, 318). Though given data limitations researchers have routinely only used one year of financial reports to identify a nonprofit as financially vulnerable. Keating et al. (2005), in the most complete study of nonprofit financial vulnerability to date, defined a programmatically disrupted organization as one with a 25 percent or more reduction in allocations to program expenses during a 12-month period (12).

2.3.2 Asset Disruption Risk

The second indicator of financial vulnerability used in previous studies is asset disruption risk. Trussel and Greenlee (2004) define financial vulnerability as a significant decrease in net assets over a three-year period. Trussel (2002) suggested that a significant decrease such as a 20 percent reduction in net assets over a three-year period constitutes a serious financial disruption. Keating et al. (2005) also used asset disruption risk (they referred to this variable as financial disruption risk) as a proxy for financial vulnerability; they defined a financially disrupted nonprofit as “one with a 25 percent or greater decline in net assets during a 12-month period” (11).

2.3.3 Funding Disruption Risk

Nonprofit literature on financial vulnerability focused exclusively on asset or program disruption as indicators of financial vulnerability until Keating et al. (2005) added two additional variables, funding disruption risk and insolvency risk. Their
justification for including funding disruption as an additional variable is based on the belief that a significant loss of funding forces an organization to reduce or eliminate services (2005, 11). Accordingly, they defined an organization that is experiencing a funding disruption as “one with a 25 percent or greater decline in total revenues during a 12-month period” (11).

2.3.4 Insolvency Risk

The final indicator of financial vulnerability, insolvency risk, derives from the corporate finance approaches of Altman (1968) and Ohlson (1980) and is alternatively referred to in the literature as bankruptcy risk. Insolvency exists when total liabilities are greater than total assets. Once again, relating the effect of this variable to program reductions, Keating et al. (2005) suggest an insolvent organization that is unable to pay its debts would have its abilities to provide services impacted (11). Therefore, to measure insolvency, they developed “an indicator variable that is one when a firm has negative net assets or zero when net assets are zero or positive” (2005, 11).

Table 2.1 shows the four indicators of financial vulnerability and their description from previous nonprofit financial vulnerability studies.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Description</th>
<th>FV Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolvency Risk</td>
<td>Exists when total liabilities are greater than total assets</td>
<td>Altman 1968; Ohlson; 1980; Keating et al. 2005</td>
</tr>
<tr>
<td>Asset Disruption Risk</td>
<td>Change in net assets from previous fiscal year</td>
<td>Trussel 2002; Trussel &amp; Greenlee 2004; Keating et al. 2005</td>
</tr>
<tr>
<td>Funding Disruption Risk</td>
<td>Change in total revenues from previous fiscal year</td>
<td>Keating et al. 2005</td>
</tr>
<tr>
<td>Program Disruption Risk</td>
<td>Change in allocations to program expenditures from previous year</td>
<td>Tuckman &amp; Chang 1991; Greenlee &amp; Trussel 2000; Keating et al. 2005</td>
</tr>
</tbody>
</table>
2.4 Predictors of Financial Vulnerability

Having reviewed the literature regarding the four indicators of nonprofit financial vulnerability that constitute the dependent variable in this dissertation, it is important to review the literature on predictors of nonprofit financial vulnerability. As indicated in Chapter 1, the prediction of nonprofit financial vulnerability, borrowing heavily from the for-profit corporate finance literature, has devolved into an accounting exercise. Though some of the models, most clearly with Keating et al. (2005), achieve good explanatory power it is attained via brute empiricism by combining accounting ratios from several previous studies. The approach in this dissertation is to organize the numerous accounting ratios based on theoretical constructs. The constructs: solvency, profitability, liquidity, and operating margin represent underlying financial measures that are more clearly understood than the multiple accounting ratios employed previously.

Table 2.2 shows the multiple variables employed by Keating et al. (2005) and their regression results on the four proxies of financial vulnerability discussed above (insolvency risk, asset disruption risk, funding disruption risk, and program disruption risk). The table is included as a visual to demonstrate the increasingly common data-driven approach to predicting nonprofit financial vulnerability. This dissertation’s method is to employ a more theory-informed approach to modeling nonprofit financial vulnerability that is also more easily understood and interpreted by individuals without extensive accounting knowledge. While many of the variables in Table 2.2 are used in
### Table 2.2: Keating et al.’s Expanded Model – Discrete Hazard Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Insolvency Risk</th>
<th>Financial Disruption Risk</th>
<th>Funding Disruption Risk</th>
<th>Program Disruption Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.2</td>
<td>-0.42***</td>
<td>-2.09***</td>
<td>-0.88***</td>
</tr>
<tr>
<td>NA/TR Net Assets/Total Revenue</td>
<td>-0.03***</td>
<td>-0.04***</td>
<td>0.00***</td>
<td>0.00</td>
</tr>
<tr>
<td>RCI Revenue Concentration Index</td>
<td>0.50***</td>
<td>0.77***</td>
<td>-0.14***</td>
<td>-0.24***</td>
</tr>
<tr>
<td>NI/TR Net Income/Total Revenue</td>
<td>-0.09***</td>
<td>-0.32***</td>
<td>1.69***</td>
<td>-0.32***</td>
</tr>
<tr>
<td>AE/TR Administrative Expenses/Total Revenue</td>
<td>-0.05**</td>
<td>-0.12</td>
<td>0.48</td>
<td>-0.31***</td>
</tr>
<tr>
<td>WC/TA Working Capital/Total Assets</td>
<td>0.05</td>
<td>0.00</td>
<td>-0.01**</td>
<td>0.00*</td>
</tr>
<tr>
<td>NA/TA Net Assets/Total Assets</td>
<td>-3.98***</td>
<td>0.01*</td>
<td>0.00</td>
<td>-0.00*</td>
</tr>
<tr>
<td>EBIT/TA Earnings before interest &amp; tax/Total Assets</td>
<td>-0.16**</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.04*</td>
</tr>
<tr>
<td>TR/TA Total Revenue/Total Assets</td>
<td>0.00***</td>
<td>0.00</td>
<td>0.00*</td>
<td>0.00</td>
</tr>
<tr>
<td>SIZE In(Total Assets/GDP price index)</td>
<td>-0.45***</td>
<td>-0.33***</td>
<td>-0.00</td>
<td>-0.09***</td>
</tr>
<tr>
<td>CL/CA Current Liabilities/Current Assets</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>NI/TA Net Income/Total Assets</td>
<td>-0.45***</td>
<td>0.04</td>
<td>0.05</td>
<td>0.04*</td>
</tr>
<tr>
<td>FFO/TL Funds from Operations/Total Liabilities</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00***</td>
</tr>
<tr>
<td>INTWO Net Income for the previous FY</td>
<td>2.06***</td>
<td>0.98***</td>
<td>0.73***</td>
<td>0.15***</td>
</tr>
<tr>
<td>NAFail Insolvency Risk</td>
<td>-</td>
<td>1.20***</td>
<td>0.19***</td>
<td>0.10***</td>
</tr>
<tr>
<td>CHIN Scaled Change in Net Income</td>
<td>-1.81***</td>
<td>-1.31***</td>
<td>-1.42***</td>
<td>0.32***</td>
</tr>
<tr>
<td>COMREV/TR Commercial Revenue/Total Revenue</td>
<td>0.34***</td>
<td>-0.03</td>
<td>-1.08***</td>
<td>-0.65***</td>
</tr>
<tr>
<td>INV/TA Investment Portfolio/Total Assets</td>
<td>0.00</td>
<td>0.00***</td>
<td>-0.00***</td>
<td>-0.00***</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>265,374</td>
<td>271,046</td>
<td>271,888</td>
<td>275,621</td>
</tr>
<tr>
<td>Pseudo-R²</td>
<td>0.36</td>
<td>0.19</td>
<td>0.19</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*** (**) [*] significant at the 1% (5%) [10%] level (two-sided test)  
Industry and year included as controls but coefficients not shown
this dissertation, they are organized into fewer constructs. The next three sections explore the theories that focus attention on certain predictors of nonprofit financial vulnerability. With the discussion of each of these theories, several predictor variables are introduced. While many of the variables are multifaceted and could be related to multiple theories, the variables are categorized with the theory to which they are most integral. The first two theories, resource dependence and portfolio theory are commonly cited in the literature on nonprofit financial vulnerability. The third theory, organizational ecology, is added in this dissertation to represent the environmental variables hypothesized to impact financial vulnerability.

2.5 Resource Dependence Theory

Introduced by Pfeffer and Salancik (1978), resource dependence theory explains how an organization’s strategy, structure, and survival depend on the availability of resources and asymmetrical dependency relationships with external institutions (Hodge & Piccolo 2005, 172). According to Pfeffer and Salancik (1978), “the key to organizational survival is the ability to acquire and maintain resources” (2). This task is problematic due to the scarcity of external resources and the uncertainty of environmental conditions (Froelich 1999, 247). According to resource dependence theory, the resource imperative results in organizational adaptation to requirements of external resource providers (1999, 247). The role of managers, though integral in organizational survival, was originally conceived as limited to removing or altering
negative external constraints (Pfeffer & Salancik 1978).

The resource dependence theory that Pfeffer and Salancik (1978) suggest is a deterministic approach yielding very little agency to an organization’s manager. The manager is responsible for responding to external demands and can only act strategically to ensure organizational survival by garnering the social support necessary to engage environmental constraints. In other words, managerial action is not sufficient for organizational survival. If there are onerous external demands threatening the organization, it is only by removing or altering constraints in the environment with considerable social support that the organization can survive.

However, over time resource dependence has developed to model contingencies where managerial action can reduce external constraints through strategic decision-making regarding resource acquisition and maintenance. Pfeffer and Salancik (1978) suggest that the survival strategies employed by for-profit organizations are dependent on the nature and uniqueness of a firm’s resources (Hodge & Piccolo 2005, 172). Froelich (1999) suggests that the degree of dependence in this view is determined by the importance and concentration of its resources. Finally, Gronbjerg (1991) proposes that strategic decisions by nonprofit managers depend on the stability and nature of the organization’s funding (2005, 172).

Therefore, it is important for organizations to explore opportunities associated with financial stability so that variance in revenue, assets, and investments is reduced and the degree of dependence on the external environment is eased. In other words, a
manager can decrease the degree of dependence on external stakeholders by stabilizing the firm’s finances. For a nonprofit manager, knowing whether to focus on profitability, operating margin, solvency, or liquidity to avoid financial vulnerability is paramount to the strategic performance of the organization. In this sense, performance is defined as the demonstrated ability to acquire and maintain the funding necessary for organizational survival (Stone et al. 1999; Kanter & Summers 1987; Yuchtman & Seashore 1967).

Resource dependence theory has served as the basis for several studies of nonprofit survival and performance (Miller-Millesen 2003), but according to Hodge and Piccolo (2005), while numerous studies have explored the relationship between resources and strategy, the results are inconclusive (2005, 172). This is in part due to the broad definition of resources in the literature on strategy development and implementation (2005, 173). Nonprofit studies of organizations in the social service sector have used funding as the primary resource of interest (Hodge & Piccolo 2005; Bigelow & Stone 1995; Grant 1991) and have had greater success. Building on the assumption that managers can strategically address external constraints by improving the nonprofit’s financial position (Hodge & Piccolo 2005; Froelich 1999) and the position that financial sources of support are critical determinants of a nonprofit’s activity (Weisbrod 1998), resource dependence theory provides a suitable framework for this analysis.

Resource dependence suggests that an increase in an organization’s financial
position through the acquisition and maintenance of resources decreases financial vulnerability and decreases the susceptibility of the organization to onerous external demands deriving from an uncertain funding environment. With greater financial stability, managers can make strategic decisions to decrease dependence on external resource providers that require adapting to burdensome requirements. The firm-specific accounting constructs that represent an organization’s financial position are categorized in four separate constructs: solvency, profitability, liquidity, and operating margin. The indicator variables are assigned to each construct consistent with previous literature and are discussed next. They are also condensed in a summary table (Table 2.3) at the end of this chapter.

2.5.1 Solvency

Unlike for-profit organizations, nonprofit organizations are prohibited, due to the nondistribution constraint, from distributing profits to officers of the organization or stakeholders; and any profit accumulation must remain within the nonprofit for use by the organization (Calabrese 2011b, 2; Hansmann 1980). Though net assets represent the annual surplus of total assets less total liabilities (profits in the for-profit sector), in the nonprofit sector “net assets do not represent cash balances of the organization; rather, net assets represent a claim of ownership on assets owned by the organization. Net assets represent those assets reinvested within the NPO rather than used up” (2011b, 3). Further, unlike the for-profit sector, some of this equity can be donor restricted by use or time. So, while nonprofit net assets appear synonymous with
corporate retained earnings, they are not (2011b, 3).

Generally Accepted Accounting Principles (GAAP) require nonprofits to classify total net assets (TNA) into three categories: unrestricted net assets (UNA), temporarily restricted net assets (TRNA), and permanently restricted net assets (PRNA) (Calabrese 2011b, 3; FASB 1993b²). However, with the exception of recent studies on endowments and capital structures (Bowman et al. 2012; Calabrese 2011a; Calabrese 2011b; Bowman 2011a), net assets have been lumped together as a singular category. Unrestricted net assets more closely approximate the actual amount of equity a nonprofit organization may spend in times of financial distress or use as collateral for borrowing (Calabrese 2011a). According to Calabrese (Calabrese 2011b, 5), existing theory suggests that net assets are desirable for long-term financing (labeled solvency here), but also for short-term financing (labeled liquidity here). This is because total net assets represent the nonprofit organization’s equity regardless of donor-imposed restrictions, whereas unrestricted net assets represent the cash balances that can be used by nonprofit managers to reinvest in the organization to overcome short-term financial shocks. A marked improvement over previous financial vulnerability studies is this dissertation’s inclusion of variables that capture both total net assets and unrestricted net assets.

Solvency is measured in nonprofit financial vulnerability literature three ways. Consistent with previous literature, Figure 2.2 shows the indicator variables and their relationship to solvency in this dissertation.
Solvency is the “ability of an organization to remain in business while continuously satisfying all ongoing financial obligations in a timely manner” (Bowman 2011b, 183). As outlined in Chapter 1, solvency in this dissertation refers to the long-term capacity of a nonprofit organization to maintain services. The first two variables are common in accounting-based bankruptcy prediction models to measure solvency, total net assets divided by total revenue (TNA/TR) and total net assets divided by total assets (TNA/TA). Total net assets refer to the difference between total assets and total liabilities. Previous studies (Bowman 2011a; Keating et al. 2005; Tuckman & Chang 1991; Altman 1968) show that as these variables go up, financial vulnerability goes down. The last solvency variable (NASOLV) measures whether total assets are greater than total liabilities. This variable subtracts total liabilities from total assets to assess a firm’s equity and is analogous to Ohlson’s (1980) insolvency risk variable. Insolvency risk was a strong predictor of program disruption risk, asset disruption risk, and funding disruption risk in Keating et al.’s (2005) study.

**Hypothesis 1:** Greater solvency will decrease financial vulnerability.
2.5.2 Profitability

Profitability is commonly measured in nonprofit financial vulnerability literature three ways. Two of the measures are included here. They are displayed in Figure 2.3. For reasons associated with the choice of data and number of years, the third variable is not included. Further explanation follows.

![Figure 2.3: Dimensions of Profitability](image)

Profitability refers to the long-term sustainability of the nonprofit organization by calculating how much the organization makes after accounting for expenses. There are three variables representing profitability common to accounting-based models. First, net income divided by total assets (NI/TA). As the ratio of net income to total assets (return on assets) increases, the likelihood of financial vulnerability increases (Bowman 2011a; Keating et al. 2005; Ohlson 1980). The second variable, NIPROF (analogous to the INTWO variable in Keating et al. 2005), represents the nonprofit organization’s net income – revenues less expenses. The final variable common to accounting-based financial vulnerability models is the scaled change in net income (referred to as CHIN in the literature). In studies by Ohlson (1980) and Keating et al. (2005), NIPROF and CHIN had a negative relationship with financial vulnerability. The first two variables (NI/TA and NIPROF) are included here; the third variable (CHIN) is
not. As with other variables calculating a change from the previous year, CHIN requires every organization to have data for each year. Given the pooled panel nature of the longitudinal data used in this dissertation, it would decimate the sample to limit observations to organizations that have data for each year. Therefore, CHIN is not included here. This is explained further in Chapter 3.

**Hypothesis 2:** Greater profitability will decrease financial vulnerability.

### 2.5.3 Liquidity

Liquidity is commonly measured in nonprofit financial vulnerability literature two ways. Consistent with previous literature, Figure 2.4 shows the indicator variables and their relationship to liquidity in this dissertation.

![Figure 2.4: Dimensions of Liquidity](image)

**Figure 2.4: Dimensions of Liquidity**

Liquidity “consists of cash or financial resources without donor restrictions, which can be efficiently converted into cash quickly” (Bowman 2011b, 179). Operating liquidity is the cash available to continue the organization’s operations in the short-run. In a sense, it is short-term solvency and refers to the resiliency of an organization to sustain financial shocks. There are two variables in this dissertation that assess liquidity, both commonly used indicators in the accounting literature. The first is working capital divided by total assets (WC/TA); working capital refers to the
difference between current assets and both current liabilities and temporarily restricted net assets. The second is months of spending (MS), which is, “the number of months an organization could survive after losing all current income and maintaining its spending on operations at a constant level” (Bowman 2011b, 179). The variable MS incorporates the previously discussed unrestricted net assets (UNA) in the numerator, that way only immediately available funds without donor restriction are considered. Altman (1968) and Keating et al. (2005) found a negative relationship between the ratio of working capital to total assets and financial vulnerability. Likewise, Bowman (2011a) suggests months of spending will have a similar effect.

**Hypothesis 3:** Greater liquidity will decrease financial vulnerability.

### 2.5.4 Operating Margin

Operating margin refers to the efficiency of earnings and represents a nonprofit’s short-term sustainability. Operating margin is commonly measured in nonprofit financial vulnerability literature one way. An additional variable is added at the recommendation of Bowman (2011a). Figure 2.5 shows the two measures of operating margin in this dissertation.

![Figure 2.5: Dimensions of Operating Margin](image)

The commonly used measure for operating margin, net income divided by total
revenue (NI/TR), is used here. Tuckman and Chang (1991) found a negative relationship between NI/TR and financial vulnerability. Markup (MU) is also included as an indicator of operating margin. Markup is “an organization’s annual surplus expressed as a percentage of spending on operations. For ordinary service providers it is the change in months of spending divided by spending on operations” (Bowman 2011b, 179). Markup is used in the business literature where in retailing it is “the difference between revenue and expenses expressed as a percentage of cost per unit sold” (Bowman 2011b, 167). Though new to nonprofit literature, Bowman (2011a) suggests that markup is better for calculations in the nonprofit sector than margin, because margin does not include depreciation. Further, in the business literature margin typically places revenue in the denominator, but dividing by revenue is “problematic because nonprofits have inaccessible revenues such as restricted gifts and endowment returns. Expenses, being unrestricted by definition, raise none of these problems” (2011a, 44). Markup places expenses in the denominator and thereby circumvents the problem associated with margin ratios. Concurrent with Bowman’s premise, it is anticipated that as markup increases, operating margin will increase and financial vulnerability will decrease.

_Hypothesis 4:_ Greater operating margin will decrease financial vulnerability.

### 2.6 Portfolio Theory

Introduced by Markowitz (1952), modern portfolio theory describes the process by which an individual selects an investment portfolio. According to Markowitz (1952),
the process of selecting an investment portfolio involves two primary components, the desire for high returns and the variability associated with the expected returns. Selecting an optimal portfolio that will both maximize expected returns and minimize variance is difficult because higher portfolio returns are typically associated with higher portfolio volatility (Carroll & Stater 2009, 948). The goal of the investor then is to choose the investment option that balances their desire for a high return with their willingness to endure variance in the expected returns. In other words, “an investor must either assume some risk to maximize expected returns or give up some returns to minimize variance” (2009, 948). Ideally, diversification, given the law of large numbers, keeps actual returns close to the amount of anticipated returns (2009, 948; Markowitz 1952). In reality, “diversification has been shown to reduce overall portfolio volatility for a given expected return” (Carroll & Stater 2009, 949; Wilson 1997). Therefore, understanding diversification and investment mix can help financial managers achieve high performing portfolios (Sorensen et al. 2004).

In the nonprofit context, managers seek to “provide a certain level of services (a given level of expected return) while minimizing unpredictable changes in revenue (risk). Like for-profit portfolio managers, nonprofit managers can also choose combinations of risk and return by selecting different streams of financing” (Kingma 1993, 105). By selecting revenues that reduce volatility, the nonprofit firm is also reducing risk exposure. Revenue diversification can potentially minimize the volatility of portfolios managed by nonprofit organizations and is a prudent revenue generation...
strategy (Carroll & Stater 2009, 949; Frumkin & Keating 2003; Froelich 1999; Jegers 1997; Chang & Tuckman 1996; Kingma 1993). Therefore, “when designing a portfolio comprising charitable donations from individuals and corporations, grants, contracts for service, and sales of goods and services,” nonprofits should consider the adequacy and potential instability of each revenue source (Carroll & Stater 2009, 949; Gronbjerg 1993; Kingma 1993).

In resource dependence theory, nonprofit organizations are subject to their environment and external stakeholders. The challenge then is for nonprofit managers to marshal their resources to maximize their financial position in order to reduce their dependence on the environment for organizational survival. Portfolio theory extends this reasoning by assuming that managers can increase the organization’s equity and achieve financial stability through decision-making that reduces volatility in the revenue portfolio (Carroll & Stater 2009, 948; Tuckman & Chang 1991).

2.6.1 Revenue Stream

Revenue streams do not reduce the likelihood of financial volatility equally. Nonprofits relying primarily on contributions will experience more volatility (Carroll & Stater 2009) and more financial distress (Frumkin & Keating 2003). Carroll and Stater (2009) found that donative nonprofits (receiving greater than 50% of their funding from donations) experience over time an average volatility in their revenue structures that is 2.75% greater than commercial nonprofits (959). Further, a nonprofit firm is less likely to experience financial vulnerability if it relies more heavily on commercial
revenues rather than donative revenues since “contributions are non-recurring and sensitive to changes in economic and political conditions” (Carroll & Stater 2009; Keating et al. 2005, 20; Froelich 1999).

Following Keating et al. (2005), an independent variable (COMREV) is included that measures commercial revenue as a ratio of total revenue. Keating et al. (2005) found that as this ratio goes up, funding disruption risk and program disruption risk go down. Another variable related to revenue stream and portfolio theory is revenue diversification (RDI). Organizations with few revenue sources are expected to be more vulnerable to financial shocks than those with multiple revenue sources. Diversification of revenue sources is consistently associated with lower financial vulnerability in nonprofit organizations (Keating et al. 2005; Frumkin & Keating 2003; Greenlee 2002; Hager 2001; Greenlee & Trussel 2000; Froelich 1999; Chang & Tuckman 1996; Gronbjerg 1993; Tuckman & Chang 1991), less revenue volatility (Carroll & Stater 2009), and is linked to financial health (Chang & Tuckman 1996; Tuckman & Chang 1991), decreases in the likelihood of closure in arts organizations (Hager 2001), decreases in the likelihood that a nonprofit will cut program expenditures (Greenlee 2002; Greenlee & Trussel 2000), and decreased risk of insolvency (Keating et al. 2005). Consistent with previous financial management research on nonprofits (Carroll & Stater 2009, Keating et al. 2005; Frumkin & Keating 2003; Trussel et al. 2002; Trussel 2002; Hager 2001; Greenlee & Trussell 2000; Tuckman & Chang 1991) and governments (Carroll 2005; Hendrick 2002; Suyderhoud 1994) a Hirschman-
Herfindahl Index (HHI) is used to measure a revenue diversification index (RDI). The HHI provides a score that reflects the balance of an organization’s revenue across categories. It is expected that an increase in RDI (i.e., an increase in revenue diversification) will lead to a decrease in financial vulnerability.

**Hypothesis 5:** A greater ratio of commercial revenue to total revenue will decrease financial vulnerability.

**Hypothesis 6:** Greater revenue diversification will decrease financial vulnerability.

### 2.7 Organizational Ecology

Organizational ecology literature seeks to explain organizational rates of birth, growth, and mortality in a given environment. Emerging from concepts associated with Darwinian selection, this theory argues that social, economic, and political conditions affect the relative abundance and diversity of organizations and account for their changing composition over time (Hannan & Freeman 1977). In other words, an organization survives to the extent it has an optimal fit with the environment; otherwise it is selected out (i.e., fails or dies).

While organizational ecology is traditionally viewed as a deterministic theory that downplays the agency of organizational actors, it does leave room for adaptation. According to Baum and Amburgey (2000), variations in the population result from human behavior that either intentionally or blindly tries to adapt to the environment to ensure organizational survival (2). While Hannan & Freeman (1984) acknowledge
adaptation, they state that, "in a world of high uncertainty, adaptive efforts... turn out to be essentially random with respect to future value" (150). This view reinforces the notion that organizational actors are impotent. However, the view that organizations are powerless to resist environmental forces is a common misconception and presupposes that a low probabilism of survival is the same as having no voluntarism (Baum & Amburgey 2000, 3).

According to organizational ecology, individuals are not constrained by the environment into passivity; rather, the problem lies in the identification and implementation of a successful survival strategy by organizational actors. “Under conditions of uncertainty and ambiguity... there are severe constraints on the ability of boundedly rational individuals to consistently conceive and implement changes that improve organizational success and survival chances in the face of competition” (Baum & Amburgey 2000, 3). In other words, individuals do matter, but managers must identify a successful adaptation strategy, then overcome uncertainty and ambiguity in the environment as well as internal constraints to implement change.

According to the notion of adaptation in organizational ecology, an organization must overcome structural inertia, an organizational tendency to maintain its internal structure regardless of environmental factors, and external inertia, public legitimization of organizational activity, to survive (Hannan & Freeman 1977). Additional concepts integral to organizational ecology are niche width, density, legitimacy, and competition. Each will be discussed briefly as they relate to this dissertation.
Niche width theory (Peters and Hogwood 1991; Hannan & Freeman 1977), suggests that populations of organizations occupy the same niche to the extent that they depend on identical environmental resources. A niche is the confluence of resources and support that may permit an organization to survive and flourish. Niche width is “the population’s tolerance for changing availability of resources, its ability to resist outside competitors, and policy responses to other external factors that might inhibit its growth” (1991). It follows then that if two populations of organizations occupy the same niche while differing in some organizational characteristic, the population with less fit in the environment will be selected out.

According to Carroll and Hannan (1989), density in the environment affects organizational founding and mortality rates given the concepts of legitimacy and competition. “At low density, the density dependence model predicts that the legitimization process will dominate to increase organizational founding rates and decrease mortality rates” (1989, 524). At high levels of density, competition will dominate, leading to low founding rates and high mortality rates (1989, 524).

Organizational legitimacy in the environment makes it easier to acquire resources and leads to a decrease in mortality rates. Therefore, if competition is high, legitimacy and adaptation are important to organizational survival, because given fewer available resources, founding rates drop and mortality rates increase.
2.7.1 Environmental Variables

Consistent with organizational ecology, there are several pertinent environmental variables that potentially drive nonprofit financial vulnerability. Environmental variables as determinants of nonprofit financial vulnerability have not been the subject of much empirical study. Keating et al. (2005) used industry and time dummies to model the baseline hazard rate for bankruptcies and impounded macroeconomic factors in the control variables for year (the justification for which was the relative decline in economic factors during 2000 compared to the prosperity of 1998 and 1999), but given the small sample period the findings were inconclusive. Keating et al. (2005) refer to the use of macroeconomic factors as controls, but fail to clearly operationalize the variables or report their effects. This dissertation will make those connections more evident.

In their study of revenue volatility, Carroll and Stater (2009) created a variable (urbanicity) that reflected whether a nonprofit was in an urban area. They found that organizations within urban areas had lower revenue volatility. They explained their findings by suggesting that organizations in urban areas have higher levels of demand (greater market for their service) and greater access to funding opportunities (2009, 956). By looking at variables that measure density (Market_Sat) and carrying capacity (Med_House_Inc), their assumptions are tested more clearly here.

Figure 2.6 shows the relationship of median household income, which captures carrying capacity, to nonprofit financial vulnerability. There are hypothesized direct
effects on financial vulnerability and indirect effects through organizational variables.

**Figure 2.6: Median Household Income**

*Hypothesis 7:* Greater median household income will decrease financial vulnerability.

*Hypothesis 8:* Greater median household income will increase solvency.

*Hypothesis 9:* Greater median household income will increase profitability.

*Hypothesis 10:* Greater median household income will increase liquidity.

*Hypothesis 11:* Greater median household income will increase operating margin.

Organizational ecology states that environmental factors influence organizational survival. Therefore, it is expected that increases in density and competition increase vulnerability. Consistent with this premise, LeRoux and Wright (2010) found that strategic decision making in nonprofit organizations had a significant negative relationship to competition. They measured competition as the number of nonprofits in the metro area with the same National Taxonomy of Exempt Entities (NTEE) code as the respondent organization in their survey (2010, 579). They concluded that “nonprofits embedded in highly competitive environments may devote
most of their administrative energies to more pressing activities such as day-to-day service delivery, at the expense of other fundamental tasks such as planning and decision making” (2010, 584). This suggests that nonprofits in highly competitive environments have less opportunity to adapt to the environment or make strategic financial decisions, and thus are more susceptible to financial vulnerability. This premise is tested here with the inclusion of a variable that measures regional saturation by NTEE code (Market_Sat) and a regional revenue share variable (Rev_Share_Reg).

Figures 2.7 and 2.8 show the effect of saturation and regional revenue share, which capture elements of density, competition, and niche width on financial vulnerability. As with median household income, these environmental variables are expected to have direct effects on financial vulnerability and indirect effects through several organizational predictors.

![Figure 2.7: Saturation](image)

**Hypothesis 12:** Greater saturation will increase financial vulnerability.

**Hypothesis 13:** Greater saturation will decrease solvency.

**Hypothesis 14:** Greater saturation will decrease profitability.

**Hypothesis 15:** Greater saturation will decrease liquidity.
**Hypothesis 16:** Greater saturation will decrease operating margin.

**Figure 2.8: Regional Revenue Share**

**Hypothesis 17:** Greater regional revenue share will decrease financial vulnerability.

**Hypothesis 18:** Greater regional revenue share will increase solvency.

**Hypothesis 19:** Greater regional revenue share will increase profitability.

**Hypothesis 20:** Greater regional revenue share will increase liquidity.

**Hypothesis 21:** Greater regional revenue share will increase operating margin.

Greenlee and Tuckman (2007) suggest the value of nonprofit firms can be altered by developments in the larger society (321). Keating et al. (2005) take it a step further and suggest incorporating macroeconomic variables such as gross domestic product and state product in studies of nonprofit financial vulnerability. Therefore, gross domestic product (GDP) and state product (SP) are included here as environmental predictors. As with previous figures, Figures 2.9 and 2.10 show the effects of gross domestic product and state product on organizational variables as well as the dependent variable. GDP and SP are expected to have direct and indirect effects on financial vulnerability.
Figure 2.9: Gross Domestic Product

**Hypothesis 22:** Greater gross domestic product will decrease financial vulnerability.

**Hypothesis 23:** Greater gross domestic product will increase solvency.

**Hypothesis 24:** Greater gross domestic product will increase profitability.

**Hypothesis 25:** Greater gross domestic product will increase liquidity.

**Hypothesis 26:** Greater gross domestic product will increase operating margin.

Figure 2.10: State Product

**Hypothesis 27:** Greater state product will decrease financial vulnerability.

**Hypothesis 28:** Greater state product will increase solvency.

**Hypothesis 29:** Greater state product will increase profitability.

**Hypothesis 30:** Greater state product will increase liquidity.

**Hypothesis 31:** Greater state product will increase operating margin.
### 2.8 Control Variables Impacting Financial Vulnerability

Control variables are variables that can have antecedent effects on both the independent variable and the dependent variable or intervening effects between the independent variable and dependent variable. This dissertation identifies four control variables discussed in the literature on nonprofit financial vulnerability. The control variables are a mix of organizational and environmental factors.

The three organization level control variables are size, investment portfolio, and endowment; all are commonly cited predictors of financial health. These variables speak to the legitimacy, size, and slack resources of the organization to resist external constraints. Introduced in nonprofit financial vulnerability studies by Trussel et al. (2002), size (SIZE) measured as the natural log of total assets, has consistently been used in subsequent studies (Hodge & Piccolo 2005; Keating et al. 2005; Trussel 2002). The organization's investment sufficiency (INVEST) measured as the ratio of investment portfolio to total assets (Keating et al. 2005, Bowman 2002), is expected to reduce financial vulnerability. Lastly, endowment sufficiency (ENDOW) is expected to reduce financial vulnerability by increasing financial slack to overcome short-run financial shocks (Bowman et al. 2012).

Following Carroll and Stater (2009), subsector (determined by NTEE code) and inflation are included as controls. Inflation is controlled by placing all data in 2003 dollar values and the variable subsector (SUBSECTOR) is included in the structural equation model.
2.9 Conclusion

Organizational ecology and resource dependence theories emphasize environmental conditions as a determinant of organizational action, however the theories do afford managerial control and organizational adaptation given certain factors such as financial stability and legitimacy. The view is that given built-up organizational legitimacy and greater financial slack, the risk of vulnerability declines. When combined with portfolio theory, it presents a picture that balances firm-specific variables under the nonprofit manager's control with the macroeconomic factors beyond the control of the organization in the environment. With organizational ecology, resource dependence, and portfolio theories as the basis for this dissertation, I will explore the effect of several organizational variables and several environmental variables that over time impact nonprofit financial vulnerability.

2.9.1 Summary of Research Hypotheses

*Hypothesis 1:* Greater solvency will decrease financial vulnerability.

*Hypothesis 2:* Greater profitability will decrease financial vulnerability.

*Hypothesis 3:* Greater liquidity will decrease financial vulnerability.

*Hypothesis 4:* Greater operating margin will decrease financial vulnerability.

*Hypothesis 5:* A greater ratio of commercial revenue to total revenue will decrease financial vulnerability.

*Hypothesis 6:* Greater revenue diversification will decrease financial vulnerability.
**Hypothesis 7:** Greater median household income will decrease financial vulnerability.

**Hypothesis 8:** Greater median household income will increase solvency.

**Hypothesis 9:** Greater median household income will increase profitability.

**Hypothesis 10:** Greater median household income will increase liquidity.

**Hypothesis 11:** Greater median household income will increase operating margin.

**Hypothesis 12:** Greater saturation will increase financial vulnerability.

**Hypothesis 13:** Greater saturation will decrease solvency.

**Hypothesis 14:** Greater saturation will decrease profitability.

**Hypothesis 15:** Greater saturation will decrease liquidity.

**Hypothesis 16:** Greater saturation will decrease operating margin.

**Hypothesis 17:** Greater regional revenue share will decrease financial vulnerability.

**Hypothesis 18:** Greater regional revenue share will increase solvency.

**Hypothesis 19:** Greater regional revenue share will increase profitability.

**Hypothesis 20:** Greater regional revenue share will increase liquidity.

**Hypothesis 21:** Greater regional revenue share will increase operating margin.

**Hypothesis 22:** Greater gross domestic product will decrease financial vulnerability.

**Hypothesis 23:** Greater gross domestic product will increase solvency.
**Hypothesis 24:** Greater gross domestic product will increase profitability.

**Hypothesis 25:** Greater gross domestic product will increase liquidity.

**Hypothesis 26:** Greater gross domestic product will increase operating margin.

**Hypothesis 27:** Greater state product will decrease financial vulnerability.

**Hypothesis 28:** Greater state product will increase solvency.

**Hypothesis 29:** Greater state product will increase profitability.

**Hypothesis 30:** Greater state product will increase liquidity.

**Hypothesis 31:** Greater state product will increase operating margin.

### 2.9.2 Preview of Chapter 3

Chapter 2 provides a review of the literature and identifies several areas for potential improvement on previous nonprofit financial vulnerability studies. Chapter 3 explicitly addresses those gaps starting with a discussion of data and the decision to perform a longitudinal analysis with financial vulnerability measured as a continuous dependent variable. Next, the method of analysis, structural equation modeling is discussed and the case is made as to why this method is preferred to previously employed methods in nonprofit financial vulnerability literature. Then, the four accounting constructs – solvency, profitability, liquidity, and markup – that represent a simplified approach to the analysis of financial vulnerability are operationalized. Following the accounting constructs, other commonly used organizational predictors as well as the proposed environmental variables are operationalized. Finally, the chapter concludes with the planned steps to the data analysis.
<table>
<thead>
<tr>
<th>Theory</th>
<th>Variable</th>
<th>FV Studies</th>
<th>Hypothesis</th>
<th>Predicted Sign on FV</th>
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<tr>
<td></td>
<td></td>
<td>[NASOLV Ohlson 1980; Keating et al. 2005]</td>
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<td></td>
<td></td>
<td>[NIPROF Ohlson 1980; Keating et al. 2005]</td>
<td></td>
<td></td>
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<tr>
<td>Liquidity</td>
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<td></td>
<td>[MS Bowman 2011a]</td>
<td></td>
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<tr>
<td>Operating Margin</td>
<td></td>
<td>[NI/TR Tuckman &amp; Chang 1991]</td>
<td>H4</td>
<td>-</td>
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<tr>
<td></td>
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<td>[MU Bowman 2011a]</td>
<td></td>
<td></td>
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<tr>
<td>Portfolio</td>
<td></td>
<td>[COMREV Frumkin &amp; Keating 2003; Keating et al. 2005]</td>
<td>H5</td>
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<td></td>
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<td>[Rev_Share_Reg]</td>
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<td>[GDP Keating et al. 2005]</td>
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<td></td>
<td></td>
<td>[ENDOW Bowman et al. 2012]</td>
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CHAPTER 3: DATA, VARIABLES, AND METHODOLOGY

3.1 Introduction

There are three notable divergences from previous research in this dissertation. First, is testing a conceptually clearer approach to accounting-based research on nonprofit financial vulnerability. Nonprofit studies, as reviewed in Chapter 2, have consistently used similar methods of analysis to predict financial vulnerability. The approach here is to organize accounting ratios into fewer latent constructs and to test their effect on financial vulnerability using structural equation modeling. The accounting constructs – solvency, profitability, liquidity, and operating margin – are commonly used to categorize accounting ratios in the literature, but are yet to be empirically tested using nonprofit data.

The second divergence is conducting a longitudinal analysis and exploring nonprofit financial vulnerability as a continuous dependent variable. Previous studies have modeled financial vulnerability as a dichotomous variable using one year of predictive data. Looking at multiple years of data increases the generalizability of the findings and allows for the analysis of changes over time. By making the dependent variable continuous the relationship between the variables is explored without constraint.

The notion that environmental variables can affect nonprofit financial health (Greenlee & Tuckman 2007), nonprofit financial vulnerability (Keating et al. 2005), and nonprofit revenue volatility (Carroll & Stater 2009) is discussed, but tested sparingly.
The third divergence is the integration of multiple environmental variables to test niche width, competition, and density as they relate to nonprofit financial vulnerability.

3.2 Data Sources

Data for this study were compiled from a variety of sources including the National Center for Charitable Statistics, the Census Bureau, the Bureau of Economic Analysis, and the Consumer Price Index.

3.2.1 IRS Form 990 and NCCS

IRS Form 990 is a tax return that must be filed by all tax-exempt organizations annually with two notable exceptions: congregations and nonprofits with annual gross receipts of less than $25,000\(^3\). Though, starting in 2007, organizations meeting the minimum total revenue exemption are required to file form 990-N, an information postcard; failure to do so for three consecutive years can result in the loss of tax-exempt status. Nonprofits with earnings below specific thresholds may file Form 990-EZ, a shorter and simplified version of the longer Form 990, and private foundations are required to file Form 990-PF.

The National Center for Charitable Statistics (NCCS) is a program of the Center for Nonprofits and Philanthropy at the Urban Institute – a nonprofit educational and research organization. They maintain several data files, among them the Core data, the Statistics of Income data, and the NCCS-GuideStar National Nonprofit Research Database (digitized data). The Core data maintains IRS Form 990 information for each filing nonprofit and is released twice annually, with one list containing 501(c)(3)
organizations and the second file containing all others. The Statistics of Income (SOI) data includes years 1985 to 2005 for nonprofit organizations with assets greater than $10 million and a random sample of smaller charities. While the SOI data is carefully screened for data errors and contains significantly more financial data than the Core data files, it is heavily biased toward large nonprofit organizations and is not representative of the nonprofit landscape. This is an especially acute concern considering that estimates suggest that roughly only 30% of nonprofits meet the minimum revenue threshold of $25,000 for filing (Froelich et al. 2000), a potential source of nonresponse error. Lastly, the digitized data includes all numbered items from form 990 and 990-EZ for all filing 501(c)(3) organizations. While not subject to the same error checking procedures as the SOI files, the digitized data are verified by the NCCS (Calabrese 2011a) and includes digitized information scanned from all Form 990s received by the IRS for years 1998 to 2003. The digitized data are the standard for financial research on nonprofit organizations and as such will be used in this dissertation.

Research using 990 data is increasingly commonplace over the past two decades and the NCCS data files are used for the analysis of hundreds of thousands of nonprofit organizations. In a study of financial measures in nonprofit research, Froelich et al. (2000) compared IRS 990 data with audited financial statement data and concluded that 990 data are an adequate and reliable source of financial information. Further, NCCS data are the basis upon which most studies have been conducted relating to
financial variables such as capital structures (Calabrese 2011a) and endowments (Bowman 2002; Bowman et al. 2012) and are the sole source of data in studies regarding financial vulnerability (Calabrese 2011b; Carroll & Stater 2009; Keating et al. 2005; Hodge & Piccolo 2005; Trussel 2002; Trussel et al. 2002; Hager 2001; Greenlee & Trussel 2000; Tuckman & Chang 1991).

Though 990 data are considered the gold standard, there are several documented weaknesses. First, as noted above, estimates suggest as few as 30% of nonprofit organizations meet the minimum revenue threshold of $25,000 to file. This means the data is potentially biased toward larger organizations. Though, it is worth noting that organizations earning less than $25,000, not legally compelled to file a tax return, often do so. Of the 1,388,480 observations in the digitized data, 72,615 are from organizations earning less than $25,000 in total revenue for the fiscal year. It is conceivable that nonprofit organizations exempted from filing, chose to file to increase financial transparency and maintain legitimacy in the community in order to preserve or increase funding and volunteer hours.

Second, while there are no sound estimates regarding the error rate of 990 data files, anecdotally, several shortcomings have been identified. Some of the most commonly cited concerns are the completeness and accuracy of 990 information (Abramson 1995; Orend et al. 1997; Skelly & Steurele 1992). Inaccuracies have been attributed to several causes including unclear guidelines for IRS 990 entry calculations (Gorman & Tanenbaum 1993), preparation of the return by outside accountants with
limited knowledge of the organization and its activities, and in-house preparation of the return by nonprofit employees with insufficient accounting knowledge (Froelich & Knoepfle 1996). Variables such as total revenue, gross profit from sales, total program expenses, total salaries and wages, and revenue categories including government funding and program fees have been prone to inaccuracies (Froelich & Knoepfle 1996; Tuckman & Chang 1991; Hodgkinson et al. 1993). Many of these suggested weaknesses are addressed in the data cleaning section later in this chapter.

The digitized data from NCCS contain six years of 990 data (1998-2003) for all filing 501(c)(3) organizations. The result is data for 1,388,480 cases across hundreds of variables. Given the volume of data, multiple digitized data files are needed. Variables for this study are merged from 4 such files (DD Revenue and Expenses, DD Master Header, DD Balance Sheet, and DD Functional Expenses). Details regarding which variables were culled from each digitized data file can be found in Appendix A.

3.2.2 Additional Data Sources

The majority of the data are from NCCS's digitized data files. However, additional supplementary data are used. Data on gross domestic product and state product for years 1998 to 2003 are from the Bureau of Economic Analysis – a bureau of the U.S. Department of Commerce. Median household income and population figures for years 1998 to 2003 are from the Census Bureau – also a bureau of the U.S. Department of Commerce. Lastly, following Carroll and Stater (2009), information regarding inflation is from the Consumer Price Index – a program run by the U.S. Department of Labor's
Bureau of Labor Statistics. This information is used to put the data into 2003 dollars.

### 3.3 Data Cleaning

The digitized data files were cleaned to reduce measurement error and to overcome concerns regarding the accuracy of financial variables gleaned from 990 data. The procedure followed the recommendations of Bowman et al. (2012) and Calabrese (2011a). According to Bowman et al. (2012), researchers should consider six issues before using the digitized data; all six recommendations were followed and are listed next. First, limiting the data to public charities and excluding the less than 1% of organizations that fall into other tax categories or are of unknown type. Second, removing group returns, which account for approximately 0.2% of the dataset, because they increase the number of outliers. Consistent with Bowman et al. (2012), the cases of unknown type (26.5%) are classified as individual returns to avoid decimating the sample.

Third, using the cases that file the long form 990 and excluding those that file the short form (990-EZ). IRS Form 990-EZ does not have the level of detail in the financial variables necessary for this study and produces missing value fields in the digitized data. Fourth, excluding cases that fail to use accrual accounting. Generally Accepted Accounting Principles require accrual accounting, and data from 990s that use cash accounting are not comparable (Bowman et al. 2012, 12). Further, one could argue that organizations that fail to use accrual accounting lack sufficient accounting knowledge and are more prone to making errors in preparing their tax returns.
Fifth, excluding cases that fail to abide by the Statements of Financial Accounting Standards (SFAS) that govern nonprofits. The Financial Accounting Standards Board (FASB) establishes standards of accounting that govern the preparation of financial statements. SFAS 116 and SFAS 117 define donor restrictions as being either permanent or temporary and require reporting based on this classification (FASB 1993a; FASB 1993b). Variables in this dissertation require a clear distinction between unrestricted net assets and assets restricted by time or purpose. A box on Form 990 provides organizations the opportunity to signal compliance with SFAS 117. However, Bowman et al. (2012) speculate that many preparers may overlook the box so they suggest “adding retained earnings, paid-in or capital surplus, and capital stock (which charities should not have) and excluding organizations reporting a nonzero sum” (12-13). The recommendation was followed here.

Lastly, Bowman et al. (2012) recommend excluding inactive organizations, shell organizations that own property without doing something with it (13). Therefore, organizations with total expenses greater than the sum of depreciation and interest paid and organizations with zero or negative assets were removed. Table 3.1 shows the proportion of the sample meeting the conditions for selection. Sample size (N) represents the number of cases that meet the listed condition. The percent N represents of the original sample is also listed.

In addition to the six steps listed above, four more data cleaning procedures were undertaken here. Consistent with Calabrese (2011a), cases with obvious data
Table 3.1: Proportion of Sample Meeting Conditions for Selection

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<tr>
<th>Sample Selection</th>
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<tr>
<td>Public Charity</td>
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<td>Accrual Accounting</td>
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<tr>
<td>SFAS 117</td>
<td>1,084,112</td>
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</tr>
<tr>
<td>Active: Total Assets &gt; 0</td>
<td>1,332,137</td>
<td>95.9</td>
</tr>
<tr>
<td>No obvious data errors (negative liabilities, negative expenses, no program expenses)</td>
<td>1,055,538</td>
<td>76.0</td>
</tr>
<tr>
<td>FIPS Code</td>
<td>1,383,598</td>
<td>99.6</td>
</tr>
<tr>
<td>U.S. States and District of Columbia</td>
<td>1,387,288</td>
<td>99.9</td>
</tr>
<tr>
<td>All</td>
<td>549,686</td>
<td>39.6</td>
</tr>
</tbody>
</table>

errors (negative liabilities, negative expenses, and no program expenses) were excluded. Furthermore, cases that failed to report a Federal Information Processing Standard (FIPS) code and cases from outlying territories (Aruba, Puerto Rico, Guam, Mariana Islands, Palau, and Virgin Islands) were removed. Lastly, after all data were merged and cleaned, inflation was controlled using information from the Consumer Price Index to place all values in 2003 dollars. Table 3.2 shows the process followed here to arrive at the final sample. Starting with the total sample at the top, each condition and the number of non-conforming cases lost is listed in the order of the procedure, resulting in a final sample of 549,686 observations.

Table 3.2: Data Cleaning – Process of Dropping Non-Conforming Cases

<table>
<thead>
<tr>
<th>Sample Selection</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample Size</td>
<td>1,388,480</td>
</tr>
<tr>
<td>Less: All organizations other than public charities</td>
<td>12,343</td>
</tr>
<tr>
<td>Less: All organizations that file group returns</td>
<td>2,880</td>
</tr>
<tr>
<td>Less: All organizations filing Form 990-EZ</td>
<td>282,113</td>
</tr>
<tr>
<td>Less: All organizations not using accrual accounting</td>
<td>437,751</td>
</tr>
<tr>
<td>Less: All organizations not compliant with SFAS 117</td>
<td>79,559</td>
</tr>
</tbody>
</table>
3.4 Nonprofit Financial Vulnerability – Methods of Analysis

The current analysis departs from preceding literature on nonprofit financial vulnerability with regard to the operationalization of the dependent variable. The goal of most nonprofit financial vulnerability research is to identify and attempt to predict the occurrence of organizational bankruptcies. Market-based bankruptcy prediction models deriving from Black and Scholes (1973), and Merton (1974) are explored in the for-profit sector; but as discussed in Chapter 2, the inability to formulate a market value for nonprofit organizations suggests a market-based approach is not viable in the nonprofit sector.

Accounting models from the corporate finance literature (Altman 1968; Ohlson 1980) were adapted and transferred to the nonprofit sector in hopes they would perform the same function in nonprofit research. However, unlike their for-profit counterparts, nonprofits cannot be forced by creditors to liquidate or file bankruptcy (11 U.S.C.A § 303(a); Simon et al. 2006, 269) so these models, while conceptually useful, have not been able to predict bankruptcy for individual organizations. Part of the inherent design flaw in adapting these models to the nonprofit sector is that
bankruptcies cannot be measured (see Chapter 2, page 17). Since nonprofits cannot be forced into bankruptcy, there is no satisfactory list that correctly identifies bankrupt nonprofits (see Chapter 2, page 18).

Consequently, nonprofit researchers created a proxy for bankruptcy, financial vulnerability, and suggested that a significant drop in revenue, assets, or program expenditures theoretically correlate with the likelihood of bankruptcy (Keating et al. 2005). Given this assumption, the dependent variable of financial vulnerability is measured discretely as though it were bankruptcy. In other words, if a nonprofit organization has a 25% or more reduction in allocations to program expenditures then the organization is financially vulnerable and coded 1, otherwise they are not considered financially vulnerable and coded 0. While the use of financial vulnerability as a proxy for bankruptcy in nonprofit financial research is theoretically intuitive, the cutoff of 25% in measuring significant reductions in revenues, assets, and program expenditures is arbitrary. Further, predicting financial vulnerability using logistic regression (as though they were actually predicting bankruptcy) needlessly dichotomizes a continuous variable, which can result in the loss of valuable information and attenuated correlation. This may be why Keating et al. (2005) warned that “while the existing prediction models provide insights into some indicators of future financial vulnerability, they are not very effective in distinguishing the particular firms that will experience distress” (22).

Therefore, this dissertation proposes removing the methodological constraint of
dichotomizing financial vulnerability and instead measures financial vulnerability continuously. Instead of treating an organization with a 24% reduction in program expenditures the same as organizations with an increase in program expenditure, or conversely treating a nonprofit with a 25% reduction in revenues the same as a nonprofit with a 75% reduction in revenues, as previous research has done, this approach will capture greater variance and thus yield greater clarity into how the accounting constructs relate to financial vulnerability. Only then, with a clear understanding of this relationship can future researchers, hopefully with access to more accurate bankruptcy lists, make predictions; something Keating et al. (2005) discourage researchers and practitioners from doing given current models.

For-profit bankruptcy prediction studies have traditionally used methodology that accommodates a dichotomous dependent variable (Hilleges et al. 2004; Shumway 2001; Ohlson 1980; Altman 1968). Since nonprofit financial vulnerability has its roots in for-profit bankruptcy studies, these studies have also used methods of analysis that incorporate a dichotomous dependent variable. In other words, nonprofit financial vulnerability literature has attempted to predict if an organization either is or is not financially vulnerable. Given the reconceptualization of the dependent variable as a continuous variable, it logically follows that an alternate statistical approach (one that does not constrain the data) is warranted. Multigroup structural equation modeling has not been tested in this arena, but affords several advantages over the most commonly performed methods (logistic and hazard rate regression models). The next subsection
briefly reviews logistic and hazard rate regression modeling in nonprofit financial vulnerability. The following subsection discusses factor analysis followed by a subsection on multigroup structural equation modeling (SEM) and a figure (Figure 3.1) of the testable model proposed in this dissertation.

3.4.1 Logistic and Hazard Rate Regression

The most common approach to modeling nonprofit financial vulnerability is a logistic regression model. In the single-period logit approach, researchers identify financially vulnerable nonprofits (for instance organizations with a 20% decline in program expenses from 2000-2002) then look at the numbers from the preceding fiscal year (1999) to see if the regression model could have correctly predicted the probability of financial distress (Trussel 2002; Hager 2001; Greenlee & Trussel 2000).

More recently, discrete hazard rate regression models are the preferred methodology. Deriving from the for-profit finance literature (Hillegeist et al. 2004; Shumway 2001), this approach models a time-varying variable that captures the underlying baseline hazard rate. In this approach, there can be multiple observations for each firm (unlike the single-period logit approach). Keating et al. (2005) suggest a discrete hazard rate model improves on the logit approach by modeling predictors that yield time to bankruptcy and by including a baseline hazard rate. A baseline hazard rate “addresses the issue of dependence arising from a fluctuating systematic hazard rate” (10). Shumway (2001) used the natural log of firm trading age and Hillegeist et al. (2004) used the bankruptcy rate over the previous 12 months as baseline hazard rates.
However, as established in Chapter 2, an accurate hazard rate of nonprofit bankruptcies is not available, nor is there a nonprofit analog to firm trading age. While Keating et al. (2005) suggest one of the two main advantages to using discrete hazard rate regression is the specification of a baseline hazard, due to insufficient data, they model the baseline hazard in the nonprofit sector by using industry and time dummies. These dummy variables could have been included in a single-period logit approach as control variables. Consequently the main benefit to using hazard rate regression modeling is its ability to capture multiple years for each firm, which can also be done in other statistical methods of analysis. Further, by reducing the amount of variance in the observations by constraining them into two groups (financially vulnerable and not financially vulnerable), logistic and hazard rate regression models have lost valuable information.

3.4.2 Factor Analysis

Factor analysis is a non-dependent procedure that reveals the underlying latent structure of a set of variables (Garson 2012a) by accounting for the covariance among them. The underlying latent structure is assumed to influence the set of observed variables. The relationship between the set of observed variables and the unobserved latent construct can be tested through exploratory factor analysis (EFA) or confirmatory factor analysis (CFA). Multigroup SEM, the proposed methodology for this study, utilizes CFA. In SEM, the researcher imposes restrictions on the model by suggesting constructs and drawing causal arrows on the basis of theory in an effort to
test specific hypotheses. EFA on the other hand is an atheoretical data-driven approach that looks for patterns in the data and proposes latent constructs on the basis of factor loadings.

The accounting constructs in this dissertation (solvency, profitability, liquidity, and operating margin) have been suggested as organizing frameworks in previous studies of nonprofit financial vulnerability but never explicitly studied as constructs. As such, before proceeding to SEM, the first step will be to uncover the basic underlying latent structures of the independent variables with EFA. In other words, since this is the first attempt to test for the underlying latent structure of commonly used accounting ratios to model nonprofit financial vulnerability, an intermediate step is prudent. Once the EFA is complete, and assuming the factor loadings align closely with the proposed accounting constructs in this study, the next step will be to test the model using SEM.

3.4.3 Multigroup Structural Equation Modeling

“A regression model consists solely of observed variables where a single dependent observed variable is predicted or explained by one or more independent observed variables” (Schumacker & Lomax 2010, 4). In contrast, a path model in structural equation modeling (SEM) is also specified entirely with observed variables, but allows for assessing the fit of a model with multiple independent observed variables and multiple dependent observed variables. Whereas Keating et al. (2005) performed four separate discrete hazard rate regression models (one for each dependent variable), this approach has the flexibility to accommodate all four dependents simultaneously.
Structural equation models consist of observed variables and latent variables, whether independent or dependent; latent variables are measured, defined, or inferred by multiple observed or measured indicator variables (Schumacker & Lomax 2010, 4). There are several advantages to using SEM for the study of nonprofit financial vulnerability including more flexible assumptions; specifically with regards to interpretation given multicollinearity, reduced measurement error, the ability to test models with multiple dependents, the ability to model error terms, and the ability to handle longitudinal data (Garson 2012b; Schumacker & Lomax 2010). In this analysis the multiple samples are data grouped by year. With SEM a single specified model can be compared to all other years in the data, permitting tests for group differences (i.e., differences by year).

Using multigroup SEM an analysis will be performed that tests the latent constructs of solvency, profitability, liquidity, operating margin, and several independent direct effects on the financial vulnerability latent construct. Figure 3.1 shows the proposed structural equation model. The following sections address each part of the model beginning with the dependent variable.

3.5 Operationalization of Financial Vulnerability

Financial vulnerability has several definitions in nonprofit literature. Tuckman and Chang (1991) defined a nonprofit as financially vulnerable “if it is likely to cut back program services immediately when experiencing a financial shock” (445). In this sense, financial flexibility (slack) is important to a nonprofit’s financial health. Tuckman
and Chang (1991) suggest “financial flexibility is assumed to exist if an organization has access to equity balances, many revenue sources, high administrative costs, and high operating margins” (450). Therefore, organizations that lack financial flexibility are assumed to be more vulnerable. They establish a relative ranking procedure that assumes nonprofits falling into the lowest quintile of each criterion are labeled

**Figure 3.1: Full Structural Equation Model**
severely-at-risk and considered vulnerable to reducing program services given a
financial shock. Likewise, if an organization falls into the bottom quintile of only one
criterion, it is labeled at-risk and has lower financial vulnerability than those
organizations labeled severely-at-risk. Each organization is then assessed a score on a
financial vulnerability index (FVI). Trussel, Greenlee, and Brady (2002) improved the
calculation of an FVI by adding organizational size and Hodge and Piccolo (2005) tested
FVI as it related to board involvement techniques.

Greenlee & Trussel (2000) extended Tuckman and Chang’s research and
developed an output measure for financial vulnerability. They used the same financial
indicators but attempted to predict which charities will become financially vulnerable.
In determining the probability, Greenlee and Trussel (2000) defined a financially
vulnerable charity as “one that reduces program expenditures (deflated by total
revenues) in each of three consecutive years” (203).

Trussel & Greenlee (2001) changed the emphasis from a reduction in program
expenditures to a decrease in net assets (fund balance) for three consecutive years.
Trussel (2002) narrowed the focus to define a financially vulnerable nonprofit as one
that experiences a 20% reduction in fund balance over a three-year period (20). Finally,
Keating et al. (2005) expanded the definition and looked at four proxies for nonprofit
financial vulnerability. The same four variables (insolvency risk, asset disruption risk,
funding disruption risk, and program disruption risk) are tested here though there are
differences in measurement. Figure 3.2 shows the four indicator variables of financial
vulnerability. Keating et al. (2005) define insolvency risk as a dichotomous dependent variable, where insolvency exists if total liabilities are greater than total assets. When an organization is insolvent and unable to pay its debts as they become due, it is financially vulnerable and has a reduced capacity for providing programs or services. Here, insolvency risk is viewed similarly, but the variable is continuous.

![Figure 3.2: Dimensions of Financial Vulnerability](image)

The other three Keating et al. (2005) variables define financial vulnerability as a 25% decrease in net assets, program expenses, or total revenue over a 12-month period. In this study, asset disruption risk, funding disruption risk, and program disruption risk are converted from dichotomous dependent variables to continuous dependent variables. This will reduce measurement error and provide a clearer picture of the relationship between the accounting-based independent variables and financial vulnerability. The indicators of financial vulnerability and their calculations are provided in Table 3.3.
Table 3.3: Indicators of Financial Vulnerability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Line 990 Calculation</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolvency Risk</td>
<td>Exists when total liabilities are greater than total assets</td>
<td>line 59B - line 66B</td>
<td>Continuous</td>
</tr>
<tr>
<td>Asset Disruption Risk</td>
<td>Change in net assets from previous fiscal year</td>
<td>line 73B - line 73A</td>
<td>Continuous</td>
</tr>
<tr>
<td>Funding Disruption Risk</td>
<td>Total revenues</td>
<td>line 12</td>
<td>Continuous</td>
</tr>
<tr>
<td>Program Disruption Risk</td>
<td>Total program expenditures</td>
<td>line 44B</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

As is evident in Table 3.3, funding disruption risk and program disruption risk are measured as raw values and do not signal a change from the previous year’s value as is the case in Keating et al. (2005). The explanation has to do with the number of years used in this analysis. Keating et al. (2005) used two years of data (1999 & 2000) on organizations to diagnose financial vulnerability and then used the previous year’s data (1998) to see if their model could correctly predict the organizations labeled as financially vulnerable. This analysis instead uses all six years in the digitized data. The advantage of a longitudinal approach is that it will capture more organizations and more observations over time. Further, the approach here does not require three or more years of financial data for a nonprofit to be included in the analysis – a restriction used by previous nonprofit financial vulnerability studies and one that likely increases sampling error. As the output in Table 3.4 shows, organizations that file more years consistently have higher levels of average total revenue. This is an indication that by biasing the sample toward organizations that filed multiple years to obtain true panel data, one could be capturing fewer financially vulnerable organizations. Indeed, if the
The purpose of nonprofit financial vulnerability studies is to identify and model financially vulnerable organizations, then those with less total revenue need to be included.

Table 3.4: Number of Organizations Per Number of 990 Filings

<table>
<thead>
<tr>
<th>Number of Filings</th>
<th>Number of Organizations</th>
<th>Percent of Sample</th>
<th>Average Total Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15,477</td>
<td>12.3%</td>
<td>$2,435,188</td>
</tr>
<tr>
<td>2</td>
<td>12,452</td>
<td>9.9%</td>
<td>$2,313,157</td>
</tr>
<tr>
<td>3</td>
<td>11,405</td>
<td>9.0%</td>
<td>$3,084,248</td>
</tr>
<tr>
<td>4</td>
<td>12,433</td>
<td>9.9%</td>
<td>$4,045,567</td>
</tr>
<tr>
<td>5</td>
<td>21,216</td>
<td>16.8%</td>
<td>$6,975,701</td>
</tr>
<tr>
<td>6</td>
<td>53,213</td>
<td>42.2%</td>
<td>$10,421,344</td>
</tr>
</tbody>
</table>

Output reflects organizations in cleaned dataset (N=549,686). Number of organizations: 126,196.

The disadvantage of this approach is that a pooled panel design fails to capture data for the same organizations over time, but rather captures some repeated and some new organizations for each year. The trade-off then is between sampling error and measurement error and given the previously mentioned drawbacks to using 990 data as a sampling frame, the decision here is to avoid biasing the sample further by excluding organizations with fewer 990 filings in the dataset.

3.6 Predictors of Nonprofit Financial Vulnerability and Hypotheses

Nonprofit financial vulnerability studies have consistently used a form of logistic regression and modeled the accounting ratios as independent variables. Though modeled independently, the literature has consistently justified the inclusion of accounting ratios by saying that they capture more easily understood concepts such as operating margin or solvency. While many of the attributions are intuitive (i.e., net income provides a picture of an organization’s profitability and working capital
suggests the level of liquidity) these constructs have gone untested in the nonprofit context. In other words, this analysis goes beyond previous nonprofit literature and tests the constructs by proposing a structural equation model.

Many studies acknowledge that certain accounting ratios get at larger indicators of an organization’s financial health – solvency, liquidity, profitability, and operating margin. This analysis uses the best accounting ratios from previous nonprofit financial vulnerability literature to present a simplified model that tests these constructs and their effect on nonprofit financial vulnerability. There are four latent constructs that relate to nonprofit financial vulnerability in this dissertation: solvency, profitability, liquidity, and operating margin. Each latent construct has observed variables that, on the basis of previous literature, are agreed upon accounting measures to capture the construct. The observed variables are operationalized in this section (and condensed in Appendix D) employing methods previously tested by nonprofit researchers. Additional independent variables representing revenue source, environmental variables, and control variables are modeled as direct and indirect effects on financial vulnerability. Hypotheses discussed in Chapter 2 will also be reiterated here for consistency and clarification.

3.6.1 Solvency

As discussed in Chapter 1, the solvency latent represents the long-term financial capacity of an organization to continue operations. According to previous research, the more net assets a firm has in relation to total revenue (Tuckman & Chang 1991) and
total assets (Bowman 2011a; Keating et al. 2005; Altman 1968), the lower the likelihood of financial vulnerability. The third observed variable NASOLV, captures equity. NASOLV measured insolvency and was a dichotomous variable (NAFAIL) in Ohlson (1980) and Keating et al. (2005). In this study, NASOLV is a continuous variable that captures firm equity. All three indicators are accounting measures commonly cited to capture an organization's solvency.

Figure 3.3 shows the proposed relationship between the underlying solvency construct and the indicator variables.

![Figure 3.3: Dimensions of Solvency](image)

**Solvency Indicator 1:**

- Variable: TNA/TR
- Calculation: total net assets/total revenue
- Form 990: Line 73B/Line 12

**Solvency Indicator 2:**

- Variable: TNA/TA
- Calculation: total net assets/total assets
- Form 990: Line 73B/59B
Solvency Indicator 3:

- Variable: NASOLV
- Calculation: total assets – total liabilities
- Form 990: Line 59B – Line 69B

**Hypothesis 1:** Greater solvency will decrease financial vulnerability.

### 3.6.2 Profitability

Profitability, which represents a firm's long-term financial sustainability, has two observed variables commonly cited in the literature. An organization’s long-term profitability is considered stronger as the ratio of annual net income to total assets decreases (i.e., less of the organization’s assets are due to current year profits) (Bowman 2011a; Keating et al. 2005; Ohlson 1980). This is because the organization is assumed to have reserves that extend beyond the current year's profit. Whereas if the ratio is close to one, then the organization's equity is considered almost solely reliant on current year profits. The second indicator variable, NIPROF, measures net income as a continuous variable. This variable is similar to the INTWO variable in Ohlson (1980) and Keating et al. (2005). Though where INTWO was measured as a dichotomous variable over two years, NIPROF is measured here continuously for one year. While three or more indicators are recommended for each latent variable, fewer indicators are acceptable if theory permits and if there is confidence in the measure's validity and reliability (Garson 2012b; Schumacker & Lomax 2010).

Figure 3.4 shows the proposed relationship between the underlying profitability
construct and the indicator variables.

![Diagram of Profitability](image)

**Figure 3.4: Dimensions of Profitability**

*Profitability Indicator 1:*

- Variable: NI/TA
- Calculation: net income/total assets
- Form 990: Line 18/Line 59B

*Profitability Indicator 2:*

- Variable: NI
- Calculation: net income
- Form 990: Line 18

**Hypothesis 2:** Greater profitability will decrease financial vulnerability.

### 3.6.3 Liquidity

Liquidity is the short-term capacity of an organization to sustain operations given interruptions in revenue or other financial shocks. Altman (1968) and Keating et al. (2005) found that increases in working capital resulted in a lower probability of bankruptcy and financial vulnerability respectively. Similar to working capital, months of spending represents the amount of liquid assets available to an organization free of donor restrictions (Bowman 2011a).
Figure 3.5 shows the proposed relationship between the underlying liquidity construct and the indicator variables.

![Diagram](image)

**Figure 3.5: Dimensions of Liquidity**

**Liquidity Indicator 1:**
- Variable: WC/TA
- Calculation: working capital/total assets
  - (Current Assets - (Current Liabilities + Temporarily Restricted Net Assets))/Total Assets
- Form 990: ((Line 45B + ... + 53B) - ((Line 60B + ... + 64aB) + Line 68B))/Line 59B

**Liquidity Indicator 2:**
- Variable: MS
- Calculation: months of spending
  - 12 months * (Unrestricted Net Assets – Equity in Property, Plant, & Equipment)/Spending on Operations
- Form 990: 12 months * (Line 67B - (Line 55cB + Line 57cB - Line 64aB - Line 64bB))/ (Line 44A - Line 42A)

**Hypothesis 3:** Greater liquidity will decrease financial vulnerability.
### 3.6.4 Operating Margin

Operating margin represents the short-term sustainability of an organization. One way to conceive this variable is to view operating margin as the short-term profitability of an organization. There are two indicator variables for this latent variable. The first variable, NI/TR, is the traditionally used ratio to measure an organization’s operating margin. The second, markup (MU), was suggested by Bowman (2011a) as an alternative to operating margin, more apt for the nonprofit sector because it considers only funds free from restrictions including annual unrestricted net income and functional expenses, plus it accounts for depreciation.

Figure 3.6 shows the proposed relationship between the underlying operating margin construct and the indicator variables.

![Diagram showing the relationship between MU, NI/TR, and Operating Margin]

**Figure 3.6: Dimensions of Operating Margin**

*Operating Margin Indicator 1:*

- Variable: NI/TR
- Calculation: net income/total revenue
- Form 990: Line 18/Line 12

*Operating Margin Indicator 2:*

- Variable: MU
• Calculation: markup
  
  o \(100\% \times \left(\text{Change in Unrestricted Net Assets} + \text{Depreciation}/\text{Spending on Operations}\right)\)

• Form 990: \(100\% \times (\text{Line 67B - Line 67A + Line 42A})/(\text{Line 44A - Line 42A})\)

**Hypothesis 4:** Greater operating margin will decrease financial vulnerability.

### 3.6.5 Revenue Source and Revenue Mix

In previous literature, the source of a nonprofit’s revenue has consistently been associated with financial health (Chapter 2). As such, revenue source and revenue mix are explored here consistent with the methods used by previous nonprofit financial vulnerability researchers. The first variable, COMREV, is operationalized consistent with Frumkin and Keating (2003), Keating et al. (2005), and Hodge (2005). The second variable, RDI, is a revenue diversification index that uses a Hirschman-Herfindahl Index (HHI) to measure the extent to which a nonprofit has spread revenue across three categories: donative, earned income, and investment.

Previous nonprofit financial vulnerability research has alternatively measured this variable as a revenue concentration index (RCI) and used alternate categories. Tuckman and Chang (1991), Greenlee and Trussel (2000), and Trussel et al. (2002) measured revenues from five sources: contracts, gifts, and grants; program service revenue; membership dues; sales of unrelated goods; and investment income. Hager (2001) measured public support, program service revenues, dues and assessments, net
fundraising income, and profits from sale of inventory. Hodge (2005) and Hodge and Piccolo (2005) measured private funding, government funding, commercial and program funding, and indirect private funding.

This dissertation follows Carroll and Stater (2009) and defines three streams of revenue: donative (Form 990 lines 1d, 9a), earned income (Form 990 lines 2, 3, 11), and investment (Form 990 lines 8a, 4, 7). Once the revenue classifications were calculated, a HHI was constructed to yield a diversification score on a range of 0 to 1 with scores close to 1 indicating greater levels of diversification in the revenue mix. Revenue diversification is calculated as follows:

$$ RDI = \frac{1 - \sum_{i=1}^{3} R_i^2}{0.6666} $$

where $R_i$ is the fraction of revenue generated by each of the three revenue sources (Carroll & Stater 2009, 953).

**Hypothesis 5:** A greater ratio of commercial revenue to total revenue will decrease financial vulnerability.

**Hypothesis 6:** Greater revenue diversification will decrease financial vulnerability.

### 3.6.6 Environmental Variables

Environmental variables affect a firm’s revenues including investment return, donations, and program revenue and are beyond the control of a nonprofit manager. These variables could also place a strain on nonprofit organizations by increasing demand on non revenue-generating services (ex: charitable activities) and decreasing
demand for revenue-generating programs (ex: resale stores). It is expected (consistent with other hypotheses) that organizations with higher levels of solvency, profitability, liquidity, and operating margin, especially larger organizations with bigger endowments and more sources of revenue including commercial, will resist these variables with greater efficacy.

Carroll and Stater (2009) measured urbanicity, whether nonprofits in the sample were in a Metropolitan Statistical area, as a dichotomous variable. The rationale for which was the assumed higher level of demand for services in urban areas and greater access to funding opportunities. This study operationalizes this concept differently by measuring the carrying capacity of the area with the inclusion of population and median household income by FIPS code. Carrying capacity (median household income) is hypothesized to have direct and indirect effects on nonprofit financial vulnerability.

*Median Household Income:*

- Variable: Med_House_Inc
- Source: Census Bureau
- Calculation: Median Household Income by FIPS code for the years 1998-2003

**Hypothesis 7:** Greater median household income will decrease financial vulnerability.

**Hypothesis 8:** Greater median household income will increase solvency.
Hypothesis 9: Greater median household income will increase profitability.

Hypothesis 10: Greater median household income will increase liquidity.

Hypothesis 11: Greater median household income will increase operating margin.

LeRoux and Wright (2010) measured market competition as the number of nonprofits in a metro area with the same National Taxonomy of Exempt Entities (NTEE) code as the respondent organization in their survey sample. This study extends that approach by capturing the saturation of similarly classified organizations in each FIPS code. The variable, Market_Sat, calculates the number of nonprofit organizations with the same NTEE designation in each FIPS code per one thousand people. This variable tests the underlying concepts of density and competition.

Regional Saturation:

- Variable: Market_Sat
- Source: NCCS digitized data for the 12 major groups based on NTEE classifications and Census Bureau for population by FIPS code.
- Calculation: Frequency of nonprofits with same NTEE classification in FIPS code/(FIPS code population/1000)

Hypothesis 12: Greater saturation will increase financial vulnerability.

Hypothesis 13: Greater saturation will decrease solvency.

Hypothesis 14: Greater saturation will decrease profitability.

Hypothesis 15: Greater saturation will decrease liquidity.
**Hypothesis 16:** Greater saturation will decrease operating margin.

Further, to test the level of competition and niche width for each nonprofit, another variable – regional revenue share – is included. Regional revenue share is calculated by dividing a nonprofit’s total revenue by the total summed revenue of all nonprofits with the same NTEE designation and within the same FIPS code.

*Regional Revenue Share:*

- Variable: Rev_Share_Reg
- Source: NCCS digitized data for the 12 major groups based on NTEE classifications
- Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all nonprofits within the same major group in the same FIPS code) * 100

**Hypothesis 17:** Greater regional revenue share will decrease financial vulnerability.

**Hypothesis 18:** Greater regional revenue share will increase solvency.

**Hypothesis 19:** Greater regional revenue share will increase profitability.

**Hypothesis 20:** Greater regional revenue share will increase liquidity.

**Hypothesis 21:** Greater regional revenue share will increase operating margin.

To test the effect of macroeconomic variables on nonprofit financial vulnerability, gross domestic product and state product are included. Gross domestic product (GDP) was obtained for the years 1998 to 2003 from the Bureau of Economic Analysis.
Gross Domestic Product:

- Variable: GDP
- Source: Bureau of Economic Analysis
- Calculation: Reported gross domestic product for the years 1998-2003

Hypothesis 22: Greater gross domestic product will decrease financial vulnerability.

Hypothesis 23: Greater gross domestic product will increase solvency.

Hypothesis 24: Greater gross domestic product will increase profitability.

Hypothesis 25: Greater gross domestic product will increase liquidity.

Hypothesis 26: Greater gross domestic product will increase operating margin.

State product was obtained for each state for the years 1998 to 2003 from the Bureau of Economic Analysis.

State Product:

- Variable: SP
- Source: Bureau of Economic Analysis
- Calculation: Reported state product by state for the years 1998-2003

Hypothesis 27: Greater state product will decrease financial vulnerability.

Hypothesis 28: Greater state product will increase solvency.

Hypothesis 29: Greater state product will increase profitability.

Hypothesis 30: Greater state product will increase liquidity.

Hypothesis 31: Greater state product will increase operating margin.
### 3.6.7 Control Variables

There are several included control variables; all of which are either commonly used in the literature on nonprofit financial vulnerability or have been recommended for future research. These control variables fall into two categories, organizational variables (investment portfolio, endowment, and size of the organization) and environmental variables (inflation and subsector).

Investment income is measured consistent with Bowman (2002) and Keating et al. (2005), as a ratio of the nonprofit’s investment portfolio to total assets.

*Investment Income:*

- **Variable:** INVEST
- **Calculation:** Investment Portfolio/Total Assets
- **Form 990:** (Line 4 + Line 5 + Line 7 + Line 8a)/Line 59B

Endowment is calculated as a dichotomous variable following the recommendation of Bowman et al. (2012) where a prospectively endowed nonprofit is labeled 1 and 0 otherwise.

*Endowment:*

- **Calculation:** If liquid investments (i.e., securities, not buildings) are greater than or equal to total expenses then 1, otherwise 0
- **Form 990:** If (Line 54B + Line 56B) ≥ Line 17 then 1, otherwise 0

The variable controlling for the size of the organization is operationalized here consistent with previous studies on nonprofit financial vulnerability (Keating et al.)

Organizational Size:

- Variable: SIZE
- Calculation: ln(TA)
- Form 990: ln(Line 59B)

Inflation is calculated consistent with Carroll and Stater (2009) by using the Consumer Price Index (CPI). In this case, all dollar values were calculated to represent 2003 dollars using the conversion recommended by CPI for each year. Table 3.5 shows how the calculations were performed for data from each year, where $X_i$ represents the dollar value before adjusting for inflation. Subsector is controlled using the 12 major categories in the NCCS data, which is better than the 10 major groups in NCCS data because it separates hospitals and higher education from health and education.

<table>
<thead>
<tr>
<th>Year</th>
<th>CPI</th>
<th>Data Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$100.00</td>
<td>n/a</td>
</tr>
<tr>
<td>2002</td>
<td>$97.77</td>
<td>$X_i \times \left(\frac{100.00}{97.77}\right)$</td>
</tr>
<tr>
<td>2001</td>
<td>$96.25</td>
<td>$X_i \times \left(\frac{100.00}{96.25}\right)$</td>
</tr>
<tr>
<td>2000</td>
<td>$93.59</td>
<td>$X_i \times \left(\frac{100.00}{93.59}\right)$</td>
</tr>
<tr>
<td>1999</td>
<td>$90.54</td>
<td>$X_i \times \left(\frac{100.00}{90.54}\right)$</td>
</tr>
<tr>
<td>1998</td>
<td>$88.59</td>
<td>$X_i \times \left(\frac{100.00}{88.59}\right)$</td>
</tr>
</tbody>
</table>

3.7 Plan for Data Analysis

Data analysis will begin with an exploratory factor analysis (EFA) of the following accounting predictor variables to see if they load on the constructs of solvency, profitability, liquidity, and operating margin as the literature suggests. The
variables are:

- TNA/TR (total net assets/total revenue)
- TNA/TA (total net assets/total assets)
- NASOLV (total assets – total liabilities)
- NI/TA (net income/total assets)
- NI (net income)
- WC/TA (working capital/total assets)
- MS (months of spending)
- NI/TR (net income/total revenue)
- MU (markup)

Output will be analyzed to determine whether the accounting ratios load consistent with theory. Factor loadings for the indicator variables greater than 0.7 on the proposed construct, and less than 0.3 on other constructs, are desirable for a simple factor structure. Otherwise there is evidence of cross-loading; where indicators load on multiple factors.

Assuming the factor loadings are consistent with the proposed accounting constructs, multigroup structural equation modeling will be performed.

3.8 Preview of Chapter 4

Chapter 4 begins with the output of the exploratory factor analysis on the accounting predictor variables. The results suggest the accounting variables do not relate to one another as expected. Further, the results do not yield theoretically
intuitive constructs underlying the accounting variables. Given these findings, structural equation modeling with confirmatory factor analysis is not a viable method. Therefore, an alternate method of analysis is proposed (generalized estimating equations) and the accounting variables are modeled independently.

Generalized estimating equations (GEE) is an extension of generalized linear modeling and can handle correlated observations stemming from longitudinal or repeated-measures data. As a population-averaged approach, GEE models aggregate changes in a dependent variable over time, not individual-level changes. Therefore, the marginal expectation is the focus and the models “describe how the average response across subjects changes with the covariates” (Zeger et al. 1988, 1059). Though GEE does not provide organization-level results, an advantage is that the “population-averaged response for a given covariate value... is directly estimable from observations without assumptions about the heterogeneity across individuals in the parameters” (1998, 1051).

In addition to the change in method of analysis, Chapter 4 covers other amendments to the approach proposed here in Chapter 3; including combining the indicators of financial vulnerability into component scores, limiting the data from sector-wide to two subsectors, and adding two new environmental variables.
CHAPTER 4: EFA RESULTS AND AMENDED APPROACH

4.1 Introduction

Efforts to identify the best model for nonprofit financial vulnerability have achieved higher explanatory power at the expense of interpretability. As discussed in Chapters 2 and 3, Keating et al.’s (2005) model is the most complete model to date, but the data-driven approach increased complexity and made the study of nonprofit financial vulnerability unintelligible to anyone without a degree in accounting. The approach here is to provide conceptual clarity by identifying the best predictors of nonprofit financial vulnerability and organizing these accounting ratios into one of four constructs – liquidity, solvency, operating margin, or profitability. Though previous studies consistently attribute accounting ratios to one of the four constructs on the basis of a priori knowledge, the validity of the constructs have not been empirically tested.

The constructs and their hypothesized relationships to financial vulnerability are outlined in the full structural equation model (Figure 3.1). However, before proceeding to structural equation modeling (SEM) and confirmatory factor analysis (CFA), an exploratory factor analysis (EFA) was performed. An EFA, using principal component extraction and a Varimax rotation, was conducted on the cleaned dataset to determine how well the proposed latent constructs conform to the data. The accounting ratios (indicator variables) and their proposed latent constructs are outlined in Table 4.1.
The next section covers the results of the EFA and provides additional information on the relationships among the accounting measures in this study. The results of the EFA suggest it is not viable to conduct multigroup SEM as intended. Therefore, the following sections discuss amendments to the proposed model including combining the indicators of financial vulnerability into component scores and narrowing the focus of the study from sector-wide to two subsectors. The chapter concludes with a section proposing an alternate method of analysis – generalized estimating equations – to test the updated hypotheses.

4.2 Results from Factor Analysis on Proposed Accounting Constructs

The results of the factor analysis (Table 4.2) suggest several interesting findings. First, though the literature commonly labels accounting ratios as representative of larger constructs (i.e., solvency, profitability, liquidity, operating margin), the ratios appear to be measuring distinctly different things. For the nine indicator variables, the factor analysis returned five components with an eigenvalue above 1.0. Further, the
variables do not load as the literature suggests.

**Table 4.2: Component Matrix – All Subsectors**

<table>
<thead>
<tr>
<th></th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Component 4</th>
<th>Component 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNA/TR</td>
<td>0.879</td>
<td>0.000</td>
<td>0.005</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>TNA/TA</td>
<td>0.000</td>
<td>-0.868</td>
<td>0.000</td>
<td>0.001</td>
<td>0.075</td>
</tr>
<tr>
<td>NASOLV</td>
<td>0.005</td>
<td>0.000</td>
<td>0.857</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>NI/TA</td>
<td>0.000</td>
<td>0.005</td>
<td>0.000</td>
<td>0.000</td>
<td>0.997</td>
</tr>
<tr>
<td>NIPROF</td>
<td>-0.005</td>
<td>0.000</td>
<td>0.857</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>WC/TA</td>
<td>0.000</td>
<td>0.867</td>
<td>0.000</td>
<td>0.001</td>
<td>0.080</td>
</tr>
<tr>
<td>MS</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.814</td>
<td>0.000</td>
</tr>
<tr>
<td>NI/TR</td>
<td>-0.879</td>
<td>0.000</td>
<td>0.004</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>MU</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.814</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

If theory were correct, the first three items in Table 4.2 would load together, yet they all load quite clearly on three separate components. The patterns that emerge are just as confounding as they are illuminating. Component 1 items both have total revenues in the denominator, so it is possible that it is just picking up on revenues. But one would expect income and assets to load similarly and NI/TR is negative while TNA/TR is positive. Similar to component 1, component 2 items both have total assets in the denominator, perhaps overwhelming the long-term focus of total net assets and the short-term focus of working capital. Though, TNA/TA loads negatively while WC/TA loads positively. Component 3 items, NASOLV and NIPROF, are both long-term measures; and component 4 items, MS and MU, are both short-term measures. It is
unclear why NI/TA loads independently on component 5 and does not load with other measures that have total assets in the denominator in component 2.

The second interesting finding is that the correlation matrix shows only moderate correlations between the variables (Table 4.3). All correlations are below .7 (the strongest correlation is -.545), with many at or near zero. This adds strength to the assessment that each of the financial ratios is measuring different things, despite similarities in their measurement (i.e., same numerator or denominator).

<table>
<thead>
<tr>
<th></th>
<th>TNA/TR</th>
<th>TNA/TA</th>
<th>NASOLV</th>
<th>NI/TA</th>
<th>NIPROF</th>
<th>WC/TA</th>
<th>MS</th>
<th>NI/TR</th>
<th>MU</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNA/TR</td>
<td>1.000</td>
<td>.001</td>
<td>.006</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
</tr>
<tr>
<td>TNA/TA</td>
<td>.001</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>NASOLV</td>
<td>.006</td>
<td>.000</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>NI/TA</td>
<td>.000</td>
<td>.033</td>
<td>.000</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>NIPROF</td>
<td>-.001</td>
<td>.001</td>
<td>.469</td>
<td>.000</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>WC/TA</td>
<td>.000</td>
<td>-.505</td>
<td>.000</td>
<td>.046</td>
<td>.000</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>MS</td>
<td>.002</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>1.00</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>NI/TR</td>
<td>-.545</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.005</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>1.00</td>
</tr>
<tr>
<td>MU</td>
<td>.001</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
<td>.000</td>
<td>.326</td>
<td>.000</td>
<td>1.00</td>
</tr>
</tbody>
</table>

To illuminate the relationship between the financial ratios further, a regression analysis was conducted and collinearity statistics were generated. The nine indicator variables were entered as independent variables, predicting funding disruption risk (Table 4.4). Despite concerns that multicollinearity is the reason for the unexpected results of the factor analysis, tolerance for each of the variables is above .20 and VIF is below 4 (the generally accepted cut-offs). The lowest tolerance is .703 and highest VIF is 1.422.
Table 4.4: Regression Coefficients – All Subsectors

<table>
<thead>
<tr>
<th>Model</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>(Constant)</td>
<td></td>
</tr>
<tr>
<td>TNA/TR</td>
<td>.703</td>
</tr>
<tr>
<td>TNA/TA</td>
<td>.742</td>
</tr>
<tr>
<td>NASOLV</td>
<td>.780</td>
</tr>
<tr>
<td>NI/TA</td>
<td>.994</td>
</tr>
<tr>
<td>NIPROF</td>
<td>.780</td>
</tr>
<tr>
<td>WC/TA</td>
<td>.741</td>
</tr>
<tr>
<td>MS</td>
<td>.894</td>
</tr>
<tr>
<td>MU</td>
<td>.894</td>
</tr>
<tr>
<td>NI/TR</td>
<td>.703</td>
</tr>
</tbody>
</table>

Dependent Variable: Funding Disruption Risk

Third, given the likelihood that subsectors with typically large endowments (e.g., higher education, hospitals) react differently than subsectors with smaller endowments (e.g., human services, religion), a factor analysis was conducted on each subsector (using NTEE Major 12 codes). Even after the subsector effect was removed, the variables continued to load similarly. Which is to say, not as the literature suggests.

Table 4.5 is a summary of the factor analytic results conducted on each subsector (full results can be found in Appendix C). Each row in the table reports the results of a factor analysis performed on one subsector. Therefore, numbers in one row do not correlate with numbers in other rows (i.e., a 1 in arts is not equivalent to a 1 in education). The first column contains the subsectors. The second column shows the number of components with an eigenvalue greater than 1.0 for each subsector. The numbers in columns three to eleven represent the component each variable loaded highest on, with negatives signifying that the variable loaded negatively. Since the
numbers across rows do not correlate to one another, cells are color coded to improve interpretation across subsectors (rows). The colors represent variables that load together. In other words, TNA/TR and NI/TR load together for nearly every subsector. Likewise, TNA/TA, WC/TA, and NI/TA tend to load together, NASOLV and NIPROF consistently load together, and MS and MU load together. Table 4.5 illustrates that while there is some variance across subsectors, it is clear subsector has a negligible effect on the correlations of the accounting ratios.

Table 4.5: Factor Analysis of Accounting Ratios by Subsector

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Number of Components</th>
<th>TNA/TR</th>
<th>TNA/TA</th>
<th>NASOLV</th>
<th>NI/TR</th>
<th>NIPROF</th>
<th>WC/TA</th>
<th>MS</th>
<th>NI/TR</th>
<th>MU</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subsectors</td>
<td>5</td>
<td>1</td>
<td>-2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>-1</td>
<td>4</td>
</tr>
<tr>
<td>Arts</td>
<td>4</td>
<td>-1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Higher Education</td>
<td>4</td>
<td>-4</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>-3</td>
<td>4</td>
</tr>
<tr>
<td>Hospitals</td>
<td>4</td>
<td>-3</td>
<td>1</td>
<td>4</td>
<td>-1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Environment</td>
<td>4</td>
<td>-2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Health</td>
<td>4</td>
<td>-2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Human Services</td>
<td>5</td>
<td>-1</td>
<td>-2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>-5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>International</td>
<td>4</td>
<td>-2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>-4</td>
</tr>
<tr>
<td>Mutual Benefit</td>
<td>3</td>
<td>-3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Public Benefit</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>-4</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>Religion</td>
<td>4</td>
<td>-1</td>
<td>-4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>-2</td>
<td>1</td>
</tr>
</tbody>
</table>

Numbers represent the component each variable loaded highest on (negative if loaded negatively) for the factor analysis performed on each subsector
Numbers represent different components one row to the next and should not be compared
Colors illustrate variables that load similarly across subsectors (rows)
Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Finally, to test the feasibility of creating an index for each accounting construct
(solvency, liquidity, profitability, and operating margin), a reliability analysis was conducted for each and the extremely low Cronbach’s alpha scores and intraclass correlations (Table 4.6) suggest the proposed indicators do not hang together very well.

Table 4.6: Reliability Analysis – All Subsectors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Intraclass Correlation</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency</td>
<td>.000</td>
<td>5.419E-009</td>
</tr>
<tr>
<td>Profitability</td>
<td>.000</td>
<td>7.025E-008</td>
</tr>
<tr>
<td>Liquidity</td>
<td>.000</td>
<td>2.278E-007</td>
</tr>
<tr>
<td>Operating Margin</td>
<td>.000</td>
<td>4.940E-007</td>
</tr>
</tbody>
</table>

While the literature suggests accounting ratios represent larger constructs in theory, they do not in this data and further exploration is needed to determine why. Initial observations suggest authors classify financial ratios as representative of solvency, liquidity, operating margin, or profitability on custom. While it may be easy to resort to these labels, the perpetual misclassification of ratios is potentially creating additional noise and added confusion.

Returning to the intended purpose of this study, given the unexpected findings with the exploratory factor analysis, conducting a confirmatory factor analysis in multigroup structural equation modeling is not possible. To explore the relationship between the proposed organizational and environmental predictor variables in the original model and financial vulnerability, an alternate method of analysis is required.

Additionally, there are two further adjustments to the model to note. First, instead of attempting to model all subsectors (NTEE Major 12), two subsectors were chosen. Second, the financial vulnerability indicators were combined to create
component scores. The next section discusses these adjustments.

4.3 Amended Approach to Modeling Financial Vulnerability

The diversity of the nonprofit sector is well documented (Hager 2001). Even
focusing on specifically 501(c)(3) charitable organizations as this study does yields a
to understand the behavior of nonprofit organizations by studying all kinds of
nonprofits at once is empirically problematic. The sector is so broad that practitioners
infrequently think of themselves as part of an independent sector, and scholars have
questioned whether it is useful to even think of the diversity of organizations as a single
or functionally independent category (Hall 1992)” (379). Therefore, narrowing the
focus from sector-wide to specific subsectors will yield more interpretable results.

There are theoretical as well as data-driven considerations in the selection of the
subsectors. In the proposed model (Figure 3.1), subsector is incorporated as a control
variable based on NTEE Major 12 designations. While this theoretically controls for
subsector effect, there is potentially a significant loss of information.

Among the NTEE major 12 designations, the human services subsector
represents the organizations that are most commonly associated with the charitable
sector. These include NTEE categories (I, J, K, L, M, N, O, P) that cover food programs
(e.g., food banks, soup kitchens), housing and shelter (e.g., homeless shelters), youth
development (e.g., Boys and Girls Clubs), and human services organizations (e.g.,
American Red Cross, family violence shelters, foster care, LGBT centers) to name a few.
Further, as detailed below, human services has the most organizations and is arguably the most financially vulnerable subsector. Tables 4.7 and 4.8 contain frequencies and case summaries for each subsector. Human services has the lowest mean level of net assets (highest risk of insolvency) and the lowest mean increase in year-over-year assets (highest risk of asset disruption). The dollar values in Table 4.7 are obtained by calculating net assets for each subsector. The dollar values in Table 4.8 are obtained by subtracting beginning of year total assets from end of year total assets. The high level of insolvency risk and asset disruption risk, two of the indicators of financial vulnerability, suggests the human services subsector is a suitable choice for the analysis.

Table 4.7: Net Assets by Subsector

<table>
<thead>
<tr>
<th>Subsector</th>
<th>N</th>
<th>Mean ($)</th>
<th>Median ($)</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subsectors</td>
<td>549,686</td>
<td>9,410,414</td>
<td>471,405</td>
<td>234,370,534</td>
</tr>
<tr>
<td>Arts</td>
<td>48,058</td>
<td>5,473,462</td>
<td>398,424</td>
<td>35,693,653</td>
</tr>
<tr>
<td>Higher Education</td>
<td>8,469</td>
<td>161,301,882</td>
<td>22,685,489</td>
<td>855,614,459</td>
</tr>
<tr>
<td>Education</td>
<td>59,527</td>
<td>8,123,607</td>
<td>588,472</td>
<td>76,832,211</td>
</tr>
<tr>
<td>Hospitals</td>
<td>17,662</td>
<td>81,483,214</td>
<td>22,169,337</td>
<td>1.04858E+9</td>
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<tr>
<td>Environment</td>
<td>16,137</td>
<td>5,575,172</td>
<td>529,104</td>
<td>55,610,782</td>
</tr>
<tr>
<td>Health</td>
<td>95,644</td>
<td>5,522,335</td>
<td>577,029</td>
<td>95,293,961</td>
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<tr>
<td>Human Services</td>
<td>219,266</td>
<td>1,957,595</td>
<td>349,219</td>
<td>17,663,542</td>
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<tr>
<td>International</td>
<td>8,820</td>
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<td>503,926</td>
<td>23,932,769</td>
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<tr>
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<td>59,461</td>
<td>7,994,247</td>
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<td>219,158,918</td>
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<tr>
<td>Religion</td>
<td>13,969</td>
<td>3,004,933</td>
<td>312,216</td>
<td>27,121,351</td>
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<tr>
<td>Unknown</td>
<td>1,710</td>
<td>376,024</td>
<td>471,404</td>
<td>234,370,534</td>
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</table>

In contrast to the human services subsector, higher education (NTEE category B40) was chosen given its relative financial health. Higher education has the highest
Table 4.8: Year over Year Change in Assets by Subsector

<table>
<thead>
<tr>
<th>Subsector</th>
<th>N</th>
<th>Mean ($)</th>
<th>Median ($)</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subsectors</td>
<td>549,686</td>
<td>514,207</td>
<td>15,541</td>
<td>19,377,564</td>
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<td>Arts</td>
<td>48,058</td>
<td>345,553</td>
<td>11,011</td>
<td>5,651,161</td>
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<td>Higher Education</td>
<td>8,469</td>
<td>8,802,776</td>
<td>349,936</td>
<td>106,599,716</td>
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<tr>
<td>Education</td>
<td>59,527</td>
<td>593,806</td>
<td>27,903</td>
<td>10,410,420</td>
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<td>Hospitals</td>
<td>17,662</td>
<td>3,546,544</td>
<td>555,586</td>
<td>48,784,168</td>
</tr>
<tr>
<td>Environment</td>
<td>16,137</td>
<td>485,616</td>
<td>25,128</td>
<td>7,942,118</td>
</tr>
<tr>
<td>Health</td>
<td>95,644</td>
<td>297,584</td>
<td>19,967</td>
<td>12,745,462</td>
</tr>
<tr>
<td>Human Services</td>
<td>219,266</td>
<td>121,329</td>
<td>9,710</td>
<td>2,404,287</td>
</tr>
<tr>
<td>International</td>
<td>8,820</td>
<td>457,906</td>
<td>14,474</td>
<td>7,855,403</td>
</tr>
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<td>Mutual Benefit</td>
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<td>8,766</td>
<td>4,119,934</td>
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<td>16,624</td>
<td>26,090,918</td>
</tr>
<tr>
<td>Religion</td>
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<td>178,632</td>
<td>10,223</td>
<td>6,048,820</td>
</tr>
<tr>
<td>Unknown</td>
<td>1,710</td>
<td>38,384</td>
<td>5,119</td>
<td>425,370</td>
</tr>
</tbody>
</table>

The mean level of net assets (lowest risk of insolvency) and the highest mean increase in year-over-year assets (lowest risk of asset disruption). The side-by-side analysis of human services and higher education will provide a unique look at two different levels of analysis. Human services, though considered a subsector, contains a heterogeneous mix of nonprofit organizations with diverse mission areas (multiple NTEE codes) and accounts for 179,164 observations. Higher education on the other hand drills down to a specific NTEE code and provides an analysis of a more homogenous group accounting for 6,996 observations.

4.3.1 Combining Financial Vulnerability Indicators

The four indicator variables representing financial vulnerability in this dissertation – asset disruption risk, insolvency risk, program disruption risk, and funding disruption risk – theoretically are driven by an underlying financial
vulnerability construct. But as we learned from the factor analysis of the accounting ratios, empirical analysis is needed for confirmation. Therefore, to see if the measures capture an underlying financial vulnerability variable, a principal component analysis of the human services subsector was conducted on all observations across all six years. The results yield one component with an eigenvalue greater than 1.0 and this component accounts for 69.6% of the variance. The factor loadings suggest sufficient convergence to warrant indexing financial vulnerability into component scores.

Table 4.9 displays component loadings for the principal component analysis (PCA) conducted on all human services observations for all 6 years in the study. Component loadings show the direct effect (or when squared the percent variance) in the indicator explained by the component (Garson 2012a, 33; Clerkin et al. 2009). While it is preferred to have component loadings greater than .7 “to confirm that independent variables identified a priori are represented by a particular factor,…, the .7 standard is a high one and real-life data may well not meet this criterion, which is why some researchers… will use a lower level such as .4” (Garson 2012a, 34).

<table>
<thead>
<tr>
<th>Component</th>
<th>Component 1a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolvency</td>
<td>.884</td>
</tr>
<tr>
<td>Asset Disruption</td>
<td>.460</td>
</tr>
<tr>
<td>Funding Disruption</td>
<td>.958</td>
</tr>
<tr>
<td>Program Disruption</td>
<td>.935</td>
</tr>
</tbody>
</table>

The results in Table 4.9 provide sufficient evidence to proceed with the creation
of an indexed dependent variable. Regression component scores were created for the
human services subsector on the basis of separate principal component analyses for
each of the six years in the data. The regression component scores are standardized
with a mean of zero and standard deviation of one. While there is fluctuation in the
convergence of the four indicator variables from one year to the next (most notably in
2001), the results consistently suggest only one component with an eigenvalue greater
than 1.0. Full results of the PCA for each year are provided in Table 4.10. The anomaly
in 2001 is likely due to the effects of the dot com bubble burst in 2000. Future studies
should explore this possibility by looking at nonprofit finances immediately before and
after the economic downturn in 2001. This study washes those effects out by looking at
population averages over time, an unfortunate but necessary trade-off.

Table 4.10: Financial Vulnerability Component Loadings by Year – Human Services

<table>
<thead>
<tr>
<th>Year</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Component Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Insolvency</td>
</tr>
<tr>
<td>1998</td>
<td>2.994</td>
<td>74.86</td>
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</tr>
<tr>
<td>1999</td>
<td>3.297</td>
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<tr>
<td>2000</td>
<td>2.904</td>
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<tr>
<td>2001</td>
<td>2.727</td>
<td>68.18</td>
<td>.898</td>
</tr>
<tr>
<td>2002</td>
<td>3.396</td>
<td>84.90</td>
<td>.896</td>
</tr>
<tr>
<td>2003</td>
<td>3.135</td>
<td>78.38</td>
<td>.832</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis

Following the steps taken for human services, a similar approach was used to
combine the indicators of financial vulnerability for higher education. Table 4.11
represents the principal component analysis of all higher education observations for all
six years. As with human services, the results yield one component with an eigenvalue greater than 1.0 and this component accounts for 77.96% of the variance. Once again, the factor loadings suggest sufficient convergence to warrant combining financial vulnerability into component scores.

Table 4.11: Higher Education – Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>1(^a)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.929</td>
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<tr>
<td>Asset Disruption</td>
<td>.692</td>
</tr>
<tr>
<td>Funding Disruption</td>
<td>.977</td>
</tr>
<tr>
<td>Program Disruption</td>
<td>.906</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis
a. 1 component extracted

Table 4.12 represents the principal component analysis for higher education observations for each of the six years in the data. Similar to the results from human services, the component loading for asset disruption risk in 2001 presents as an anomaly. It is safe to assume, the macroeconomic effect of the dot com bubble burst affected both subsectors.

Table 4.12: Financial Vulnerability Component Loadings by year – Higher Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Component Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Insolvency</td>
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<tr>
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<tr>
<td>1999</td>
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</tr>
<tr>
<td>2000</td>
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</tr>
<tr>
<td>2001</td>
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<td>69.59</td>
<td>.931</td>
</tr>
<tr>
<td>2002</td>
<td>3.186</td>
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</tr>
<tr>
<td>2003</td>
<td>3.252</td>
<td>81.30</td>
<td>.947</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis
4.3.2 Generalized Estimating Equations

The digitized data used in this dissertation are not true panel data “where the same subjects are measured in each time period” (Garson 2012c, 91). Rather, the data are cross-sectional time series data. Though predominantly composed of the same subjects, the data also contain different subjects for each time period. “With cross-sectional time series data, the researcher cannot study individuals over time, only averages over time” (Garson 2012c, 92). As such, population-averaged panel data regression methods are ideal. One approach, generalized estimating equations, is an extension of generalized linear models (GZLM) and is used for the analysis of longitudinal data in which the aggregate response for the population is the focus (i.e., population-averaged model) (Zeger et al. 1988, 1049). In this approach, the population-averaged response is modeled “as a function of covariates without explicitly accounting for subject-to-subject heterogeneity” (1988, 1050). Therefore, “the regression coefficients have interpretation for the population rather than for any individual” (1988, 1050).

Generalized estimating equations (GEE) handle correlated data by allowing the researcher to specify a subject variable, in this case an organization’s employee identification number (EIN), and a within-subject variable, which in this case is fiscal year (for years 1998-2003). GEE has relaxed assumptions regarding the normality of the distribution and provides options regarding the choice of link function. The researcher is able to determine the correct distribution and link function by observing
the goodness-of-fit statistics (e.g., QIC), where lower is better. Here, a normal distribution with an identity link function yielded the lowest QIC (quasi likelihood under independence model criterion). As with other regression methods, missing data can lead to biased results. In GEE, missing values are ignored. So for those organizations in the data without all six years of data, data imputation is recommended. According to Garson, multiple imputation is preferred over missing value analysis (MVA) in SPSS and is effective at generating “estimates that better reflect true variability and uncertainty in the data than do regression or even expectation maximization methods” (2012d, 11).

4.3.3 Multiple Imputation

Multiple imputation (MI) “is a method of generating multiple simulated values for each incomplete datum, then iteratively analyzing datasets with each simulated value substituted in turn” (Garson 2012d, 11). When performed with SPSS, MI yields multiple imputed replicated datasets, where five is typical (2012d, 11). Once MI is complete, GEE can be performed on the original dataset (with the missing values) and each of the replicated datasets (with imputed values). Output including model significance, goodness-of-fit, test of model effects, and parameter estimates are generated for each dataset.

After imputing the data, GEE analyses will be performed on human services then higher education data. Each analysis begins with the full theoretical model and all hypothesized predictors. Consistent with commonly accepted practice in GEE (Garson 2012e, 37), nonsignificant variables will be removed one by one until all remaining
variables in the trimmed models are significant. The cutoff for inclusion, given the large sample sizes, is .01 in the original data (with missing values). The variable with the lowest significance is removed first. Type III sums of squares is selected, so the entry order will not affect the results.

4.3.4 Independent Variables

An analysis of the independent variables in the human services and higher education subsectors suggests aspects of the proposed model should be edited prior to GEE analysis.

The proposed environmental variables in this research are operationalized in Chapter 3 by region, specifically by federal information processing standard (FIPS) code. The purpose is to measure density and the level of competition faced by charities in their geographic region. This logic holds for human services organizations, but fails to fully capture the market for institutions of higher education. For instance, two soup kitchens operating in the same FIPS code may be competing for the same resources (e.g., donors, funding, volunteers...), but a college’s niche extends beyond a narrow geographic region. Therefore, two new revenue share variables are introduced for the analysis of higher education; one that captures the organization’s revenue share at the state level and one that captures the organization’s revenue share at the national level. They are measured similar to Rev_Share_Reg, but on a broader scale.

State Revenue Share:

- Variable: Rev_Share_State
• Source: NCCS digitized data for the 12 major groups based on NTEE classifications
• Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all higher education nonprofits within the same state) * 100

National Revenue Share:
• Variable: Rev_Share_Nat
• Source: NCCS digitized data for the 12 major groups based on NTEE classifications
• Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all higher education nonprofits in the nation) * 100

An additional change in the choice of variables entails the removal of NASOLV. NASOLV was proposed by Keating et al. (2005) as an equity variable used to predict asset disruption risk, program disruption risk, and funding disruption risk. Though, they removed NASOLV from the analysis when modeling insolvency risk because the variable is measured the same; and equity (or conversely insolvency) in time 1 is expected to predict insolvency in time 2. Since insolvency risk is part of the dependent component scores noted above, the same reasoning applies here and NASOLV is removed as an explanatory variable. Further, as the correlation matrices for human services and higher education, Tables 4.13 and 4.14 respectively, show, NASOLV has high correlations with two other independent variables. The correlation between
Table 4.13: Correlation Matrix – Human Services

<table>
<thead>
<tr>
<th></th>
<th>END OW</th>
<th>Med_House_Inc</th>
<th>Market_Sat</th>
<th>Rev_Share</th>
<th>SP</th>
<th>GDP</th>
<th>TNA/TR</th>
<th>TNA/TA</th>
<th>NASO</th>
<th>NI/TR</th>
<th>NI/TA</th>
<th>NIPR</th>
<th>WC/TA</th>
<th>MS</th>
<th>MU</th>
<th>COM_REV</th>
<th>RDI</th>
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NASOLV and NIPROF is .609 for human services and .840 for higher education; and the correlation is .880 for NASOLV and Rev_Share_Nat in higher education. If left in, NASOLV would lead to diminished interpretability in the results. In other words, the path dependency of insolvency is less interesting than exploring the effects of other explanatory variables on financial vulnerability, such as NIPROF.

The correlation matrices for human services and higher education have some differences worth noting. In Tables 4.13 and 4.14 all correlations greater than .500 in absolute magnitude are in bold. TNA/TA and WC/TA are highly and negatively correlated (-.765) in human services, but have a slight positive correlation (.283) in higher education. Other highly correlated variables in higher education, for example NI/TA and INVEST at .684 and MS and MU at .926, display different relationships in human services where the correlations are -.065 and -.011 respectively. These differences reinforce the notion that the diversity of the charitable sector is too great to empirically study all at once.

4.4 Amended Hypotheses

With the change in method of analysis from structural equation modeling to generalized estimating equations, many of the hypotheses presented in Chapters 2 and 3 require updating. The amended hypotheses reflect a shift away from the notion of latent constructs and represent the hypothesized effect of the independent variables on the financial vulnerability component scores. As the literature is reviewed in Chapter 2, the justification for the hypothesized effects is not reiterated here. The hypotheses are
organized into three broad categories for clarity. The first category includes the proposed accounting variables; those that failed to load as literature suggests. Second are the revenue variables, which have repeatedly been associated with lower levels of financial vulnerability. The third category contains the environmental variables new to this study. The control variables are also reintroduced.

To avoid confusion, the updated hypotheses are labeled with alphabetic, as opposed to numeric, designations (as was done in Chapters 2 and 3 with the original hypotheses). It is also important to note that the hypothesized relationships listed below signify the independent variables modeled in time 1 (e.g., 1998), with the financial vulnerability component scores in time 2 (e.g., 1999).

**Accounting Variables**

*Hypothesis A:* As the ratio of total net assets to total revenue (TNA/TR) increases, financial vulnerability will decrease.

*Hypothesis B:* As the ratio of total net assets to total assets (TNA/TA) increases, financial vulnerability will decrease.

*Hypothesis C:* As the ratio of net income to total assets (NI/TA) increases, financial vulnerability will increase.

*Hypothesis D:* As net income (NIPROF) increase, financial vulnerability will decrease.

*Hypothesis E:* As the ratio of working capital to total assets increases, financial vulnerability will decrease.
**Hypothesis F:** As months of spending (MS) increases, financial vulnerability will decrease.

**Hypothesis G:** As the ratio of net income to total revenue (NI/TR) increases, financial vulnerability will decrease.

**Hypothesis H:** As markup (MU) increases, financial vulnerability will decrease.

**Revenue Variables**

**Hypothesis I:** As the ratio of commercial revenue to total revenue (COMREV) increases, financial vulnerability will decrease.

**Hypothesis J:** Greater revenue diversification (RDI) will decrease financial vulnerability.

**Environmental Variables**

**Hypothesis K:** Greater median household income (Med_House_Inc) will decrease financial vulnerability.

**Hypothesis L:** Greater saturation (Market_Sat) will increase financial vulnerability.

**Hypothesis M:** Greater regional revenue share (Rev_Share_Reg) will decrease financial vulnerability.

**Hypothesis N:** Greater gross domestic product (GDP) will decrease financial vulnerability.

**Hypothesis O:** Greater state product (SP) will decrease financial vulnerability.
Environmental Variables (only for Higher Education)

**Hypothesis P:** Greater national revenue share (Rev_Share_Nat) will decrease financial vulnerability.

**Hypothesis Q:** Greater state revenue share (Rev_Share_State) will decrease financial vulnerability.

**Control Variables**

In addition to the hypothesized predictors of financial vulnerability are the control variables discussed in previous chapters. They are organizational size, an organization’s investment portfolio, and a dichotomous variable representing whether the organization is prospectively endowed.

**4.5 Summary and Preview of Chapter 5**

An exploratory factor analysis using principal component extraction and Varimax rotation on the nine proposed accounting ratios yielded surprising results. In confirmatory factor analysis latent constructs represent unobservable variables and these unobservable variables are assumed to drive the indicator variables as proposed by the researcher. So, confirmatory factor analysis tells us the extent to which proposed indicator variables are driven by the suggested underlying constructs. Without clear empirical evidence to warrant proceeding with confirmatory factor analysis, an exploratory factor analysis was performed first. In exploratory factor analysis, the researcher does not specify assumptions and allows the indicator variables to relate to other variables freely. The result is data-driven constructs and factor loadings for the
variables. Factor loadings, when squared, give the percent of the indicator variable explained by the latent construct.

For this research, nine accounting ratios, which represent approximately half of the independent variables in the study, were tested with exploratory factor analysis. Previous literature suggests the accounting variables relate to another and load onto specific latent constructs (Table 4.1). However, when these accounting ratios were tested with exploratory factor analysis, the results suggest that the accounting variables do not relate to one another as anticipated and are not driven by the proposed latent constructs in the commonly accepted way.

The findings suggest the answer to this dissertation’s first research question – can accounting ratios used to assess nonprofit financial health be organized into fewer constructs – is not as simple as organizing them on the basis of previous theory. Rather, it is clear that we do not know as much about these financial measures as we thought and further exploration is needed. Future research should pursue alternate methods for organizing accounting ratios. It is possible that a broader analysis that incorporates additional accounting ratios can uncover a pattern in the data. Determining whether it is feasible to classify accounting ratios into theoretically intuitive and empirically defensible constructs would increase our understanding of these measures and simplify the approach to nonprofit financial management.

On the other hand, it is possible that there are no latent constructs here, that these accounting ratios are distinct measures, and the kitchen sink approach to
modeling nonprofit financial health is warranted. In other words, it is conceivable that the accounting variables may not be formative and a summative approach is necessary, which is the approach taken here in the amended model.

Given the unexpected findings of the factor analysis, performing confirmatory factor analysis in structural equation modeling is not viable. Therefore, an amended model and a new method of analysis were formulated for the study of nonprofit financial vulnerability. Generalized estimating equations will be used to assess the relationships of the hypothesized predictors to financial vulnerability for human services and higher education nonprofits.

Chapter 5 will present the results of these analyses and Chapter 6 will discuss the findings associated with these results as well as the broader implications of this research.
 CHAPTER 5: GEE RESULTS

5.1 Introduction

The preceding four chapters provide the framework for studying the organizational and environmental determinants of financial vulnerability, specifically among human services and higher education organizations. This research builds on past studies by incorporating established predictor variables and introducing new, untested environmental variables. The purpose is to bridge gaps in theory and improve our understanding of the factors that lead to financial vulnerability.

On the basis of previous nonprofit financial vulnerability literature and the theoretical frameworks informing this research, hypotheses were proposed and a method of analysis chosen. The hypotheses introduced at the end of Chapter 4 are tested here with generalized estimating equations. The following sections provide the results of the regression analyses on the human services and higher education subsectors.

5.2 Human Services

Human services organizations spanning several NTEE categories (I, J, K, L, M, N, O, P) comprise the largest subset of the NTEE major 12 codes and as a group are the most financially vulnerable (Chapter 4).

5.2.1 GEE Results

Generalized estimating equations (GEE) is an extension of generalized linear modeling for longitudinal or other correlated data that violate the independence
assumption of other methods. As a population-averaged approach, GEE provides information on changes from the mean response across all organizations and does not yield organization-level information. While that does not allow for predictions on a case-by-case basis, the researcher is able to model time-varying covariates.

GEE was employed here by initially modeling all predictors with theoretical implications. Consistent with commonly accepted practice (Garson 2012e, 37) non-significant predictors were then removed one at a time until all remaining variables were significant. Given the large sample size and the possibility for small effects to achieve statistical significance, the cutoff employed was .01. If a predictor variable remained statistically significant at the .01 level in the original data (with missing values), it stayed in the model. If not, the variable was trimmed. Type III sums of squares was selected, so the entry order of the predictors does not have an effect on the model.

The GEE analysis produced several interesting and unexpected results. First, the accounting variables that have long served as the basis for nonprofit financial vulnerability and for-profit bankruptcy prediction models are not reliably significant predictors. Second, the revenue variables are not as clearly related to financial vulnerability as previous studies suggest. Third, the proposed environmental variables are the most consistent predictors of financial vulnerability. Lastly, the control variables are working in unexpected directions here.

The human services dataset has 162,962 observations and 16,202 missing
values, meaning 9.0% of the cases are missing a value for the dependent variable. Using multiple imputation (MI), five imputed datasets were created to replace the missing values. Each of the imputed datasets has 179,164 observations and 0 missing values.

Table 5.1 presents the results from the first run on the original dataset (including missing values) and the results from the first run on the median imputed dataset. To determine the median imputed dataset, the goodness-of-fit statistics (QIC) were analyzed. The datasets were put in the order of their QIC and output from the dataset in the middle of the five imputations was chosen as the most representative.

Unlike in previous studies where financial vulnerability is coded 1 (instead of 0) to yield more intuitive results, the continuous component scores used here signify less financial vulnerability as they rise. Therefore, a positive relationship between an independent variable and financial vulnerability means that as the variable rises, the component scores also rise and financial vulnerability declines. Conversely, a negative relationship suggests that an increase in the independent variable will result in a decrease in the component score and an increase in financial vulnerability.

The results in Table 5.1 suggest the proposed model with 18 independent variables is not suitable for this data and a more parsimonious model is appropriate. In GEE, it is commonly accepted for the researcher to remove non-significant variables one at a time until all remaining predictors are significant (Garson 2012e, 37-38). Therefore, non-significant variables were removed one at a time while monitoring QIC for both the original dataset and the median imputed dataset until 7 variables
Table 5.1: Parameter Estimates – Full Model – Human Services

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<tr>
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<td>.0045</td>
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<td>.0044</td>
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<td>.1413</td>
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<tr>
<td>SIZE</td>
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<td>.0092</td>
</tr>
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Dependent Variable: Financial Vulnerability
Original Data QIC=135,204.82; Imputed Data QIC=151,305.66
a. Set to zero because this parameter is redundant
remained. Each time a non-significant variable was removed, QIC lowered. The result is a more parsimonious model with better fit. There is some variation in the parameter estimates from the first run with all the variables to the final model, but that is to be expected with partial coefficients.

Table 5.2 presents the results of the trimmed model for the original dataset and the median imputed dataset. The relationships of the independent variables to financial vulnerability are consistent between the original data and the imputed data, with the exception of GDP. GDP is statistically significant for the original data at the .01 level and is significant at the .05 level for the median imputed data. An additional run was performed on the imputed data, removing GDP. The QIC rose slightly and the parameter estimates for the remaining variables were remarkably similar, so based on the cutoff rule established earlier, GDP remained in the model.

### 5.2.2 Hypotheses

Based on the GEE results in Table 5.2, each of the hypotheses are reviewed. To avoid confusion, a subscript of HS or HE is placed after each hypothesis to differentiate human services from higher education, respectively.

#### Accounting Variables

Of the eight accounting variables, only two – NIPROF and NI/TA – are significant at the .01 level for both the original and median imputed datasets. The remaining six variables – TNA/TA, TNA/TR, WC/TA, NI/TR, MS, and MU – are not statistically significant in either dataset and were trimmed from the model (Table 5.2).
<table>
<thead>
<tr>
<th>Parameter</th>
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<th></th>
<th>Imputed Data</th>
<th></th>
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<td>.008</td>
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<td>SIZE</td>
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<td>.0092</td>
<td>228.322</td>
<td>.000</td>
</tr>
</tbody>
</table>

Dependent Variable: Financial Vulnerability
Original Data QIC=135,127.61; Imputed Data QIC=150,872.72
Hypotheses C\textsubscript{HS} is supported. Hypothesis C\textsubscript{HS} proposes that as the ratio of net income to total assets (NI/TA) increases, financial vulnerability also increases. The rationale is that nonprofits with a larger share of organizational assets dependent upon current year earnings (i.e., the more revenue dependent a nonprofit is without asset reserves), the more vulnerable the nonprofit is to a financial shock. Here, the coefficient is negative and the variable is significant at the .01 level. Which suggests this notion is supported.

Hypothesis D\textsubscript{HS} proposes that as net income (NIPROF) increases, financial vulnerability decreases. The coefficient for NIPROF is positive and the variable is significant at the .01 level, which supports the hypothesis. Taken together with Hypothesis C\textsubscript{HS}, these findings show that human services nonprofits with greater net income are less financially vulnerable than nonprofits with less net income, unless their net income comprises a large share of their overall total assets. This is significant because it suggests that revenue \textit{and} assets are important to avoid financial vulnerability. An organization should focus on increasing revenue and decreasing expenses, but not to the exclusion of building asset reserves.

Hypotheses F\textsubscript{HS} and H\textsubscript{HS}, which propose that increases in months of spending and markup will yield lower levels of financial vulnerability are not supported. They are both statistically significant with negative coefficients in the first run (Table 5.1), but as non-significant variables were removed, their effect diminished and they did not make the final run (Table 5.2).
Hypotheses A_{HS}, B_{HS}, E_{HS}, and G_{HS} are not supported. They propose that as the ratio of total net assets to total revenue (TNA/TR), the ratio of total net assets to total assets (TNA/TA), the ratio of working capital to total assets (WC/TA), and the ratio of net income to total revenue (NI/TR) increase, financial vulnerability decreases. The variables are not statistically significant in the original or median imputed dataset. As such, they are trimmed from the final model.

**Revenue Variables**

There are two hypotheses tied to the revenue variables, J_{HS} and K_{HS}. J_{HS} proposes that as the ratio of commercial revenue to total revenue (COMREV) increases, financial vulnerability decreases. COMREV is not significant, thus the hypothesis is not supported. Also, the notion that high revenue diversification (RDI) leads to decreases in financial vulnerability (hypothesis K_{HS}) is not supported here. RDI is not statistically significant in the original or median imputed model. As such, RDI is trimmed from the final model.

These findings of non-significance are important given the tendency in the literature to espouse the importance of specific revenues for all nonprofits. It is clear for human services charities as a group that revenue diversification and increases in commercial revenue are not surefire methods to avoid financial vulnerability. These findings suggest human services organizations should pursue revenue streams consistent with their mission-related activities and avoid the transaction costs or possible mission-drift associated with revenue diversification and commercialization.
Environmental Variables

Environmental variables, among the four categories of variables, are the most consistent predictors of financial vulnerability. Each of the environmental variables, except market saturation (Market_Sat), is in the trimmed model. Hypotheses K_HS, M_HS, N_HS, and O_HS propose that increases in median household income (Med_House_Inc), regional revenue share (Rev_Share_Reg), gross domestic product (GDP), and state product (SP) lead to decreases in financial vulnerability. The results in Table 5.2 support these hypotheses.

These findings are very critical to our understanding of nonprofit finances. The notion that extra-organizational factors affect nonprofit financial health has been proposed in several studies (Chapter 2), though these effects have gone largely untested. The significant findings here confirm that macroeconomic factors (GDP and SP), community factors (median household income), as well as an organization’s financial prominence in the region (revenue share), can decrease financial vulnerability in human services organizations.

Hypothesis L_HS proposes that increases in market saturation (Market_Sat) lead to increases in financial vulnerability. The logic is that increased density will increase competition and diminish access to valuable resources. Though not statistically significant, it is interesting to note the positive coefficient for Market_Sat in the expanded model (Table 5.1). This suggests that as regional saturation increases, financial vulnerability decreases, which does not support the hypothesis, but leads to
additional questions. Carroll and Stater (2009) found an increased stability in the revenue structures of nonprofits in a metropolitan statistical area (MSA). It is possible that density also correlates, as they suggest, with greater access to resources and thus outweighs the potential deleterious effects of competition. This may be true, but the significance of the revenue share variable suggests there are limits to this line of reasoning.

**Control Variables**

The control variables are not as clear in this study as in previous research. Organizational size (SIZE), measured as the natural log of total assets, is the only control variable in the trimmed model. It is statistically significant at the .01 level with a positive coefficient. Consistent with previous research, this suggests larger organizations experience less financial vulnerability.

The effects are less clear for the other two control variables. The ratio of investment portfolio to total assets (INVEST) is not statistically significant. As outlined in Chapter 2, increases in INVEST are traditionally associated with declines in financial vulnerability. That is not the case here. It is possible the effects of INVEST on financial vulnerability are captured, at least in part, by organizational size.

Next, the relationship between endowment (ENDOW) and financial vulnerability is not as clear as Bowman et al. (2012) suggest. Categorical variable information in the output shows that of the 162,962 observations in the original data, 10,288 (6.3%) are prospectively endowed. This percentage holds for the imputed datasets as well with
11,355 endowed organizations out of 179,164. Typically, one would expect prospectively endowed organizations to be less financially vulnerable, but the coefficients in Table 5.1 are negative for the original and imputed data. As with INVEST, it is likely the case that organizational size picks up the endowment effects on financial vulnerability and since ENDOW is not statistically significant it was trimmed from the model.

5.3 Higher Education

Higher education organizations (NTEE category B40) are the least financially vulnerable subsector (see Chapter 4, page 96). Further, they number far fewer and offer a more narrowed focus than the large and diverse human services subsector. As such, an analysis of higher education provides an interesting contrast to the analysis of human services.

5.3.1 GEE Results

The GEE analysis of higher education, as with human services, produced several unexpected and interesting results. First, though there are two additional predictor variables in this analysis, there are fewer important predictors of financial vulnerability in higher education than in human services. Of the 20 proposed predictor variables, only 6 are included in the trimmed model. Second, the relationship between the proposed environmental variables and higher education nonprofits differs from human services. Third, assets appear to be more important in higher education than revenues. The final notable observation is that only two variables are statistically significant in
both subsectors. This finding adds validity to the argument that analyses on the factors leading to financial vulnerability should be conducted on subsectors or even within subsectors as opposed to the charitable sector as a whole.

Higher education has 6,498 observations and 498 missing values, meaning 7.1% of the cases are missing a value for the dependent variable. As with human services, multiple imputation (MI) was used to create five datasets where the missing values were imputed. The imputed datasets each have 6,996 observations and 0 missing values. Following the method employed earlier, data from the median imputed dataset based on QIC (goodness-of-fit) was chosen.

Table 5.3 presents the parameter estimates for the original data (with missing values) and the median imputed dataset. This table is the first run and includes all 20 predictor variables. Interpretation is the same as in Tables 5.1 and 5.2 where increases in the dependent variable signal less financial vulnerability. Therefore, for statistically significant variables with a positive coefficient, increases in the predictor lead to a higher component score (i.e., less financial vulnerability).

The results in Table 5.3 suggest that a more parsimonious model with fewer predictors is possible. Of the 20 variables, only a handful of the predictors are significant. Therefore, an iterative process was performed where non-significant predictors were removed one at a time until all the remaining variables were statistically significant (at the .01 level) and the best model fit (lowest QIC) was achieved. To reiterate the caution stated earlier the coefficients in the parameter
Table 5.3: Parameter Estimates – Full Model – Higher Education

| Parameter              | Original Data | | | Imputed Data | | |
|------------------------|---------------|-----------------|---------------|-----------------|---------------|
|                        | B             | Std. Error      | Wald Chi-Square | Sig.          | B             | Std. Error      | Wald Chi-Square | Sig.          |
| (Intercept)            | -0.10         | 0.054           | 3.377          | 0.066         | -0.02         | 0.049           | 6.131          | 0.013         |
| [Endow=1]              | 0.030         | 0.0110          | 7.460          | 0.006         | 0.038         | 0.0103          | 13.529         | 0.000         |
| [Endow=0]              | 0*            | -               | -              | -             | 0*            | -               | -              | -             |
| Med_House_Inc         | 0.018         | 0.0091          | 4.105          | 0.043         | 0.017         | 0.0086          | 3.729          | 0.053         |
| Market_Sat            | 0.002         | 0.0022          | 0.804          | 0.370         | 0.001         | 0.0021          | 0.513          | 0.474         |
| Rev_Share_Reg         | 0.003         | 0.0037          | 0.765          | 0.382         | 0.001         | 0.0035          | 0.178          | 0.673         |
| Rev_Share_Nat         | 0.962         | 0.1016          | 89.740         | 0.000         | 0.955         | 0.0973          | 96.365         | 0.000         |
| Rev_Share_State       | -0.001        | 0.0144          | 0.003          | 0.956         | 0.001         | 0.0134          | 0.006          | 0.938         |
| SP                     | -0.005        | 0.0085          | 0.382          | 0.537         | -0.006        | 0.0081          | 0.473          | 0.492         |
| GDP                    | 0.016         | 0.0036          | 18.865         | 0.000         | 0.014         | 0.0033          | 19.321         | 0.000         |
| TNA/TR                 | 0.011         | 0.0110          | 1.038          | 0.308         | 0.014         | 0.0106          | 1.694          | 0.193         |
| TNA/TA                 | 0.022         | 0.0177          | 1.533          | 0.216         | -0.021        | 0.0023          | 89.360         | 0.000         |
| NI/TR                  | 0.002         | 0.0051          | 0.911          | 0.763         | 0.002         | 0.0038          | 0.187          | 0.666         |
| NI/TA                  | -0.017        | 0.0126          | 1.778          | 0.182         | 0.006         | 0.0028          | 5.081          | 0.024         |
| NIPROF                 | -0.003        | 0.0082          | 0.003          | 0.960         | 0.001         | 0.0055          | 0.000          | 0.984         |
| WC/TA                  | -0.009        | 0.0077          | 0.649          | 0.421         | 0.005         | 0.0012          | 18.241         | 0.000         |
| MS                     | 0.085         | 0.0285          | 8.899          | 0.003         | 0.021         | 0.0186          | 1.271          | 0.260         |
| MU                     | -0.077        | 0.0257          | 8.983          | 0.003         | -0.020        | 0.0166          | 1.478          | 0.224         |
| COMREV                 | -0.006        | 0.0050          | 1.536          | 0.215         | -0.006        | 0.0047          | 1.797          | 0.180         |
| RDI                    | 0.001         | 0.0007          | 4.537          | 0.033         | 0.001         | 0.0008          | 2.538          | 0.111         |
| INVEST                 | 0.012         | 0.0089          | 1.846          | 0.174         | -0.004        | 0.0023          | 2.451          | 0.117         |
| SIZE                   | -0.018        | 0.0144          | 1.575          | 0.210         | -0.014        | 0.0130          | 1.084          | 0.298         |

Dependent Variable: Financial Vulnerability
Original Data QIC=1185.14; Imputed Data QIC=1213.72
a. Set to zero because this parameter is redundant
estimates output for GEE are partial coefficients, so removing one variable will change remaining variables. For instance, though median household income (Med_House_Inc) appears to be nearly statistically significant in the original and imputed data in Table 5.3, when variables were iteratively removed, median household income became less important and was eventually removed to improve model fit.

Table 5.4 presents the results of the trimmed model for the original dataset and the median imputed dataset. Statistical significance and coefficients are consistent between the original data and the imputed data.

5.3.2 Hypotheses

Based on the results in Table 5.4, each of the hypotheses listed at the end of Chapter 4 are reviewed in this section. The subscript HE on the hypotheses is used as a designation for the higher education subsector, whereas HS is used above for human services.

Accounting Variables

Of the 8 accounting variables, only one variable is significant at the .01 level – NI/TA. The other variables – TNA/TR, TNA/TA, NI/TR, NIPROF, WC/TA, MS, and MU – are not statistically significant and were trimmed from the model.

Hypothesis C_{HE} proposes that as the ratio of net income to total assets (NI/TA) increases, financial vulnerability increases. This is confirmed in Table 5.4 where NI/TA is statistically significant at the .01 level with a negative coefficient for both the original data and the imputed data. This is one of only two variables that are statistically
# Table 5.4: Parameter Estimates – Trimmed Model – Higher Education

<table>
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<tr>
<th>Parameter</th>
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<th>Hypothesis Test</th>
<th>Imputed Data</th>
<th>Hypothesis Test</th>
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<td>Std. Error</td>
<td>Wald Chi-Square</td>
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<td>.090</td>
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Dependent Variable: Financial Vulnerability

Original Data QIC=869.82; Imputed Data QIC=911.28

a. Set to zero because this parameter is redundant
significant for both subsectors. As with human services, this finding suggests increased revenue dependence, without significant asset reserves, yields greater financial vulnerability.

Hypotheses $D_{HE}$, $F_{HE}$, and $H_{HE}$ are not supported, but there are elements worth noting. Hypothesis $D_{HE}$ suggests that increases in net income (NIPROF) lead to decreases in financial vulnerability. This effect was statistically significant in human services, but is not significant here. This is partly explained by the high correlation (.771) between NIPROF and national revenue share (Rev_Share_Nat) (Table 4.14). National revenue share is a better predictor of financial vulnerability and is likely capturing the effect of NIPROF.

Hypotheses $F_{HE}$ and $H_{HE}$ propose that an increase in months of spending or markup lead to a decrease in financial vulnerability. The results do not support these hypotheses and suggest their relationship to financial vulnerability is muddled. Their effects are at least partially affected by the multicollinearity between the variables (correlation is .926 in Table 4.14). During the iterative process where non-significant variables were removed, multiple runs were performed with both MS and MU in, both taken out, and each variable in with the other removed. After multiple runs, it was clear the variables did not have a clear effect on financial vulnerability and the QIC was lowest with both variables removed, so they were trimmed from the model.

As in human services, hypotheses $A_{HE}$, $B_{HE}$, $E_{HE}$, and $G_{HE}$ are not supported. They propose that as the ratio of total net assets to total revenue ($TNA/TR$), the ratio of total
net assets to total assets (TNA/TA), the ratio of working capital to total assets (WC/TA), and the ratio of net income to total revenue (NI/TR) increase, financial vulnerability decreases. The variables are not statistically significant in the original data; and though two variables are statistically significant in the imputed data (WC/TA and TNA/TA), none remain significant as non-significant variables were removed. As such, they were trimmed from the final model.

**Revenue Variables**

The two revenue variables have a greater effect on financial vulnerability in higher education organizations than in human services. Hypothesis J_{HE} states that greater revenue diversification (RDI) leads to a decrease in financial vulnerability. While this hypothesis is not supported, RDI was the final variable trimmed from the model and was nearly statistically significant at the .10 level for the original data and imputed data. Given the large sample size, this level of significance was not deemed sufficient so the variable was trimmed. Though it is worth noting the directionality of the variable, which suggests a more diversified revenue portfolio may be in the interest of a higher education nonprofit.

Hypothesis I_{HE} proposes that an increase in the ratio of commercial revenue to total revenue leads to a decrease in financial vulnerability. Commercial revenues are consistently associated with decreases in financial vulnerability and decreases in revenue volatility (Chapter 2). However this hypothesis is not supported here, where the opposite effect is statistically significant at the .01 level for the original and imputed
datasets (Table 5.4). While counterintuitive in some respects, the implication for nonprofit institutions of higher education is quite evident. Tuition-driven higher education organizations on average are more financially vulnerable than prospectively endowed higher education organizations.

**Environmental Variables**

Environmental variables represent seven hypotheses for the analysis of higher education. The five proposed for human services plus two new variables that go beyond the regional parameters of the revenue share variable and extends the analysis to statewide and national revenue share.

Hypothesis $N_{HE}$ proposes that increases in gross domestic product (GDP) lead to a decrease in financial vulnerability. As in human services, this hypothesis is supported in higher education, suggesting that macroeconomic factors affect nonprofit finances. GDP is statistically significant at the .01 level in the original and imputed datasets with a positive coefficient (Table 5.4).

Hypothesis $P_{HE}$ suggests that increases in national revenue share ($Rev_{ShareNat}$) lead to a decrease in financial vulnerability, which is supported in the data. $Rev_{ShareNat}$ is statistically significant at the .01 level for the original and imputed data with a positive coefficient. The rationale behind this variable is similar to regional revenue share ($Rev_{ShareReg}$) for human services organizations.

This is made clearer by the non-significant findings associated with median household income ($Med_{HouseInc}$), state product (SP), regional revenue share
(Rev_Share_Reg), state-level revenue share (Rev_Share_State), and market saturation (Market_Sat). Hypotheses $K_{HE}$, $L_{HE}$, $M_{HE}$, $O_{HE}$, and $Q_{HE}$ are not supported.

For a human services organization, the evidence suggests revenue share is a significant predictor at the level of FIPS code. However, for higher education, the evidence suggests revenue share is a significant predictor only at the national level. The implication is that competition and an organization’s share of the market are defined by niche more than geography; and for nonprofit higher education organizations, the niche appears to be nation-wide.

**Control Variables**

Two out of the three control variables are statistically significant and operate in the expected direction. Organizational size (SIZE) is not statistically significantly related to financial vulnerability. The moderate correlations between SIZE and ENDOW (.425) as well as SIZE and Rev_Share_Nat (.486) could account for the non-significance. It is possible they are picking up on similar effects, but ENDOW and Rev_Share_Nat are better predictors. For the second control variable, the findings suggest that organizations with a higher ratio of investments to total assets are less financially vulnerable. INVEST is statistically significant at the .01 level and has a positive coefficient, which is the expected relationship.

Next, the relationship between endowment (ENDOW) and financial vulnerability is clearer here than in human services. ENDOW is statistically significant at the .01 level with a positive coefficient for prospectively endowed organizations (ENDOW=1). This
means that on average, prospectively endowed organizations are statistically
significantly less likely to be financial vulnerable than the reference category
(organizations not deemed prospectively endowed). A significant finding here is
important given the much higher percentage of higher education nonprofits deemed
prospectively endowed. Categorical variable information in the output shows that of the
6,500 observations in the original data, 2,107 (32.4%) are prospectively endowed. This
percentage drops only slightly to 31.8% for the imputed datasets with 2,223
prospectively endowed organizations out of 6,996.

5.4 Summary and Preview of Chapter 6

There are substantial and important differences between human services and
higher education and those differences are apparent in the results of the GEE analyses.
Human services spans 8 NTEE categories (I through P) covering diverse mission areas
combined into one major category. As such, there is a high degree of heterogeneity
among the organizations and the resulting sample is large (n=162,962 in the original
data, 179,164 in the imputed data). As a group, human services organizations are, along
with religion, the most financially vulnerable subsector of the NTEE major 12
categories. Higher education on the other hand represents a more homogenous group
culled from NTEE code B40. The narrow focus yields a smaller number of observations
(n=6,498 in the original data, 6,996 in the imputed data). As a group, higher education
organizations are, along with hospitals, the least financially vulnerable subsector of the
NTEE major 12 categories.
The results of the GEE analysis for human services were interesting. Three variables – NIPROF, NI/TA, and SIZE – had expected effects on financial vulnerability. Increases in organizational size and net income lead to less financial vulnerability, which is intuitive and accords with previous research. Likewise, the results for NI/TA were expected. Increases in the ratio of net income to total assets lead to increases in financial vulnerability. On average, an organization that is too dependent on revenue and does not have sufficient asset reserves is more financially vulnerable. The takeaway from the accounting variables for human services is twofold. First, it does not appear the accounting ratios have consistently significant effects on financial vulnerability. Second, for human services organizations revenue and assets are important to avoid financial vulnerability.

Going beyond the organization, it is clear that the environment has an effect on financial vulnerability. Increases in macroeconomic factors such as gross domestic product (GDP) and state product (SP) are significantly related to decreases in financial vulnerability for human services organizations. It is also evident that the community and the organization’s place within it are also important factors. Increases in median household income (Med_House_Inc), which goes to the carrying capacity of a region is linked with lower financial vulnerability. Also, an organization’s regional revenue share (Rev_Share_Reg) is tied to financial vulnerability, where on average a larger share is predictive of lower financial vulnerability.

The results of the GEE analysis for higher education yielded two common
predictors of financial vulnerability in human services – NI/TA and GDP. Once again, an increased ratio of net income to total assets is associated with increases in financial vulnerability. Similar to the reasoning above, revenue dependent organizations that neglect building assets are more financially vulnerable. Additionally, gross domestic product is statistically significant here, suggesting macroeconomic factors affect higher education as well as human services. The control variables INVEST and ENDOW worked in expected directions. Increases in the relative size of the investment portfolio and being prospectively endowed lead to decreased financial vulnerability.

Similar to human services, revenue share is important in higher education organizations. Though, unlike in human services where regional revenue share is significant, national revenue share is statistically significant in higher education. This suggests the geographic size of an organization’s niche varies depending on subsector. Finally, commercial revenue has a significant negative relationship, which suggests that as the ratio of commercial revenue to total revenue increases, financial vulnerability also increases.

Chapter 6 will provide a summary of the first five chapters, discuss the GEE findings in greater detail, provide the limitations of this dissertation, and conclude with the broader implications of this research for future study.
CHAPTER 6: SUMMARY, LIMITATIONS, AND CONCLUSION

6.1 Introduction

Accounting-based approaches to the study of nonprofit financial vulnerability have dominated since Tuckman and Chang began this discussion two decades ago. The underlying assumption is that by analyzing accounting ratios, researchers can make predictions regarding the future likelihood that a nonprofit will experience financial vulnerability. These approaches borrow heavily from bankruptcy prediction models used in the corporate for-profit sector. The problem however rests in the reality that charitable organizations cannot be legally forced into liquidation or reorganization. Therefore, there are no satisfactory lists of nonprofit bankruptcies. Without organizational bankruptcies as a viable dependent variable, researchers turned to the notion of financial vulnerability; where a firm’s financial vulnerability was determined via several different yet equally arbitrary cutoffs. For example, previous studies suggest a 20% decrease in total net assets over three years or a 25% decrease in program expenditures over one year theoretically correlate with nonprofit financial vulnerability. An argument can and has been made that these cutoffs are defensible; but an argument is made here that any cutoff unnecessarily dichotomizes continuous variables and valuable information is lost.

Dichotomizing financial vulnerability and treating it as a proxy for bankruptcy keeps the discussion mired in the corporate for-profit bankruptcy prediction way of looking at things. This research attempts to move beyond those parameters by
reconceptualizing the dependent variable, employing an alternate method of analysis, and providing a more open systems approach to the analysis of nonprofit financial vulnerability.

There are three primary contributions of this dissertation to the literature. First, revenue and assets are important to human services and higher education nonprofits. Focusing on revenue, as several studies in the literature have done, as a means to avoid nonprofit financial vulnerability, misses the importance of building and sustaining assets. Second, underlying accounting constructs do not exist in the way theory suggests. Accounting ratios commonly referred to as representative of liquidity, solvency, profitability, and operating margin do not hang together and are not useful indicators for these theoretical constructs. Third, the environment matters. Researchers need to move away from an accounting-centric mentality and analyze the effects of environmental factors on financial vulnerability.

This dissertation used three theoretical frameworks – resource dependence, portfolio, and organizational ecology – to organize the theory driven predictors (i.e., not control variables) of nonprofit financial vulnerability into three groups – accounting variables, revenue variables, and environmental variables respectively. The results of the study are consistent with the deterministic view in resource dependence and organizational ecology regarding a limited role for nonprofit managers. The findings here suggest environmental variables affect nonprofit financial vulnerability and the best course for nonprofit managers is to build assets as a buffer to financial
vulnerability.

The sections that follow provide a brief summary of this research, the results of the study, as well as the implications of the findings for future research. First, there is a restatement of the research questions driving the research as well as a review of the dependent variable and independent variables. The following section reviews the failed attempt to provide a conceptually clearer picture of the accounting predictors leading to financial vulnerability. The results of the factor analysis and subsequent discussion regarding the accounting predictors have important implications for future research. The next two sections contain a summary of the amended model and the results of the generalized estimating equations analysis. This is followed by the limitations of this research and a final section addressing this dissertation’s findings and the implications for future research.

6.2 Review of Research Questions, Variables, and Data

There are two primary research questions motivating this dissertation. First, to explore whether accounting ratios commonly used to assess nonprofit financial health can be organized into fewer constructs. The literature suggests accounting ratios are representative of things like solvency, liquidity, operating margin, and profitability so I set out to empirically test this. Second, and more broadly, to explore several organizational and environmental factors that lead to financial vulnerability; with the emphasis on bringing a more open systems approach to the analysis by exploring previously untested environmental variables.
A review of the literature found four accepted indicators of nonprofit financial vulnerability – asset disruption risk, funding disruption risk, program disruption risk, and insolvency risk. These variables are used here as indicators of financial vulnerability. The literature review also yielded several predictor variables. The best predictors of nonprofit financial vulnerability from previous studies were selected and included here. In addition to those variables culled from previous research, several extra-organizational variables were also proposed. Generally, these predictors fall into four categories – accounting variables, revenue variables, environmental variables, and control variables.

The majority of the data are pulled from the National Center for Charitable Statistics digitized data files. These files contain information from tax returns filed for the years 1998-2003 for all filing 501(c)(3) organizations. The data were cleaned to remove organizations failing to comply with generally accepted accounting principles, observations containing obvious data errors, and other cases failing to meet common criteria required for inclusion in nonprofit financial vulnerability studies. Additional data were compiled from the Census Bureau, the Bureau of Economic Analysis, and the Consumer Price Index to capture population figures and median household income, gross domestic and state products, and inflation respectively.

6.3 Review of Factor Analysis on Accounting Variables

In an attempt to answer the first research question, the nine proposed accounting ratios were organized on the basis of previous theory into one of four
constructs – solvency, liquidity, profitability, or operating margin. Categorizing the variables did not require significant interpretation. If previous research referred to the accounting variable, for instance NI/TR, as an operating margin variable, then it was classified as such. Likewise, WC/TA is a common liquidity ratio, TNA/TA is an accepted solvency ratio, and so on. Once the data were cleaned, an exploratory factor analysis was conducted to determine whether data matched theory.

The exploratory factor analysis on the nine accounting predictor variables provides clear evidence that accounting ratios, routinely classified as representative of larger constructs, do not relate to one another as expected. The idea that various accounting ratios reliably and accurately measure singular underlying constructs such as solvency or profitability is a widely held and deeply entrenched notion, a notion that clearly needs rethinking in the nonprofit context. The results suggest the underlying constructs are not as clear as a priori thinking suggests. Presumably these accounting ratios were deemed representative indicators of larger constructs at one time and in one context, but these ratios have not been systematically tested using dimension reduction techniques in the digitized data until now. The unexpected results suggest a more rigorous analysis of the accounting ratios is necessary and researchers should avoid referring to these ratios as representative of solvency, liquidity, profitability, or operating margin because the constant misclassification of the ratios is creating additional noise. Further, since the accounting ratios and their classifications derive from corporate bankruptcy prediction models, these results caution against using
metrics from the for-profit sector in the nonprofit context without properly vetting their utility.

The other possible inference from the results of the exploratory factor analysis is that these accounting ratios are in fact distinct measures and defy classification in the nonprofit data. It is possible that pursuing a theoretically intuitive and empirically defensible taxonomy of the accounting ratios is fruitless, even counterproductive, because the variables are representative of different things. As such, a kitchen sink approach to modeling nonprofit financial vulnerability, where accounting ratios are independent predictors, may be the appropriate approach. The amended model proposed here and tested with generalized estimating equations makes this assumption.

6.4 Review of Amended Model and GEE Results

Given the unexpected results of the exploratory factor analysis, conducting confirmatory factor analysis with structural equation modeling was no longer viable. Therefore, an alternate approach to modeling nonprofit financial vulnerability was proposed in Chapter 4. The amended approach to modeling nonprofit financial vulnerability entailed four major changes from the model proposed in Chapter 3. The first was to create component scores for financial vulnerability by combining asset disruption risk, program disruption risk, insolvency risk, and funding disruption risk. Computed component scores were estimated using the regression method in SPSS via principal component analysis. Missing component scores for those organizations
without all six years of tax returns in the digitized data were imputed using multiple imputation.

Second, instead of performing one analysis on the charitable sector as whole, the focus was narrowed and two analyses were performed. Conducting a sector-wide analysis with subsector as a control variable potentially results in the loss of information. Therefore two separate analyses, one on human services and one on higher education, were performed. This offers an interesting contrast between two very different samples. Human services is vast (N=1179,164 in the imputed dataset), comprising several diverse mission areas (NTEE categories I, J, K, L, M, N, O, P); and higher education is more focused with fewer observations (N=6,996 in the imputed dataset) and only one mission area (NTEE category B40). Further, human services is the most financially vulnerable subsector while higher education is the least financially vulnerable.

Third, a change in method of analysis from structural equation modeling to generalized estimating equations (GEE). GEE is an extension of generalized linear modeling for longitudinal data. GEE can handle correlated data by allowing the researcher to specify a grouping variable (in this case, organizational tax ID or employee identification number) and a within-subject variable (fiscal year). The digitized data used here are not true panel data (i.e., where each organization has data for each year in the study); rather, the data are cross-sectional time series data (i.e., each year in the study comprises a different pool of organizations). Though many
organizations have data for each year, there are organizations with several observations missing. With cross-sectional time series data, population-averaged models (of which GEE is one) are ideal. A trade-off in using this method of analysis is that the regression coefficients have interpretation for the population rather than for individual organizations.

The final change involved adding two environmental variables to the analysis of higher education organizations. The theoretical argument behind the inclusion of environmental variables stems from organizational ecology and rests on concepts including density, competition, and market share. In Chapter 3, variables including revenue share and market saturation were constructed using a narrow geographical area as a reference. For these variables, nonprofits are compared to other nonprofits within the same subsector and within the same federal information processing standard (FIPS) code. The federal government assigns FIPS codes, where each code is a county or county equivalent. This is a valid unit of measure for comparatively smaller human service organizations, but larger higher education organizations presumably operate in a broader market. Therefore, two additional revenue share variables were created, one that reflects an organization’s revenue share at the state level and one at the national level.

6.5 GEE Results and Discussion

For the initial GEE analysis of human services, the amended model has eighteen predictor variables including eight accounting variables, two revenue variables, five
environmental variables, and three control variables. For the initial GEE analysis of higher education, the amended model has twenty predictor variables including eight accounting variables, two revenue variables, seven environmental variables, and three control variables.

The results of the initial GEE analyses suggest a more parsimonious approach for modeling financial vulnerability among human services and higher education nonprofits is recommended. Of the eighteen predictor variables, only seven variables remain statistically significant in the trimmed model for human services. Likewise, of the twenty predictor variables, only six variables remain statistically significant in the trimmed model for higher education.

The GEE results for human services suggest the environment is a significant predictor of financial vulnerability. Median household income, regional revenue share, state product, and gross domestic product are all statistically significant with positive coefficients. This means that as these variables rise, financial vulnerability decreases. Net income and organizational size were also statistically significant with positive coefficients. These are intuitive findings and suggest both revenue and assets are important predictors of financial vulnerability in human services organizations. The final significant variable, net income divided by total assets, has a negative coefficient, which is consistent with theory. As total assets are increasingly comprised of current year net income (i.e., an organization is revenue dependent with few asset reserves), financial vulnerability increases.
The GEE results for higher education diverge from those for human services in interesting and enlightening ways. Though environment is also a significant predictor of financial vulnerability in these organizations, only two variables are statistically significant – gross domestic product and national revenue share. The fact that regionally focused and even state level environmental variables did not achieve statistical significance suggests higher education nonprofits are competitive at a broader geographic level than human services. As gross domestic product and national revenue share increase, financial vulnerability decreases. Control variables including whether an organization is prospectively endowed and the size of an organization’s investment portfolio were statistically significant with positive coefficients. This accords with previous literature and suggests that assets are important for higher education nonprofits. The final two variables that achieved statistical significance are net income divided by total assets and commercial revenue as a percent of total revenue. Both variables have negative coefficients. These findings suggest that greater revenue dependence, specifically on commercial revenue, increases financial vulnerability in higher education nonprofits.

The results of the GEE analyses on human services and higher education yield several noteworthy findings. First, the accounting variables upon which models of nonprofit financial vulnerability are built are not consistently significant predictors. Only net income divided by total assets (NI/TA) is in both trimmed models and net income (NIPROF) is the only other accounting variable found in a trimmed model (in
the analysis of human services). Second, revenue variables are not as clearly related to financial vulnerability as the literature suggests and only one variable is statistically significant. Commercial revenue (COMREV) is statistically significant in the higher education analysis, but in the opposite direction to theory. Increases in commercial revenue lead to greater financial vulnerability in higher education, suggesting tuition-dependent institutions have greater financial vulnerability.

Third, the environmental variables are the most consistent predictors of financial vulnerability with two variables in the trimmed model for the analysis of higher education organizations (Rev_Share_Nat and GDP) and four variables in the trimmed model for the analysis of human services organizations (Med_House_Inc, Rev_Share_Reg, SP, and GDP). Fourth, though not all three variables were included in both trimmed models, the proposed control variables yielded a statistically significant finding for each variable in one of the models (SIZE in human services and INVEST and ENDOW in higher education).

Lastly, differences in the results between the subsectors illustrate the importance of conducting research at the level of the subsector and serves as a caution against sector-wide analyses.

6.6 Limitations

There are several limitations to this study. First, the generalizability of the findings presented here extends only to those organizations that file IRS Form 990. Second, this research, similar to other studies performed with the digitized data, covers
a six-year period that may be different than other time frames. Third, the results of the
generalized estimating equations analysis are population-averaged results, not subject
specific. Fourth, there are several theoretical implications for nonprofit financial health
researchers, but few practical implications for nonprofit managers. Each of these
limitations is explored further in the following paragraphs.

As with previous attempts to model nonprofit financial vulnerability, this
dissertation uses data available from the National Center for Charitable Statistics as a
sampling frame (specifically the digitized data). The digitized data contain information
from all 501(c)(3) organizations filing tax returns (IRS Form 990 and IRS Form 990-EZ)
during the years 1998-2003. While these data are the standard for large sample studies
of nonprofit finances, there is considerable sampling bias. The minimum revenue
threshold for filing IRS Form 990 for the years in the study (1998-2003) was $25,000.
This means nonprofit organizations earning less than $25,000 were not required to file
a tax return and estimates suggest that as few as 30% of all nonprofit organizations
meet this minimum revenue threshold. The implication then is that the findings here
only extend to those organizations that file a tax return, which tend to be larger
organizations.

Despite this bias, previous researchers routinely included in their data only
those organizations with three or more consecutive years of tax returns. As suggested
in Chapter 3, this biases the sample even more toward larger organizations. Therefore,
the multiyear restriction is not imposed here. This dissertation does not exacerbate the
sampling bias and includes organizations with fewer years of data.

In addition to concerns regarding the representativeness of the sampling frame to the population of nonprofit organizations, is the concern over the representativeness of the six years in the digitized data to other years. Though not typically addressed in the literature, there should be real misgivings that most of our nonprofit finance research on large samples is from the same dataset. These data may contain systematically divergent information and may not be representative of other time frames. For instance, the dot com bubble burst in 2000 and the macroeconomic effects stemming from the 9/11 attacks fall in this time frame. It is possible these environmental forces affect nonprofit finances different than other events. This is particularly evident now as we are yet to fully understand the current economic recession, let alone its effects on nonprofit financial vulnerability. Hence, findings in this research should not be generalized across time.

The third limitation stems from the use of generalized estimating equations (GEE) to model financial vulnerability. GEE is a population-averaged approach that yields results on the average response across organizations over time, rather than individual-level change. Therefore, changes in the predictor variables do not provide organization-level information; rather they suggest population-averaged information that applies to the sample as a whole. As such, the findings do not make predictions for specific nonprofits.

Due in part to the choice of methodology, the fourth limitation of this
dissertation is that the findings have several implications for researchers of nonprofit finance, but fewer for practicing nonprofit managers. The abstractness of component scores for the dependent variable, the size of the samples (as well as the relative diversity of mission areas in the analysis of human services), and the use of a population-averaged approach combine to prohibit many prescriptions for nonprofit managers. This dissertation did not set out to develop a guide on how to avoid financial vulnerability, but this is a limitation worth noting nonetheless.

6.7 Discussion and Implications for Future Study

The findings here point to several important implications for future study. The results of the factor analysis in Chapter 4 suggest commonly used accounting ratios are distinct measures and are not influenced by underlying constructs consistent with a priori knowledge (e.g., solvency, liquidity, operating margin, and profitability). Instead, the measures can, and perhaps should, be modeled as independent predictors of nonprofit financial vulnerability (at least until such time that a theoretically intuitive and empirically defensible classification of the accounting ratios is developed).

Additionally, the findings suggest accounting-centric approaches to modeling nonprofit financial vulnerability overlook important factors. It is evident from the results that accounting ratios do not have consistently significant effects on financial vulnerability when controlling for environmental factors. For both human services and higher education, the utility of the accounting variables is in showing the importance of maintaining asset bases that go beyond current fiscal year income. The focus in the
literature on employing multiple accounting ratios to make predictions appears misguided. Part of the problem rests in a weakness acknowledged in Chapter 2 regarding accounting-based models; that financial vulnerability and bankruptcy probability estimates are statements about the likelihood of future events, but accounting ratios are metrics designed to measure past performance. Hillegeist et al (2004) propose that accounting measures “may not be very informative about the future status of the firm” (2004, 6). The findings here support this notion. Beyond simple assessments regarding an organization’s net income and total assets, repurposing accounting measures to make predictions regarding a nonprofit’s future financial vulnerability is not value added in these data.

Therefore, future studies should shift the focus from accounting to a broader recognition of financial management fundamentals. While this dissertation falls short of making prescriptions for practicing nonprofit managers, the results show the importance of going beyond financial statements to observe the community and the nonprofit’s place within it. Greenlee and Tuckman (2007) argued there is value in assuming a nonprofit’s potential for market value, even though the value cannot be realized through a firm’s sale, because it “stands to reason that the value will be altered by developments in the larger society, such as recessions, or changes in the stock market or tax laws” (321). The findings here bolster that argument.

Though studies have long hypothesized the effects of environmental variables on nonprofit financial vulnerability, this is an important area left largely untested. This
dissertation embraces the analysis of environmental variables on nonprofit finances and the findings are clear – macroeconomic variables, competition-related variables, and community-level variables are significant predictors of financial vulnerability. Another important finding is that competition goes beyond a narrowly defined geographic area. For human services organizations variables at the regional level are highly predictive of financial vulnerability, but they are not predictive for higher education organizations where the niche appears to be nation-wide.

Another important difference between the subsectors to highlight is the effect of endowment. Bowman et al. (2012) argued that the financial behavior of prospectively endowed organizations differs from organizations that are not prospectively endowed, and as such should be evaluated differently. This notion is upheld in higher education where prospectively endowed organizations account for 31.8% of the observations, but was not upheld in human services where prospectively endowed organization only accounted for 6.3% of the observations.

These divergent findings reinforce the position advocated by Hager (2001) that nonprofit financial health studies should continue to take a more nuanced and detailed approach. Analyses performed on the charitable sector as a whole are undermined by the diversity of the sector; hence future studies should focus on subsectors and even within subsectors to obtain the best results.

Building on the work done here, future studies should explore the viability of creating a financial health index. Theory and empirical evidence come together here to
prove there is an underlying idea of financial vulnerability. The four indicator variables for the dependent variable – asset disruption risk, program disruption risk, funding disruption risk, and insolvency risk – load together and were the basis for the component scores. Decreases in the component scores represent decreases in financial health and increases in financial vulnerability. Creating an index for these indicators that is simple to comprehend and easy to employ, would help practicing nonprofit managers in assessing their organization’s financial health.

Additionally, future studies should extend the analysis of environmental factors on nonprofit financial vulnerability by exploring these effects in other data and for additional subsectors. Factors including corporate earnings, tax rates, stock and bond returns, fluctuations in government funding, among others theoretically influence nonprofit finances and as such should be explored. In addition to large sample studies, small sample studies taking a deeper look at organizational operations (including governance, management, fundraising, professionalization...) and their effects on financial vulnerability will also extend our knowledge.
ENDNOTES

1. In the interest of continuity definitions are not included in text but rather in Appendix B as a glossary of terms.


3. The revenue exception listed applies to the years used in this analysis (1998-2003). The IRS changed the rules in 2010, raising the minimum total revenue exception from $25,000 to $50,000.

4. Figure 3.1 does not represent the full measurement model so covariance arrows between independent latent constructs and error terms are not included.

5. The 12 major categories in NCCS are: arts, culture, and humanities, higher education, education, hospitals, health, environment, human services, international, mutual benefit, public and societal benefit, religion, and unknown.
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APPENDIX
## Appendix A: Data Key

**Table A-1: Data Key**

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<th>Item</th>
<th>990 Line</th>
<th>NCCS Data Code</th>
<th>Cleaned Dataset Variable Names</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net Assets (EoY)</strong></td>
<td>73B</td>
<td>p1naseoy, p4e_net, p4e_jnt, p4e_jnt</td>
<td>p1naseoy</td>
</tr>
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<td><strong>Net Assets (BoY)</strong></td>
<td>73A</td>
<td>p1nasboy, p4e_jnt, p4e_jnt</td>
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</tr>
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<td><strong>Net Income</strong></td>
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<td>44B</td>
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<td>p1pexp</td>
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<td><strong>Total Liabilities</strong></td>
<td>66B</td>
<td>p4e_liab, p4e_liab, p4e_liab</td>
<td>p4e_liab</td>
</tr>
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<td><strong>Current Assets</strong></td>
<td>45B thru 53B</td>
<td>p4e_cash, p4e_save, p4e_arec, p4e_prec, p4e_grec, p4e_irec, p4e_lrec, p4e_Invt, p4e_pre</td>
<td>p4e_cash, p4e_save, p4e_arec, p4e_prec, p4e_grec, p4e_irec, p4e_lrec, p4e_Invt, p4e_pre</td>
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<td><strong>Current Liabilities</strong></td>
<td>60B thru 64B</td>
<td>p4e_apay, p4e_gpay, p4e_defr, p4e_lpay, p4e_bond</td>
<td>p4e_apay, p4e_gpay, p4e_defr, p4e_lpay, p4e_bond</td>
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<tr>
<td><strong>Temporarily Restricted NA</strong></td>
<td>68B</td>
<td>p4e_temp, p4e_temp, p4e_temp</td>
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<tr>
<td><strong>Unrestricted NA (BoY)</strong></td>
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<td>p4b_unre</td>
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</tr>
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<td>----------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
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<td>Commercial Revenue (Hodge 2005)</td>
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<td>DD Revenue &amp; Expenses v2005b Dataset</td>
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<td></td>
<td></td>
<td>DD Balance Sheet v2005b Dataset</td>
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<td></td>
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<td>DD Functional Expenses v2005b Dataset</td>
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<td>Private Revenue (Hodge 2005)</td>
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<td>Invest: land, buildings, equipment less depreciation</td>
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<td>p4e_lind</td>
<td></td>
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<tr>
<td>Land, buildings, equipment less depreciation</td>
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<td>p4e_land</td>
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<td>Tax exempt bond liabilities</td>
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<td>p4e_bond</td>
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<tr>
<td>Mortgages and other notes payable</td>
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<td>p4e_mort</td>
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<td>Item</td>
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<td>----------</td>
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<td>--------------------------------</td>
</tr>
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<td>-</td>
<td>p4e_retn</td>
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<td>Paid-in or Capital Stock</td>
<td>71</td>
<td>-</td>
<td>p4e_surp</td>
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<tr>
<td>Capital Stock</td>
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<tr>
<td>Total Expenses</td>
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<td>Depreciation, depletion</td>
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<td>-</td>
<td>p2tdeprc</td>
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<td>Group Return</td>
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<td>Accounting Method</td>
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<td>Public Charity</td>
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<td>990 Form</td>
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**APPENDIX B: GLOSSARY OF TERMS**

**Accrual Accounting:** Accounting system that recognizes (records) revenues and expenses in financial statements when they are earned and incurred respectively.

**Brownian Motion:** a stochastic process (random walk) that over time and given a normal distribution can be predicted. This is often applied to the study of market fluctuations in an effort to predict volatility. In the bankruptcy context, researchers are suggesting that asset volatility can be predicted the same way.

**Call:** the right to buy a stock.

**Call Option:** the right to buy a stock at an agreed price or on or before a specific date.

**Cash Accounting:** Accounting system that records revenues and expenses when cash is received or spent.

**Current Assets:** Assets that are liquid (i.e., assets that are cash or can be turned into cash within the fiscal year and without significant expense).

**Current Liabilities:** Debts to be paid to third parties within the fiscal year.

**Depreciation:** The cost of a long-lived tangible asset (greater than one fiscal year) broken down and paid for over its economic life.

**Face Value:** the value of an asset as stated in the organization’s financial statements.

**Leverage:** The amount of debt used to finance an organization’s activities.

**Market Value:** the value of an asset as determined by what someone would pay for it on the open market.

**Strike Price:** a fixed price at which a call can be exercised.
## APPENDIX C: FACTOR ANALYSIS RESULTS

### Table C-1: All Subsectors

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Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

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Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

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Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

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Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
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Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser  
Normalization

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Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser  
Normalization

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Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser  
Normalization

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Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser  
Normalization
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**Extraction Method:** Principal Component Analysis  
**Rotation Method:** Varimax with Kaiser  
**Normalization**

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**Extraction Method:** Principal Component Analysis  
**Rotation Method:** Varimax with Kaiser  
**Normalization**

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**Extraction Method:** Principal Component Analysis  
**Rotation Method:** Varimax with Kaiser  
**Normalization**

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<td>.007</td>
<td>.002</td>
</tr>
<tr>
<td>WC/TA</td>
<td>-.001</td>
<td>.005</td>
<td>.002</td>
<td>.637</td>
<td>.002</td>
</tr>
<tr>
<td>MS</td>
<td>-.016</td>
<td>.870</td>
<td>.030</td>
<td>-.003</td>
<td>.002</td>
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<tr>
<td>NI/TR</td>
<td>.945</td>
<td>.038</td>
<td>.047</td>
<td>.006</td>
<td>.002</td>
</tr>
<tr>
<td>MU</td>
<td>.018</td>
<td>.869</td>
<td>.054</td>
<td>.002</td>
<td>.002</td>
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</tbody>
</table>

**Extraction Method:** Principal Component Analysis  
**Rotation Method:** Varimax with Kaiser  
**Normalization**
<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNA/TR</td>
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<td>.840</td>
<td>-.010</td>
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<tr>
<td>TNA/TA</td>
<td>.052</td>
<td>.080</td>
<td>.800</td>
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<tr>
<td>NASOLV</td>
<td>.357</td>
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<tr>
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<td>-.035</td>
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<td>.700</td>
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<td>.017</td>
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<td>.008</td>
<td>-.054</td>
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<tr>
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<td>.493</td>
<td>.071</td>
<td>.052</td>
</tr>
<tr>
<td>NI/TR</td>
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<td>-.753</td>
<td>.076</td>
</tr>
<tr>
<td>MU</td>
<td>.781</td>
<td>-.034</td>
<td>-.051</td>
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</table>

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
APPENDIX D: VARIABLE CALCULATIONS

Dependent Variable:

Table D-1: Indicators of Financial Vulnerability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Line 990 Calculation</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolvency Risk</td>
<td>Exists when total liabilities are greater than total assets</td>
<td>line 59B - line 66B</td>
<td>Continuous</td>
</tr>
<tr>
<td>Asset Disruption Risk</td>
<td>Change in net assets from previous fiscal year</td>
<td>line 73B - line 73A</td>
<td>Continuous</td>
</tr>
<tr>
<td>Funding Disruption Risk</td>
<td>Total revenues</td>
<td>line 12</td>
<td>Continuous</td>
</tr>
<tr>
<td>Program Disruption Risk</td>
<td>Total program expenditures</td>
<td>line 44B</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

Predictor Variables:

Solvency Indicator 1:
- Variable: TNA/TR
- Calculation: total net assets/total revenue
- Form 990: Line 73B/Line 12

Solvency Indicator 2:
- Variable: TNA/TA
- Calculation: total net assets/total assets
- Form 990: Line 73B/59B

Solvency Indicator 3:
- Variable: NASOLV
- Calculation: total assets – total liabilities
- Form 990: Line 59B – Line 69B
*Profitability Indicator 1:*

- Variable: NI/TA
- Calculation: net income/total assets
- Form 990: Line 18/Line 59B

*Profitability Indicator 2:*

- Variable: NI
- Calculation: net income
- Form 990: Line 18

*Liquidity Indicator 1:*

- Variable: WC/TA
- Calculation: working capital/total assets
  - \[(\text{Current Assets} - (\text{Current Liabilities} + \text{Temporarily Restricted Net Assets}))]/\text{Total Assets}\]
- Form 990: \[((\text{Line 45B} + \ldots + \text{53B}) - ((\text{Line 60B} + \ldots + \text{64aB}) + \text{Line 68B}))]/\text{Line 59B}\)

*Liquidity Indicator 2:*

- Variable: MS
- Calculation: months of spending
  - \[12 \text{ months} \times (\text{Unrestricted Net Assets} - \text{Equity in Property, Plant, 
  
  Equipment})/\text{Spending on Operations}\]
• Form 990: 12 months * (Line 67B - (Line 55cB + Line 57cB - Line 64aB - Line 64bB))/ (Line 44A - Line 42A)

**Operating Margin Indicator 1:**

• Variable: NI/TR
• Calculation: net income/total revenue
• Form 990: Line 18/Line 12

**Operating Margin Indicator 2:**

• Variable: MU
• Calculation: markup
  
  o 100% * (Change in Unrestricted Net Assets + Depreciation)/Spending on Operations
• Form 990: 100% * (Line 67B - Line 67A + Line 42A)/(Line 44A - Line 42A)

**RDI:** Revenue Diversification Index

\[
RDI = 1 - \frac{\sum_{i=1}^{3} R_i^2}{0.6666}
\]

where \( R_i \) is the fraction of revenue generated by each of the three revenue sources

• \( R_1 \)=donative (990 lines 1d, 9a)
• \( R_2 \)=earned income (990 lines 2, 3, 11)
• \( R_3 \)=investment (990 lines 8a, 4, 7)

**COMREV:**

• Calculation: Commercial Revenue/Total Revenue
• Form 990: Line 2/Line 12
**Median Household Income:**

- Variable: Med_House_Inc
- Source: Census Bureau
- Calculation: Median Household Income by FIPS code for the years 1998-2003

**Regional Saturation:**

- Variable: NTEE_Sat
- Source: NCCS digitized data for the 12 major groups based on NTEE classifications and Census Bureau for population by FIPS code.
- Calculation: Frequency of nonprofits with same NTEE classification in FIPS code/(FIPS code population/1000)

**Regional Revenue Share:**

- Variable: Rev_Share_Reg
- Source: NCCS digitized data for the 12 major groups based on NTEE classifications
- Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all nonprofits within the same major group in the same FIPS code) * 100

**State Revenue Share (Only in Higher Education):**

- Variable: Rev_Share_State
- Source: NCCS digitized data for the 12 major groups based on NTEE classifications
• Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all higher education nonprofits within the same state) * 100

**National Revenue Share (Only in Higher Education):**

• Variable: Rev_Share_Nat
• Source: NCCS digitized data for the 12 major groups based on NTEE classifications
• Calculation: (Form 990 Line 12/Sum of Form 990 Line 12 for all higher education nonprofits in the nation) * 100

**Investment Income:**

• Variable: INVEST
• Calculation: Investment Portfolio/Total Assets
• Form 990: (Line 4 + Line 5 + Line 7 + Line 8a)/Line 59B

**Endowment:**

• Calculation: If liquid investments (i.e., securities, not buildings) are greater than or equal to total expenses then 1, otherwise 0
• Form 990: If (Line 54B + Line 56B) ≥ Line 17 then 1, otherwise 0

**Organizational Size:**

• Variable: SIZE
• Calculation: ln(TA)
• Form 990: ln(Line 59B)
**Subsector:**

- The 12 major categories in NCCS are: arts, culture, and humanities, higher education, education, hospitals, health, environment, human services, international, mutual benefit, public and societal benefit, religion, and unknown.

**Table D-2: Inflation Calculations**

<table>
<thead>
<tr>
<th>Year</th>
<th>CPI</th>
<th>Data Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$100.00</td>
<td>n/a</td>
</tr>
<tr>
<td>2002</td>
<td>$97.77</td>
<td>X_t * (100.00/97.77)</td>
</tr>
<tr>
<td>2001</td>
<td>$96.25</td>
<td>X_t * (100.00/96.25)</td>
</tr>
<tr>
<td>2000</td>
<td>$93.59</td>
<td>X_t * (100.00/93.59)</td>
</tr>
<tr>
<td>1999</td>
<td>$90.54</td>
<td>X_t * (100.00/90.54)</td>
</tr>
<tr>
<td>1998</td>
<td>$88.59</td>
<td>X_t * (100.00/88.59)</td>
</tr>
</tbody>
</table>