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What is the association between the financial position of public institutions to tuition discount rates?

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WHAT IS THE ASSOCIATION BETWEEN THE FINANCIAL POSITION OF

PUBLIC INSTITUTIONS TO TUITION DISCOUNT RATES?

by

Richard Crawford, B.S, M.P.A.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

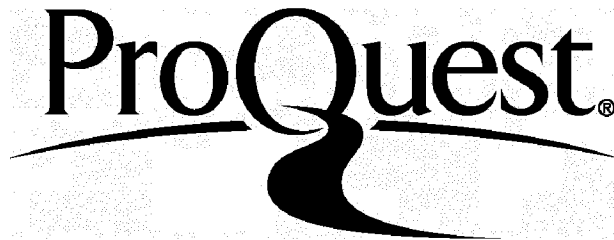COLLEGE OF EDUCATION
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Doctor of Education, Educational Leadership, Higher Education Administration

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ABSTRACT

Public higher education institutions have increased the practice of tuition discounting, which is the planned use of institutional provided financial aid to offset a portion of the tuition and fee price that students pay. As the cost of higher education has increased and the competition for students has increased, the use of tuition discounting as an enrollment management tool has also increased. The primary reason for the increase in the cost in public higher education, since the 2008 recession, is the funding cuts from state governments. The cuts in state funding have placed more pressure on public institutions to improve their efforts in recruiting and retaining students in order to offset the loss in funding from the state cuts. As the tuition discounting practice has increased, there are financial factors and consequences that must be addressed. The purpose of this research was to explore the relationship between four-year public institutions' financial positions and the tuition discount rates awarded to their students. The Financial Vulnerability Index (FVI) and its five component ratios served as a representation for institutional financial position. Integrated Postsecondary Educational Data System (IPEDS) provided the financial and institutional data for the academic years of 2006-07 and 2013-14. The analytical strategy of this study included both descriptive and inferential statistics. A two-stage hierarchical multiple regression was calculated to assess what extent the financial position of a public institution, as determined by the FVI, influences the tuition discount rate. The findings indicated a statistically significant change for the public institutions in the study over the two years for: a) the tuition

discount rate offered to students, b) the total tuition and fees charged to students, c) the diversification of the enrollment, and d) the percentage of students receiving federal financial aid. Also, the findings indicated for the public institutions in 2006-07 that are considered to be in a stable financial position, that as these institutions have become financially stable, they have been able to provide more tuition discounts for their students.

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Author _Richard Crawford_

Date _4-26-17_

DEDICATION

This dissertation is dedicated to the following people who have impacted my life and the journey of education the most.

To my parents, Clyde and Carmen Crawford, who sacrificed for me in my early years so that I could have excellent educational opportunities. I wish they were still alive to take part in the celebration of this occasion.

To my two children, Emma and Adam, who were in high school when I started this journey. I am so proud of how well you have done in school, but more importantly, the young adults that you have grown up to be. Keep pursuing your dreams! I love you both!

To my wife, Toni, who is the most wonderful wife in the world. I simply could not have made it through this journey without your love, support, help, and encouragement. I love you, and I thank God every day for the blessing that you are in my life.

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CHAPTER 1

INTRODUCTION

The rising cost of public higher education is well documented. Zumeta (2010)

states that the average price of a university degree has risen more than 100% in the past

three decades. Tuition at four-year institutions outpaced inflation and median family

income (Kirshstein, 2012). According to Zumeta, tuition increases at public four-year

institutions averaged about five percent above the general inflation rate during the 2000-

2010 period, with its two recessions. Archibald and Feldman (2008) address the reasons

for this increase prior to 2008, stating that the increases are primarily due to the labor-

intensive nature of higher education as an industry. They explain that the higher

education industry requires highly skilled labor in order to stay competitive. Also, as an

attempt to stay competitive, higher education institutions have constructed new academic,

athletic, and student services facilities (Geiger & Heller, 2011), which are often

completed by issuing long-term debt (Keith, 2013). Keith also states that long-term debt

may help the institution fund much needed construction and maintenance needs.

However, the concern with long-term institutional debt is that it could put financial stress

on institutions by diminishing financial flexibility. In order for the institution to meet the

debt service covenants required by lenders, the institution must show that it has the

available revenue streams to service the debt. Therefore, institutions are under pressure to

increase revenues by increasing the price of attendance.

Another reason the cost of public higher education continued to rise over the last decade is due in part to funding cuts from state governments. This trend is especially true since the 2008 recession. The 2008 recession was the worst economic downturn in the United States since the Depression of the 1930s (Zumeta, 2010). According to Fain (2009), since the 2008 recession, 80% of public university governing boards informed that state budget decreases put a financial stress on their institutions.

> The recession in 2008 led to the reductions of state revenues, which led to many state leaders cutting state appropriations to higher education institutions. Since 2008 many state governments have been significantly decreasing their support of public higher education to help abate their structural budget deficits. It is not unusual for states to decrease their financial support for higher education during times of fiscal austerity, but the significant size of recent rounds of reductions resulted in some of the most substantive changes to the higher education sector in decades. (Hendrickson, Lane, Harris, & Dorman, 2012, pp. 131-132)

According to O'Shaughnessy (2015), tuition and fees at public universities increased 44 percent in the decade ending 2015. Throughout this same time, state funding for these public institutions declined. O'Shaughnessy also discovered that state funding of higher education declined considerably when the 2008 recession occurred, and it has not recovered. While state funding declined throughout that period, enrollment at public institutions began increasing, as individuals believed that further education could help obtain better jobs. Webber (2016) found that there are several reasons for the increase in the cost of attending public higher education since the year 2000, but declining state funding for higher education is by far the single biggest driver of rising tuition costs for public institutions. The author estimates that only a quarter of the increase in the tuition cost of public higher education since 2000 can be assigned to increasing faculty salaries, enhanced facilities, and administrative cost increases. By contrast, the drop in state funding explains about three-quarters of the increasing tuition cost of higher education.

Anastasia (2015) states that even though the past decade saw an increase in higher education enrollment, the projections for the coming decade indicate a different situation. She found that from 2015 to 2025, the number of 18 to 25 year-olds in the United States should decline significantly, increasing competition among institutions for students and forcing many institutions to rely less on tuition revenue.

Also, McLendon, Hearn, and Mokher (2009) describe that during this difficult time for public higher education, state legislators pursued tax cuts and other operational limits on tax growth. For example, K-12 schools have had to face new requirements from federal mandates. States have also had rising healthcare costs to pay. When state funding for public higher education is cut, institutions generally must either cut educational or other services, grow tuition revenue to cover the gap, or both (Mitchell, Palacios, & Leachman, 2014). The cut in state support also places more stress on institutions to enhance their endeavors in recruiting and retaining students in order to compensate for the loss in support from the state reductions.

According to N. W. Hillman (2010a), public institutions conventionally rely on state appropriations as a key revenue source for funding the operating budgets. Over the past decade, however, this source of funding has diminished due to state budget cuts to public higher education. As a consequence, public institutions are pursuing other sources of revenue to replace state provided funds. Tuition has emerged as one of the most dependable alternative revenue sources for numerous public four-year institutions. This shift in funding of public higher education reached a milestone in 2010, when revenue from tuition exceeded revenue from state and local appropriations (Kirshstein & Hurlburt, 2012). Since students' tuition dollars are increasingly seen as a source of

critical revenue, institutions are experimenting with enrollment and revenue management strategies, such as scholarships provided by the institution, to recruit students and more effectively utilize these funds. These scholarships are also referred to as tuition discounts (Redd, 2016). While listed tuition rates are increasing, the real price a student pays often has little association to the published price, due to tuition discounts given to students in order to draw them to the institution. Long (2013) states that with the increases in discounts provided by the institution for students, average net prices to families have not increased as severely as list prices during the recent recession. However, the amount of families and students accepting this aid rose considerably.

The planned use of institutional provided financial aid to offset a portion of the tuition and fee price that students ultimately pay is referred to as tuition discounting (Redd, 2016). Tuition discounts are used to help with the difference between the published amounts the institution charges for tuition and fees and what an individual student can afford to pay. The practice is used to attract or retain students. For the purpose of this study, tuition discount is defined as a waiver of some or all of the tuition due and will be in the form of an institutional scholarship or payments funded by gifts and endowments (Allan, 1999). It would not include any state or federal financial aid. The National Association of College & University Business Officers (NACUBO) and the Financial Accounting Standards Board (FASB) use this definition of tuition discount.

Tuition discounting can become a substantial budget item for an institution. In the decade prior to the 2008 recession, the average tuition discount rate for public four-year institutions had not increased significantly (Baum, Lapovsky, & Ma, 2010). However, the operating paradigm began to change for public institutions after the 2008 recession, and

institutions needed to strategically budget their limited financial resources to stay competitive in the student recruiting market (Bruinicks, Keeney, & Thorp, 2010). The pressure to stay competitive with other institutions and grow net tuition revenue may require institutions to devote more financial resources to tuition discounts. However, increasing the number and amounts of discounts, while holding tuition fixed may have a negative impact on net tuition revenue (Porter, 2015). Institutional leaders must find ways to meet student finance and enrollment goals that may lead to more sustainable outcomes (Redd, 2016).

The pressure to stay competitive in the student recruiting market and to grow net tuition revenue has also been a major issue among private institutions as well. Among private institutions, the tuition discount rates have been rising rapidly since the economic downturn of 2008-09. Since that year, the average institutional discount rate at private institutions for first-time freshmen jumped from 39.9 percent to 48.6 percent in 2015-16 (Redd, 2016). According to Redd, these rising discount rates among private institutions are the result of: a) the ongoing intense competition among all institutions, public and private, for the highest academically qualified students, b) languishing family wages at almost all socioeconomic levels, and c) the concern among parents and students regarding the growth of loan debt to pay for educational expenses. However, Redd also states that in recent years most private institutions have not been growing their net tuition revenue at a rate that would justify the growth in their tuition discounts. The fear is that their tuition discounting strategy is not sustainable.

Historically, institutions have used tuition discounting for three primary reasons: a) to grow total enrollment, b) to grow the enrollment of academically gifted students,

and c) to provide access to higher education for financially challenged students (Corey, 2007). However, the recent trend is an increased use of institutional aid as a tool to attract academically gifted students, promoting institutional competitiveness, and elevating prestige. Ultimately all institutions must determine what their enrollment and financial goals are and how to use their limited resources to achieve those goals. Each institution will determine the importance given to the goals of student access and academic excellence, as well as institutional demographic characteristics. All are factors of student recruitment decisions and the allotment of the institution's financial resources for tuition discounts. Issues shaping an institution's ability to provide tuition discounts include institutional characteristics such as the institution's age, endowment size, wealth, prestige, and number of students enrolled (Allan, 1999). Understanding the relationship between various institutional characteristics may help to decide how much of its resources an institution assigns to institutional aid.

An institution should consider its financial position or financial constraints when deciding how much of the institutional budget it is willing to dedicate for tuition discounts. The institution must determine its ability to commit financial resources over longer periods. Thus, institutional financial characteristics may be one of the key factors in determining tuition discount rates. However, institutions must be careful not to focus so closely on the long-term goals that they risk the short-term financial health of the institution. For example, in order to recruit students, institutions may set the tuition discount rate too high attempting to get an immediate growth in enrollment. A discount rate that is too high could be a factor leading to a financial crisis at the institution.

There has been no available research on the long-term impact of tuition discounting for public institutions' financial stability. Research is limited on matters related to how financial factors shape discount rates at various public institutions under different financial limitations. Academic literature has yet to offer a detailed analysis of the relationship between public institutional finances (e.g., sources of revenue, financial position, and institutional characteristics) and tuition discounting practices. The literature has primarily focused on how private institutions have utilized tuition discounts. For example, Browning (2011) stated that private institutions have used tuition discounts since their beginning, however, it is a relatively new practice for public institutions. Browning also mentions that public institutions face less financial stress, compared to private institutions, due to their state subsidies. Therefore, private institutions must produce the funds needed to operate through multiple revenue sources. However, since the 2008 recession and the resulting state funding cuts to public higher education, public institutions are now faced with operating much like private institutions. Public institutions have been faced with new levels of financial stress and with producing new revenue sources to fund operations. This dissertation will add to the literature on tuition discounting by exploring the relationship between four-year public institutions' financial positions and the tuition discount rates awarded to their students.

<div align="center">Research Question</div>

The research question of this study: To what extent does the financial position of a public four-year institution, as determined by the Financial Vulnerability Index (FVI), influence the tuition discount rate? The FVI is discussed in more detail in Chapter 3.

Since the 2008 recession, public higher education institutions have been confronting a challenging financial paradigm shift. The decrease in available financial resources and the increase in competition for students have grown the practice of tuition discounting. This use of tuition discounting among public institutions potentially brings financial difficulties in future years (Redd, 2000). This study will add to an understanding of the relationships between financial position and tuition discounting methods and their effects among public higher education institutions. Potential contributions of this study are in the fields of accounting, budgeting, strategic planning, and decision-making. Institutions need effective instruments to recognize and adjust minor problems that may become immense problems and jeopardize institutional financial sustainability. This study provides public higher education institutional leaders with additional comprehensive material about the categories and attributes of public institutions that are more prone to be financially vulnerable. This study also provides perspective into how tuition discounting methods may negatively impact the short-term financial standing and, possibly, long-term stability of four-year public institutions. There is a need for institutional leaders to have a greater grasp of the financial foundations of tuition discounting, in light of the institutional financial position (Corey, 2007).

Much of the available research about tuition discounting in higher education has focused on private institutions and has largely been explanatory. The research has yet to explore the relevant financial indicators at public institutions such as levels of debt, asset size, surplus margin, administrative costs, or revenue sources. These types of financial markers are useful tools for strategic planning and analysis. The for-profit business sector has used them for many decades. It may be helpful for public higher education

institutions to learn from the for-profit business sector and apply some of their managerial techniques to improve the operating efficiencies of the institutions (Deem, 1998). Some of Deem's techniques include the use of internal cost centers, the fostering of competition between employees, the marketization of public sector services, and the monitoring of efficiency and effectiveness through measurement of outcomes and individual staff performances. This last technique mentioned, monitoring through measurement, would involve the use of financial statistics and ratios. In order to accomplish this type of measurement, this research will use the Financial Vulnerability Index (FVI).

Financial statistics may be useful to guide tuition discounting decisions. Researchers have used financial ratios common in the for-profit business sector to examine the relationship between institutional financial positions and various resource allocation choices (Sturm, 2005). Institutional leaders have clear reasons for the need to expand their understanding of the relationship between the institutional financial position and other important components connected to institutional health and development. The present economic setting for public institutions of higher education is doubtful to change in the near future, and this situation will probably become the new normal (Bruinicks et al., 2010). This study provides a model or framework to help explain one important facet of decision making on tuition discounting and provides a resource for institutional leaders in strategic planning, decision-making, budgeting, and accounting.

Another contribution of this study involves the use of tuition discounting policies. Public institutions may use the conclusions from this study to decide if any tuition discounting policies in relation to specific institutional characteristics are challenging

from a financial standpoint. Institutions can determine if their financial position and tuition discounting policies may support their enrollment goals (Baum et al., 2010). Research suggests that institutions use tuition discounts to increase enrollment (Redd, 2000), but increased enrollment does not always lead to an improved financial position (Supplee, 2014b). Institutions have to look at net tuition revenue and not just gross tuition revenue. From a budgeting standpoint, institutions need to know well in advance not only how many students will be enrolling in the fall, but also what discounts each of these students will be receiving from the institution and where the discount money will be obtained. It is important for the public institution to know how much of the tuition discount will be funded from gifts and endowments (restricted accounts) and how much will be unfunded or paid from the institution's operating accounts (Allan, 1999).

Institutions need to make sure their tuition discounting policies are thoroughly analyzed to promote financial health and are conducive to enrollment growth. The institution must consider the costs and benefits of a tuition discounting policy prior to enactment. Sometimes the tuition discounting policy may result in little increases in net tuition revenue, or possibly have a negative impact (Winston & Zimmerman, 2000). Following the enactment of a tuition discounting policy, the possible growth in enrollment may not offset the total negative impact on an institution's financial condition (Redd, 2000). Institutions must take into account the overall long-term financial strength of the institution when looking at the short-term needs such as enrollment growth. This concern will help safeguard against the institution placing itself in a situation resulting in financial disaster. Public institution leaders need the tools available to discern how sustainable the institution's discounting practice is for the future (Redd, 2000).

Theoretical Framework

As stated earlier, the research question of this study is to what extent does the financial position of a four-year public institution, as determined by the Financial Vulnerability Index, influence the tuition discount rate? In light of this research question, resource dependence theory presented an applicable theoretical framework to illustrate and clarify the financial procedures and decision making of public higher education institutions. Resource dependence theory explains that organizational performance is controlled and formed by the stresses and demands from external entities based on the need for resources (A. Hillman, Withers, & Collins, 2009). Resource dependence may impact how an institution directs the operation's business (Nienhuser, 2008). Resource dependence theory is a useful tool to examine and describe why institutions often adjust resources to meet stakeholder needs and hopes, even if these differ with the institution's principal mission or chosen direction.

Nienhuser (2008) states, "A fundamental assumption of resource dependence theory is that dependence on critical and important resources influences the actions of organizations and that organizational decisions and actions can be explained depending on the particular dependency situation" (pp. 10-11). Public higher education institutions depend on a few revenue sources to exist. Besides tuition revenue, they depend on private donors, federal aid programs, and state government funds. Many of these sources are at risk during periods of an economic recession (Long, 2013), therefore, these may be unstable sources of income. The status of the economy affects how much donors give to institutions and limits governments' ability to maintain financial support (Keith, 2013).

Doyle (2007) states that in the early 2000s the amount that public higher education institutions charged students was lower than the real cost to educate them, due to heavy state subsidies. Therefore, these institutions were excessively dependent on external sources of revenue. Doyle also explains that state governments provided the majority of support for public higher education in the United States, and without this level of subsidy from states, public higher education as it is known in the United States would not exist. This public higher education funding paradigm changed in 2008 with the economic downturn causing public higher education leaders to make some difficult financial decisions. However, institutional operating costs continue to rise. Due to mounting institutional intricacy, institutions have been forced to increase spending (Ehrenberg, 2005). Therefore, as student requirements and expectations increase, institutions must either cut costs, such as salaries and maintenance, or increase alternative revenue streams to survive.

Cutting costs may be challenging for higher education institutions, which is especially true for instructional costs. This difficulty is due to the characteristics of higher education as a business. Higher education is a labor-intensive business, is restricted in the capacity to increase productivity in the higher education industry, and must have higher salaries to recruit highly accomplished individuals (Archibald & Feldman, 2008). Higher education institutions are evaluated based on the reputation and ability of their faculty. Since institutional status is dependent upon excellent faculty for research and teaching, institutions usually do not cut costs related with these endeavors unless there are no other alternatives. Because institutions struggle with containing various costs, such as personnel expenses, the need for additional revenue sources increases each year.

Since there is a need to grow their revenue streams, higher education institutions have created several strategies to increase revenue (Carmichael, 2015). One example is the pursuit of external grants and fellowships for obtaining research money. Another method of growing revenue is through athletic success and attracting people to attend athletic events. An additional strategy is to grow total enrollment numbers in order to grow gross tuition revenue. Still another method is through aggressive fundraising in order to grow endowment revenues. Money given through an institution's alumni foundation is usually categorized as restricted funds and may only be used for the donor's stated purpose. The more common method in recent years among public higher education institutions to grow revenue is increased tuition prices. While institutions cannot control the unpredictable revenue streams from donors, governments, or athletics, they can better control the published tuition charged to students. Since tuition revenue has become the more dependable source of revenue for public institutions, these institutions are resource dependent on students as a steady revenue source through tuition payments.

Resource dependence theory explains how public institutions adjust to meet their financial needs. Expressly, this theory describes how public institutions deal with the need for additional sources of revenue. Because institutions are reliant on students as a steady revenue source, they rely on student tuition to deal with the growing financial challenges that they are facing (Carmichael, 2015). Institutions depend on students for tuition revenue; however, with the rising costs of tuition, a growing percentage of students have been incapable or reluctant to pay the published tuition prices (Redd, 2000). As an enticement to promote enrollment, institutions have presented financial aid to students. This offer includes discounts on the published price of tuition, which means

the institution is not receiving a portion of the possible revenue from an individual student. Tuition discounting has been used in higher education for many years (Allan, 1999). However, the use of tuition discounts has increased over the recent decades (N. P. Davis, 2013). Institutions have increased the use of tuition discounts in order to stay competitive in recruiting and retaining students, especially in light of the impact of rising tuition costs (Archibald & Feldman, 2008) and the number of institutions that are seeking to grow their student population (Redd, 2000).

Resource dependence theory presents an outline that may provide understanding about tuition discounting practices and their relationship to public institutions' attempts to sustain competitiveness and financial stability. Tuition discounts provide an instrument to help institutions contend for students. These students add to increased revenues through tuition payments, and in turn, these students may entice other students. Word of mouth from satisfied students may be the best recruiting tool for an institution (N. W. Hillman, 2010b).

Due to the growing competition among institutions for high academic achieving students, many institutions have changed their tuition discounting strategies to provide more merit based aid than need based aid (DesJardins & McCall, 2010). States and institutions have become less responsive to student need and more responsive to student academic achievement over time (Doyle, 2010). By utilizing more merit based tuition discounts to recruit high academic achieving students, tuition discounting may lead to an aggressive form of competition among peer institutions, triggering tuition discount rates to grow (Supplee, 2014a). Depending on an institution's financial condition, this strategy could be a financially precarious strategy in the long-term. If discounting strategies are

not managed wisely, they could lead an institution into a poor financial position (Supplee, 2014a). According to O'Shaughnessy (2015), state institutions have been using merit based discounts to recruit affluent out-of-state students. Public institutions have been using this approach to attract more revenue to supplement decreased state financial support and to boost their rankings. O'Shaughnessy also states the discounting strategy used by institutions may vary based on the region of the country the institution is located. In the south, states are much more likely to give discounts based on academic achievement associated with grade point averages and standardized test scores. South Carolina, Georgia, Louisiana, Tennessee, and Arkansas award the highest tuition discounts based on merit. States located north of the Mason-Dixon Line are more likely to dedicate most or all of their discounts to students who need financial help.

As public institutions are being funded less from the state budget and more from other revenue streams, the institutions are forced to look at business models to deal with inadequate resources and to depend on many sources of revenues to safeguard continuing operations (Deem, 1998). An institution is more financially stable and less financially vulnerable when it has diversified revenue streams (Hodge & Piccolo, 2005). In fact, the more each revenue stream comprises a small percentage of the total revenue, the better it is for the institution from a financial stability and diversification stand-point (Trussel, Greenlee, & Brady, 2002). Therefore, public institutions of higher education are more financially stable when they have diversified revenue streams. Public higher education institutions have a limited number of revenue sources available. These revenue sources include tuition revenue, gifts from private donors, federal aid programs, and state government funds. Most of these sources are unstable and are at risk during times of an

economic downturn (Long, 2013). Tuition is usually not impacted by the economy and is more controllable. In this new paradigm in public higher education, institutions have increasingly used tuition-discounting policies to encourage students to attend in order to increase total tuition revenue (N. W. Hillman, 2010a).

Assumptions

This research was conducted based upon the assumption that The National Center for Education Statistics' (NCES) Integrated Postsecondary Educational Data System (IPEDS) was the most appropriate data source for the study, primarily due to the fact that it is a large, multi-year survey, assembled by a team of survey researchers using methods created and enhanced over many years (Carmichael, 2015). Also, it is assumed that public higher education institutions in the study have submitted correct and complete data to IPEDS for the surveys and reporting periods of interest.

Limitations

Time, resources, context, and design are limitations that exist in all research studies (Bresciani, 2011). This study reviewed data for a limited time period. The time period covered was the two-year period of 2006-07 and 2013-14. Additionally, only public four-year institutions from the United States and within certain Carnegie categories were examined in this study. Therefore, results may not be generalizable to private institutions, two-year institutions, or four-year institutions of a different size or Carnegie type. This research utilized IPEDS as the source for the data set. The IPEDS series of surveys was the main source of data. IPEDS is an annual survey that results in a variety of institutional level data and is a widely used data source for research in various aspects of higher education institutions. The data is self-reported by the institutions based

upon the instructions given them by IPEDS staff. IPEDS data would be considered archival data since the data already is contained in existing files. There are advantages and disadvantages of using archival data. Accuracy and reliability of the information is one concern, since reliance on others inputting the data or self-reporting the data could be subject to error. The review of the literature suggests that the type of data used for this study is sufficiently accurate for comparisons (Sonnenberg, 2003). In this research, there are no known material issues with the accuracy and reliability of the IPEDS data being used. In addition, only four-year public institutions that report financial data in accordance with Governmental Accounting Standards Board (GASB) requirements were included in order to have comparable financial variables.

CHAPTER 2

LITERATURE REVIEW

According to Allan (1999), tuition discounting is the practice of allowing some

students to pay less than the published price. Tuition discounting came into existence in

the 1970s and has been a commonly used practice among private institutions of higher

education (J. S. Davis, 2003). It has just been in the last two decades that public

institutions have commonly used tuition discounting due to the decrease in the funding of

public higher education from the state budgets (N. W. Hillman, 2010b). The quantity of

the discount that each institution provides is contingent on the financial resources the

institution has available and the strategic choices made by the institution's leadership.

These strategic choices could involve how to distribute the limited resources available for

all of the institution's essential purposes, which might include hiring new faculty and

staff, pay increases, new construction, ongoing maintenance of facilities, and

institutionally funded tuition discounts.

Allan (1999) states that institutions generally use three different definitions for

tuition discounting: a) simple tuition discount, b) scholarship allowance, and c) student

tuition discount. The definitions are continuously more comprehensive, with each

encompassing all the components of the earlier definition plus added elements. The

simple tuition discount comprises only the waiver of all or a portion of the tuition due,

typically in the way of an institutional scholarship or grant. It does not include funding

from internal sources, such as gifts and endowments, or from external sources, such as federal or state funds (Allan, 1999).

The scholarship allowance contains all institutionally funded financial aid. This definition is calculated as simple tuition discount plus tuition payments funded by gifts and endowments. In this definition, the operating and endowment funds are seen as a single financial entity. Money in the institution's operating fund is viewed as substitutable, which means gift and endowment income that is restricted to financial aid may be paid from the endowment fund into the operating fund. When this happens, the institution is allowed to spend, for other purposes, operating funds that would have been spent on financial aid. This approach is a tremendous financial benefit to institutions. Scholarship allowance is the tuition discount definition used by the National Association of College and University Business Officers (NACUBO) and the Financial Accounting Standards Board (FASB) (Allan, 1999).

The student tuition discount is the most comprehensive definition, which includes the scholarship allowance plus all external federal, state, and private grants and scholarships. It is usually the one that is of the most interest to students and their families since it represents the total amount of money awarded to the student (Allan, 1999).

It is important that the leaders at a public institution communicate and discuss the definition of tuition discount they are using. Tuition discount may have multiple meanings between the admission's office, comptroller's office, financial aid office, and the president of the institution. Often in conversations of institutional finances, it is not obvious which definition is being used. This issue is significant because these discussions often involve the forecast of future tuition revenue. If all participants in the conversation

are not using the same definition of tuition discounting, the variances in the forecasts of net tuition revenue could be substantial (Allan, 1999).

The scholarship allowance will be the definition for tuition discount that will be utilized in this study. As previously stated, this definition is used by NACUBO and FASB and therefore used by most chief financial officers on college campuses. Additionally, with this definition the institution has control over elements, such as the amount of tuition waived for the student and the dollars provided by gifts and endowments (Allan, 1999).

N. W. Hillman (2010b) describes that state and federal governments have traditionally taken the lead in giving grant aid to students attending public institutions. However, the state and federal monies for public higher education have failed to keep pace with growing tuition costs and student enrollment. Therefore, public institutions have furnished students with scholarships and grants from their own funds in order to attract students to enroll. It was less common 20 years ago for public institutions to offer discounts to students.

Over the last two decades there have been many articles written about how institutional expenses and tuition rates have been increasing substantially. The average cost of a higher education degree has increased over 100% in the past three decades (Zumeta, 2010). Tuition at four-year institutions has outpaced inflation and median family income (Kirshstein, 2012). In fact, the largest increases in tuition compared with inflation in the last two decades have been at public four-year institutions (Van Der Werf & Sabatier, 2009). Tuition continues to increase at a time when federal money is limited, and state taxpayers also are less inclined to support higher education (Seaborn, 2011).

One reason for these tuition increases is the nature of higher education as an industry (Archibald & Feldman, 2008). Higher education has dealt with issues such as newly constructed or renovated facilities; pressure to increase the size and status of the faculty, causing more dollars to be spent on salaries and benefits; and growing costs of student services due to a change in thinking where students are treated as customers of the institution (Geiger & Heller, 2011).

Another reason the cost of public higher education has been on the rise is due to the decrease in funding from state governments, especially since the 2008 recession (Hendrickson et al., 2012). The 2008 recession was the worst economic downturn in the United States since the Great Depression of the 1930s (Zumeta, 2010). Since 2008, state leaders have been dealing with many issues that impact their ability to fund public higher education. Some of these issues involve tax cuts, federal mandates, and rising healthcare costs (McLendon et al., 2009). Serious state funding cuts have major effects for public institutions. When state funding is cut, public institutions must either cut educational or other services, raise tuition to cover the gap, or both.

State leaders have made the decision to decrease the funding to public higher education in spite of the research that indicates all of the societal benefits that come with the increase in the percentage of the population that obtains a higher education degree (Montanaro, 2013). The large state funding cuts may lessen the quality of education available to students at a point when a highly educated labor force is more critical than ever to the nation's economic future (Mitchell et al., 2014). Zumeta (2010) states that public higher education tends to suffer disproportionately in difficult fiscal times, as burdens on other major state functions tend to rise. Most state finances usually react

quickly to economic declines. Reserve or rainy day funds may cushion the effect of appropriation declines, but prosperity often produces political demands to initiate new programs and to reduce taxes. These stresses may greatly restrain the growth of these reserve funds. Combined state reserves stood at near record heights just before the 2008 recession. But the reserves failed to counteract much of the excessive, abrupt revenue declines.

There has been a call to state leaders by many in the public to lessen the need for higher education funding cuts by using a more stable combination of spending cuts and revenue increases to balance the state budgets. Increasing state investment in public higher education will necessitate state policymakers to make the appropriate tax and budget adoptions over the coming years. A sluggish economic recovery and the necessity to reinvest in other services that also have been reduced severely means that many states will need to grow revenue to reconstruct their higher education organizations (Mitchell et al., 2014).

According to Collins, Fitzgerald, Behr, Tuby, and Smith (2016), many public institutions will continue to contend with limits on two key revenue streams: a) state funding and b) tuition. Nationwide, total state funding is predicted to see modest increases in the 2016-17 year, and an ongoing emphasis on higher education affordability is expected to limit tuition increases. Also on a national level, larger and more economically diverse states will continue to drive total growth in state higher education funding. The states with the largest populations are more protected from stresses on any one revenue source, which heightens the probability of fiscal stability and reliable higher education funding improvements. States with less diversified economies or states with an

exposure to retiree benefit liabilities are more vulnerable to fiscal volatility and higher education funding reductions. It is becoming more apparent that the future of higher education spending in any particular state will be increasingly bound to a state's economic strength as well as its commitment to higher education (Collins et al., 2016).

Collins et al. (2016) also explain that one of the areas that are impacting states that are not revenue diversified is the volatile energy market. Energy prices are negatively impacting higher education in states such as Alaska, Louisiana, Oklahoma, and Wyoming. These states depend heavily on revenues received from energy to support higher education spending. As oil and gas prices have decreased, this revenue has declined, leading to fiscal instability and significantly reduced support for public institutions. Another issue that is impacting state budgets and higher education is large post-employment benefit obligations. These obligations are adding to the higher education budget problems throughout the nation. An additional area that is affected by budget challenges is state financial aid programs in states that are offering a wide-ranging mix of merit and need-based programs. As financial challenges continue, cutbacks or changes in state financial aid programs become more commonplace, and this in turn increases the costs to the student and their families (Collins et al., 2016).

The rising cost of higher education has driven many states to legislate policies geared towards improving affordability and access, therefore limiting tuition revenue growth projections. While some state legislatures do not have the direct authority to control tuition pricing, they may use the budget process to influence the pricing structure. With rising student debt and tuition costs, another way state legislatures and governors are getting involved is by demanding more accountability and improved student

outcomes in the form of performance based funding. As more performance-based funding models are started, individual institution's year-to-year funding may become unstable. Institutions that are best positioned to adapt will benefit the most, while others will experience state funding delays or declines (Collins et al., 2016). All of these state economic issues discussed have impacted the cost of attending public higher education institutions.

Even the polices of unfunded tuition discounting is a factor to the increases in the published costs of tuition. Unfunded tuition discounts are discounts paid from the unrestricted operating accounts of the institution. These are monies that could have been used for other purposes, such as personnel costs or maintenance expenses, if they were not being used for tuition discounts. Part of the revenue that funds the operating accounts come from tuition and fees. When tuition revenue from some students subsidizes others, the average tuition charged to all students must increase to pay for the aid, along with other program and overhead costs (Allan, 1999). The danger of unfunded tuition discounts is that in order to cover increasing institutional costs, the average tuition price must grow at a faster rate than the financial aid provided to students, which in effect causes an increase in students' out-of-pocket costs.

As discussed earlier, the increase in the price of tuition at public institutions has outpaced state and federal financial aid (N. W. Hillman, 2010b). Therefore unmet financial needs for students exist that have forced the public institutions to offer tuition discounts to help meet their financial need. Federal financial aid growth has primarily been in the form of loans. At the start of the Great Recession, student debt levels were at historic highs. This trend suggests that the role of loans in college attendance was much

more important than during previous periods. The percentage of students incurring

student loans and the mean levels of this student debt are at historical highs and continue

to increase quickly (Long, 2013). On average students are graduating with $26,600 of

debt. Student loan debt is the second highest form of consumer debt behind mortgages,

and the creditor on these loans is the U.S. taxpayer (Denhart, 2013). Over the last decade,

the obligation to pay for higher education expenses has shifted towards students and their

parents to offset the lower state funding growth. During this period, the purchasing power

of families has also declined. The combination has contributed to the growth in student

loans, in the end leading to an increased emphasis on higher education affordability

(Collins et al., 2016).

Students are concerned about the type of financial aid they receive. Students

believe that grant aid is more valuable because it does not have to be repaid (Hossler,

Ziskin, Gross, Kim, & Cekic, 2009). Additionally, low-income and minority students are

hesitant to finance their education through loans due to doubt about their future income,

the higher overall costs that loans represent, and their overall reluctance to borrow (Chen

& DesJardins, 2010). Public institutions should evaluate how they are using financial aid

to help their students attend the institution, including tuition discounting. Additionally,

public institutions should explore if the financial aid policy is not only attracting students

to the institution, but also retaining them through graduation.

Institutions have differing enrollment management goals and methods of reaching

those goals. Thus, tuition-discounting practices are different at each institution and have

become increasingly intricate. Because tuition discounts are institutional grants, based on

the definition of tuition discount that this study is using, the institution may give the

grants at their pleasure. Institutions may make these decisions based on their understanding of the competitive market in which they operate. For example, the institution may focus on a need based financial aid policy, or they might decide on a merit based policy (Baum et al., 2010). Public institutions are increasingly using tuition discounts to enhance the institution's academic profile (Rizzo, 2005). The use of tuition discounting at public institutions is progressively more about growing student excellence and, therefore, may sometimes overlook lower-income students who are, on average, less academically equipped than their higher-income cohorts (N. W. Hillman, 2010b). There appears to be growing detachment between the students who have the greatest financial need for tuition discounts and the students who actually receive them. According to J. S. Davis (2003), the average tuition discount rate has increased at a higher percentage for high-income students versus low-income students.

The move away from need-based aid toward merit-based aid drastically affects lower-income students. As public institutions change discounting policies from need-based to merit-based, they jeopardize losing their ability to enroll lower-income students who are less apt to meet the merit-based aid standards. Without institutionally funded discounts, lower-income students have diminished opportunities to afford college. A difference exists between the published price of tuition and the actual net price of tuition. Due to lack of information, many students do not know what they will actually pay for tuition until they have made their enrollment choice (Corey, 2007). Lower-income students may not comprehend or have information about financial aid opportunities and the availability of institutional aid (Chen & DesJardins, 2010).

A misunderstanding and concern about tuition discounting is that tuition discounts do not always increase institutional revenues (J. S. Davis, 2003). When institutions raise their discount rate, they are giving up tuition revenue, which lowers the amount of funds existing to operate the institution. As institutions dedicate more funds to tuition discounts, gross tuition (amount charged before discounts) must grow at a faster rate to pay for all the expenses to operate the institution (Allan, 1999). As tuition costs escalate, the discounts must be larger to draw students (Redd, 2000).

An advantage and use of tuition discounting by public institutions is that it may help manage enrollments in two ways: a) by increasing total enrollment numbers and b) by molding the composition of entering cohorts (DesJardins & Bell, 2006). If the institution needs to grow enrollment, it may offer discounts to entice students to attend. By increasing or decreasing the discount rate, combined with altering tuition and fees, institutions may also affect their net tuition revenue. The relationship may impact the prospective student's actions, as families can arrive at a price-sensitivity point at which cost may be the key issue in the enrollment decision (Pullaro, 2012).

Even if they receive a tuition discount, students will probably have to pay for a portion of their education themselves (N. W. Hillman, 2010a). Institutions are not only interested in how many students attend, but also which students attend. Hillman also states that public institutions may also use tuition discounting to shape a class based on a certain strategic objective. For example, the institution may offer discounts to accomplish access and diversity or to advance academic excellence. Due to the increases in costs to attend four-year public institutions, enrollment opportunities are more accessible to high-income students. This trend raises concerns about the income distribution at four-year

public institutions. The problem of affordability is a great challenge for low-income students, including a substantial percentage of racial/ethnic minorities (Seaborn, 2011). Therefore, institutions might use tuition discounts to target accessibility to higher education for lower-income and minority students to address this issue of diversity.

According to Zumeta (2010), some public institutions have sought more out-of-state and international students, who pay much higher tuition. But this strategy was more of a challenge to accomplish after the 2008 recession since cash-strapped students and families attempted to reduce costs by staying close to home. This trend caused institutions to explore expanding their tuition discounts in the form of out-of-state fee waivers. But Zhang (2007) states, "Considering the decreased state funding in higher education in recent decades and the revenue-generating function of nonresident enrollment at public institutions, an institution might increase both the nonresident tuition and its enrollment spaces for nonresident students" (p. 3). Zhang goes on to say that students from high-income families are more likely to attend out-of-state or out-of-country institutions than their lower income peers, and therefore have the ability to pay an additional tuition amount to do so. In the last decade, the competition for international students has become fierce since other countries have become more competitive in the enticing of international students who would have traditionally studied in the United States (Van Der Werf & Sabatier, 2009).

According to Corey (2007), there is a growing trend among public institutions to use tuition discounting as a competitive advantage. Institutions of higher education work in an atmosphere of extreme competition for the best and brightest students. Unlike other businesses, higher education operates in a setting where their main customers, the

students, are also an input to production. This concept means that the excellence of the students enrolled may be a factor in the quality of the educational experience that may be offered. Therefore, institutions are driven to aggressively recruit the highest academic caliber students that may be obtained. However, since numerous public institutions are utilizing tuition discounting as a tool in their recruiting strategy, it might not be as much of an advantage as it once was. If all institutions are offering discounts, it is harder to stand out to the prospective student and parent. The defining advantage would be the dollar amount to which public institutions may provide discounts to students.

Institutions employ tuition discounts for a variety of reasons. The way in which institutions apply tuition-discounting policies has developed over time. Currently, tuition-discounting policies differ by institution as a result of institutional goals such as promoting access, attracting more academically accomplished students, or growing enrollment (Seaborn, 2011). Some public institutions may utilize financial aid bundling to reach enrollment goals. Society recognizes the expense related with this method not only as an inducement for students to enroll but also as an investment in the future. The discounts draw students, especially superior academic quality students. By attracting higher academic quality students, the institution may raise the ranking, prestige, and perceived quality of the institution (Corey, 2007).

More prestigious institutions may attain their enrollment goals with higher-income students who are in a situation to pay full tuition. But such institutions also use tuition discounts to fashion a cohort of students with a particular degree of academic excellence, to enhance student diversity on campus, and help those students who cannot afford to pay full tuition (Allan, 1999). Many see these approaches for granting discounts

as motivated by the opinion that public institutions have an obligation to foster access. However, there are at least three other influences that explain how institutions award tuition discounts compared to those discussed above (Redd, 2000). First, because the middle class does not desire to pay for the increasing prices of tuition and student loan indebtedness, institutions have changed to merit-based aid. Second, institutions are under a growing burden to give more aid to higher-income students to help counteract the rising costs of attending a public higher education institution (Seaborn, 2011). In these first two cases, institutions do not use tuition discounts to help lower-income students who have a restricted financial capacity to pay for college. Instead, the tuition discounts help the middle and upper income students. At four-year public institutions, need based aid comprises less than half of the financial aid budget (Seaborn, 2011). Third, institutions frequently present financial aid bundling for academically talented students, pursuing merit as opposed to need criteria. Higher-income students are more likely to have better academic backgrounds, making them much more likely to profit from tuition discounting in a merit system (Seaborn, 2011). Regardless of how public institutions award tuition discounts, they must insure that they have enough financial resources to offer the discounts for the short term as well as the long term.

Tuition discounts may be funded or unfunded. When the tuition discount is funded, the institution still collects the tuition revenue, but from a source other than the student. Endowment earnings, donations, and other financial support pay the tuition (Allan, 1999). Donors, not the institution, place restrictions on endowment funds. While institutions pursue donations without donor restrictions, most donors give because they desire for the beneficiary institution to use their funds to advance some particular part of

the institution. Many areas within higher education profit from the use of endowment funds: scholarships are funded, buildings are built, equipment is purchased, professorships are funded, library collections are enhanced, and athletic programs are improved (McPherson & Shulenburger, 2008).

The money given for tuition discounts is restricted and available only for the uses of scholarships and grants. Consequently, the institution does not have to expend its unrestricted money from the general operating fund for tuition aid and may use those funds for other purposes (Allan, 1999). This ability to free up the operating fund is a tremendous financial benefit to public institutions. The progression of using endowments to fund tuition discounts may play a role in financial stability for the institution, but few public institutions have gifts and endowments to encompass all of the tuition discounts that the institutions provide.

When the tuition discount is unfunded, the institution must give up the tuition revenue in order to fund the discount. This situation may threaten the financial position of the institution for two reasons. First, institutions do not get 100% of the gross tuition when they provide a tuition discount, and their expenditures usually do not decline in proportion. Instead, the discount burdens the operating budget. To compensate for this, institutions may either defer expenditures (hiring, technological investments or upgrades, repairs and maintenance of the physical plant) in the short term or postpone them indefinitely. If the institution delays these expenditures or does not attend to them at all, the infrastructure and physical plant may decline to the point of future enrollment losses for the institution (Redd, 2000).

Institutions must find a balance so they may give tuition discounts without risking their future financial stability. The relationship between tuition discounting and the financial stability of a public institution has not been considered in the literature. Existing research has primarily studied tuition discounting in relation to private institutions. Also, the research has concentrated on the topics of tuition discounting tendencies, common variances between institutions, and the feasibility of institutions, but has not considered the financial consequences of different tuition discounting systems at public institutions.

The financial position and stability of a higher education institution may be verified using financial ratios, which gauge numerous facets of an institution's fiscal security. Financial measures may provide researchers with quantitative measures of key markers of the financial position and vision into the institution's capability to operate over the long-term (Hodge, 2006). These ratios, when correctly analyzed, indicate the strength or weakness of institutional financial statement line items or ratios related to industry benchmarks. Financial ratios indicate the effectiveness of the institution's management of resources, the skill to operate within its revenues, and the capacity to deliver and sustain excellent educational services and amenities, as assessed by industry norms and standards (Prager et al., 2005). A ratio in and of itself does not reveal good or bad performance, but comparisons to benchmarks with other institutions reveal comparatively good or bad performance. Financial ratios provide accurate relative data that are significant in a competitive environment (Montanaro, 2013). This study uses the Financial Vulnerability Index (FVI) as a ratio measure for financial position and stability. The FVI and its ratios are discussed in more detail in Chapter 3 of this study.

As discussed earlier, the use of tuition discounting among public institutions has been increasing steadily over time. It is a method for institutions to contend for the best students (Winston & Zimmerman, 2000). According to Baum and Ma (2010), institutions are the largest supplier of grant aid to students. Total institutional grants increased from $30.5 billion in 2007-08 to $42.1 billion in 2011-12 (Long, 2013). As a percentage of total undergraduate grant aid, institutional grants have been increasing each year since 1990. While public institutions have offered discounts to more students and the discount rates have risen in recent years, increases in institutional expenditures have repeatedly outpaced the rate of inflation (Keith, 2013).

This trend of increased tuition discounts and increased institutional expenditures is obviously not a healthy financial trend for institutions. One possible explanation for the continuation of this trend in the short term is because the tuition discounts have been primarily unfunded. In this situation, institutions may extend the operating budget to manage the institution's rising expenditures, thus delaying normal and needed expenditures. This strategy enables institutions to support itself on its net revenues for the short-term, assuming the institution's enrollment is growing. In this situation, it could cause neglect of the physical plant and infrastructure and have long-term consequences (Redd, 2000).

Gifts and endowments do not fund the bulk of tuition discounts at public institutions. Instead, discounts reduce net revenue to the institution because the discounts are unfunded and paid for through tuition from other students (Redd, 2000), meaning that enough students must be full-paying to subsidize those who receive the tuition discount. It also promotes institutions to escalate their prices. The concern is that maintaining this

type of subsidy for discounts will be difficult because the students who receive tuition discounts might outnumber full paying students. The general fund must extend too far to meet the financial needs of the institution. With fewer funds for the institution, spending on programs is cut, which correlates to less resources for academic and student support services (Redd, 2000).

Institutions indicating higher growths in unfunded tuition discount rates are the universities mainly reliant on tuition and fee revenue to fund their main educational operations. But these same institutions lose money on each student due to its escalated spending on unfunded tuition discounts. This loss of revenue is equivalent to negative tuition because the institution essentially pays students to attend instead of charging them to attend. N. W. Hillman (2010a) indicated that four-year public institutions suffer weakening revenue returns when their unfunded tuition discount rates exceed 13%. However, the literature does not entirely explain how the financial position of the public institution influences the institution's decisions connected to the granting of tuition discounts.

As stated earlier, financial ratios can be used to understand the financial position of an institution. Ratio analysis is a frequently used device in business to evaluate financial relationships and production statistics to establish how well a company operates contrasted to itself, its competitors, and its industry (Elliott & Elliott, 2011). Financial ratios were also established to give an organization's stakeholders assurance that the firm was managed efficiently and give management ways of assessing organizational performance over time. Management often uses ratios to explain the impact of activities within the organization (Montanaro, 2013). This ratio analysis may also verify whether

the business is achieving a certain standard, such as budget contrasted to actual results.

When the outcomes are less than expected, adjustments are needed within the company to

enhance the outcomes (Elliott & Elliott, 2011). Historically it has been thought that

higher education was too different from the business world to employ the same analysis

methods, such as ratio analysis methods, for institutional performance analysis (Buddy,

1999). However, as institutional systems have progressed over time, that view has

changed. Institutions are increasingly more susceptible to the condition of business and

economic settings. Institutions have been forced to respond by adopting new ways to

generate revenue or cut costs (Deem, 1998). This response is very similar to

contemporary business models.

A number of financial ratios are existing and suitable to examine a for-profit

business organization. Key ratios used in for-profit entities are ratios that measure an

organization's liquidity, debt utilization, asset utilization, and profitability (Elliott &

Elliott, 2011). Liquidity ratios gauge the entity's capacity to pay short-term debts as they

become due. Debt utilization ratios gauge the complete debt situation of the entity

associated with its assets and earnings. Asset utilization ratios gauge the size and

efficiency of the entity's assets. Profitability ratios gauge the entity's capability to

produce a return on its endeavors. These types of ratios are fairly simple to comprehend

because the objective or purpose of a company is usually profit focused or profit

connected. One may basically look at the ratios and ascertain how well the company has

achieved over time compared to benchmarks.

The purpose of a public higher education institution is different from that of a for-

profit business. While being fiscally responsible with the money and assets of the

institution is always important, the emphasis of the institution is not on profit. Not-for-profit entities have different purposes and group their financial resources differently than do for-profit entities. Not-for-profit institutions usually highlight stewardship and accountability (Chabotar, 1989), which are more likely assessed through the access and academic excellence missions of higher education.

This different emphasis makes using for-profit financial ratios problematic, because the goals, values, and mission statements of higher education institutions as not-for-profit entities are unique. Using the same financial ratios to analyze a public higher education institution as a for-profit business enterprise would produce outcomes that seem unreasonable if considered from the standpoint of the for-profit entity. It could be argued that not-for profit institutions should be managed similarly to for-profit organizations in that profitability is necessary in order to continue activities over the long-term. However, the allocation of resources, the ability of the organization to meet mission driven goals, and assisting management and stakeholders in evaluating performance necessitates an innovative approach for the not-for-profit public higher education industry (Montanaro, 2013). Based on a mission that is different than that of a for-profit entity, not-for-profit institutions would likely acquire a different group of measures for financial analysis to assess performance.

Leaders and administrators of higher education and other not-for-profit institutions take notice of the financial position of their organizations. These individuals are also concerned with a more basic assessment of the organization, including whether it is financially vulnerable to an economic setback that could cause it to go into financial exigency. They believe in assessing the financial stability of an institution. The financial

vulnerability index (FVI) is a measure based on financial ratios and was created to ascertain the financial vulnerability or stability of a not-for-profit institution (Trussel et al., 2002).

The intent of the FVI is to analyze the financial vulnerability of an institution at a given point in time. As with other ratio analyses, its use over a period of time may help reveal movement in an institution's financial position. For example, an administrator could determine whether the financial position of the institution is changing and in what direction the change is occurring (Prager et al., 2005). The FVI offers only an assessment of the financial element of the institution's stability, which is the emphasis of this research. Researchers and administrators must take into account other issues when ascertaining the total well-being of an institution (Prager et al., 2005).

The existing literature contains research regarding the diverse facets of tuition discounting. Literature is available concerning how college cost increases outpace inflation (Kirshstein, 2012) and how college cost increases outpace financial aid increases (Long, 2013). The literature addresses how institutions have changed their financial aid policies from need-based to merit-based aid (Redd, 2000). The majority of tuition discounting research focuses on private four-year institutions. Very few studies examine the practice at public institutions (N. W. Hillman, 2010b). The research has made the study of tuition discounting significant. It is important to the higher education industry, but also from the perspective of students and parents who must navigate the system.

Growth has occurred in recent years in the percentage of students receiving tuition discounts and the average tuition discount rate provided to students (Keith, 2013). This growth appears to be a positive development because more students have received help,

but the problem is that a substantial percentage of institutional aid awarded is unfunded, meaning that institutions basically give up the revenue. The concern is that eventually unfunded tuition discounts may lead to financial instability for the institution (Redd, 2000). The point of instability is unknown and may vary by institution, but the issue creates interesting questions about how the institution itself is a vital component in deciding the proper level of tuition discounting. This research examines the relationship between tuition discounting and the financial position of four-year public institutions. Resource dependence theory will be applied to inform the theoretical application of this study.

CHAPTER 3

METHODOLOGY

The dataset source for this research is IPEDS ("Integrated Postsecondary

Educational Data Survey," 2016). IPEDS is an annual survey that results in a range of

institutional records on the number of degrees completed, general institutional

characteristics, enrollments, finances, graduation rates, student financial aid, and

institutional human resources. All higher education institutions that receive Title IV

funding in accordance with the Higher Education Act (HEA) of 1965, as amended, for

student aid are required to provide timely and accurate information to IPEDS. It is a

commonly used data source for research in numerous facets of higher education

institutions. It uses a consistent set of common statistical elements that apply to all

providers of postsecondary education data. The information is available to the public free

of charge on the NCES website (http://nces.ed.gov/ipeds/).

Because IPEDS is publicly available and human subjects were not involved, data

security was not applicable. I notified my institution's Institutional Review Board (IRB)

in writing of my intent to use this dataset for the study and requested a determination

letter from the IRB. The IRB approved the request to use IPEDS. This study, therefore,

relied on secondary or archival record analysis, i.e., the analysis of records that were not

specifically collected to address the research question in this study (Church, 2002). A

large, multi-year survey, assembled by a team of survey researchers using methods

created and enhanced over many years, was a benefit of relying on secondary

information. It would be difficult for a single researcher to reproduce work on this level. This advantage and the availability of national datasets explain why secondary analysis is a main source of research in education and other similar fields (Carmichael, 2015). Downloaded records from IPEDS comprised the dataset for this study. Once the information was acquired and merged, the next step was to assign random numbers to each institution to mask their identities. To maintain anonymity, all research and results were reported in the aggregate; no identifiable institutional examples were reported.

The data collection methods in this study depended on the work of NCES to document and test their data collection methods. Data collection techniques for IPEDS are well documented and publicly available (NACUBO, 2010; NCES, 2013). Evidence for measurement validity and reliability for the key variables came from the work of NCES to validate the survey and ensure the quality of data collection. IPEDS data collection methods take advantage of the longitudinal nature of the survey to check the reliability of measurements over time. The survey designers assume that year-to-year variations within institutions for most financial variables will be small. The IPEDS data collection method utilizes a web-based survey. As respondents enter information, the data collection system automatically computes totals, averages, and percentages and compares the responses with the previous year's submission for the same institution to make sure the information is consistent. The system also compares reported records with other related values reported for the year to certify consistency of reporting within each survey component and across the data collection program (Ginder, Kelly-Reid, & Mann, 2015).

The research question of this study is: To what extent does the financial position of a public institution, as determined by the Financial Vulnerability Index (FVI),

influence the tuition discount rate? Understanding the influence of the financial position on the tuition discount rate called for a quantitative design. The quantitative method used is a hierarchical multiple regression analysis.

The period under examination was the academic years 2006-07 and 2013-14. These two years compare the information over time, as well as examine the numbers pre and post the 2008 recession. The years of economic crisis since 2008 may represent an important and lasting change in public higher education finances (Carmichael, 2015). Academic year 2013-14 was the most recent year that all of the variables of interest were available at the time of this study.

Using the IPEDS available selection criteria, the sample for this study was chosen and the following categories used: a) public, b) four-year or above, c) Carnegie classification 2015: Basic: Doctoral Universities: Highest, Higher, and Moderate Research Activity; and Master's Colleges & Universities: Larger Programs, d) Institutional size category: 5,000 enrollment and above, and e) institutions located in the United States. The selected categories above provide a relevant and accurate comparison among institutions. To make comparisons among higher education institutions, comparable peers must be selected. These comparisons were enhanced by the use of institutional size, public status, and Carnegie classification. Additionally, the use of the IPEDS dataset provided uniformity of available records. All of these factors gave a reasonable balance that allowed both a common sense approach and a technically sound basis for comparisons.

Public institutions were chosen for this study since the research is limited on matters related to how financial factors shape discount rates at public institutions. The

available literature has primarily focused on how private institutions have utilized tuition discounts. Due to the 2008 recession and the resulting state funding cuts to public higher education, public institutions must operate much like private institutions. Public institutions cannot rely on state funding and must independently produce the funds needed to operate through multiple revenue sources (Hodge & Piccolo, 2005). The relatively new need for public institutions to self-fund makes the study of the financial components of public institutions more informative than prior to the 2008 recession. The resulting sample consisted of 312 institutions.

Missing data and reliability concerns make eliminating certain information necessary. According to Mertler and Vannatta (2013), when a dataset includes missing information it is important to examine the dataset upfront in the process to determine if this is a random issue. If the missing data is deemed random in nature, Mertler and Vannatta state that an appropriate option would involve deleting the cases or variables that have created the problems. Mertler and Vannatta further explain that if only a few cases have missing values, deleting the cases is a good alternative. Missing data issues are especially problematic for smaller institutions that may not have the resources to provide accurate and reliable information to IPEDS (Winston & Yen, 1995). Generally speaking, smaller institutions have less staff available to devote to state and federal reporting requirements. Similarly, smaller institutions may also have a higher incidence of missing data. Therefore, eliminating them may reduce the number of cases with missing and unreliable records. As stated earlier in this chapter, institutions with total enrollment under 5,000 were not included in this study. In addition to smaller institutions being excluded, institutions were excluded if all of their financial, tuition discount, or

other covariate variable information was unavailable. This unavailability of information limited the ability to calculate all FVI components, tuition discount rate, or covariate variable data, which are the key variables in this research. Once the missing data and reliability concerns were addressed, all the variables were ready to be analyzed.

This research includes an independent variable, covariate variables, and a dependent variable. The independent variable is the financial vulnerability index (FVI). The covariate variables are: a) tuition and fees, b) total enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal financial aid. The dependent variable for this study is the tuition discount rate for the institution.

Financial Vulnerability Index (FVI)

All of the information in this chapter, especially the upcoming pages, regarding the FVI were obtained from an article written in 2002 for *The CPA Journal* by three certified public accountants, John Trussel, Janet Greenlee, and Thomas Brady. The authors realized that using the financial measures that have been developed for the business sector are often inappropriate for organizations that are not-for-profit and there was a strong need for not-for-profit organizations to be able to use financial measures or tools to analyze their financial stability and vulnerability (Trussel et al., 2002). The FVI contains five financial measures, each with component variables: the debt ratio (Debt), the revenue concentration index (Concen), the surplus margin ratio (Margin), the administrative costs ratio (Admin), and the asset size ratio (Size).

The debt ratio, stated as a percentage, illustrates the quantity of debt in the institution's capital structure. It signifies the amount of debt the institution has in its

capital structure in relation to its assets. An institution with a lower ratio is financially healthier.

The revenue concentration index, stated as a value between zero and one, communicates the number of revenue sources existing and the diversification of the revenue streams of an institution. As the amount of revenue sources grows, the index approaches zero. If an institution has one revenue source, the index would be one. Consequently, an institution with a smaller number is financially healthier than an institution with a higher number.

The surplus margin ratio, stated as a percentage, is a gauge of profitability and indicates whether the institution is operating within its revenues. It signifies the ratio of the excess of total revenues over total expenses divided by total revenues. An institution with a higher surplus margin ratio is financially healthier than an institution with a smaller surplus margin ratio or negative surplus margin ratio.

The administrative cost ratio, stated as a percentage, recognizes the proportion of institutional spending made for non-operational activities. It signifies the amount of administrative costs in relation to total revenues. An institution with a lower ratio is financially healthier than an institution with a higher ratio.

The asset size, stated as a number larger than one, recognizes the institution's financial size as a function of its total assets. A bigger size ratio signifies a higher asset value for the institution. An institution with a higher size ratio is financially healthier than an institution with a lower size ratio.

Each of these five components is a continuous measure. These five elements comprise the FVI, a representative combined gauge of institutions' financial health. The

FVI provides a numerical gauge of the relative financial vulnerability experienced by institutions. Institutions that score high on the measure are considered vulnerable and less able to recover from a disruption in revenue stability (Hodge, 2006). A comprehensive gauge such as the FVI recognizes more causes of variability than does a univariate gauge, such as net tuition revenue. Univariate measures, by themselves, do not disclose the level of intricacy of institutional financial position (Prager et al., 2005). FVI component ratios are a more comprehensive and extensive measure of the overall financial position of the organization. Therefore, combining the five measures of the FVI into a single score allows for a more complete viewing of the institution's financial position, in which the strength of one of the FVI components may offset the weakness of another component. The literature cautions against the dependence on single-ratio gauges of financial position, suggesting a preference for composite measures of financial performance (Hodge, 2006). According to Buddy (1999), ratio analysis may act as an early warning system by drawing attention to features of an institution's financial condition that warrant additional study and may necessitate management engagement. Buddy also states that higher education institutions must carefully examine their financial resources in order to operate efficiently and effectively.

An alternative index, identified as the independent variable, is the Composite Financial Index (CFI). Institutional financial executives and independent auditors may utilize the CFI to establish the financial position of institutions (Prager et al., 2005). The CFI utilizes four component ratios: a) the primary reserve ratio, b) the viability ratio, c) the return on assets ratio, and d) the net operating revenues ratio. Not all of the information needed to calculate the four component variables of the CFI for all of the

public four-year institutions were available in IPEDS. Without all the information, accurate calculation of the CFI was not possible. Therefore, the CFI was not utilized for this study.

Calculating the FVI is a three-step progression. First, the values of the five component measures – debt ratio, revenue concentration index, surplus margin ratio, administrative costs ratio, and asset size ratio – were computed and then those values were used to calculate the formula exponent, z (see formula on following page). The FVI was then calculated using the z value (see formula on following page). Using this procedure, an institution will normally have an FVI score between 0 and 1. An FVI score of less than .10 signifies the institution is not financially vulnerable: it is stable. An FVI score of more than .20 signifies the institution is financially vulnerable: it is not stable. An FVI score between .10 and .20 is inconclusive regarding institutional vulnerability. However, an institution with a FVI score between .10 and .20 can be described as not being in a financially stable position since only institutions with a FVI score of less than .10 are categorized as financially stable. The Certified Public Accountants, as mentioned previously, established these cut-off points using a multiple step process by which they first identified a sample of financially vulnerable institutions and a group of similar institutions that were not financially vulnerable. Next, they examined the variances between the groups and used the five-component measures to create an equation to explain the variances between the two types of institutions. The authors then tested the equation on another sample of institutions (a holdout sample) to assess the predictive power of the equation. Finally, they created a decision rule that reduced the number of incorrect predictions.

IPEDS was used as the source of the needed variables for the calculation of the five ratios for the FVI. After calculating each individual measure, the FVI was calculated using the following formula:

$$FVI = 1/1+e^{-z} \text{ where}$$

$$z = 0.7754 + (0.9272 \text{ x Debt}) + (0.1496 \text{ x Concen}) - (2.8419 \text{ x Margin}) + (0.1206 \text{ x Admin}) - (0.1665 \text{ x Size}), \text{ where}$$

$$e = 2.718$$

$$\text{Debt} = \text{Total Liabilities} / \text{Total Assets}$$

$$\text{Concen} = \Sigma (\text{Revenue}_i / \text{Total Revenues})^2$$

$$\text{Margin} = \text{Total Revenues} - \text{Total Expenses} / \text{Total Revenues}$$

$$\text{Admin} = \text{Administrative Expenses} / \text{Total Revenues}$$

$$\text{Size} = \ln (\text{Total Assets})$$

The formula shows that the FVI is a composite measure of relative financial position, calculated through regression analysis. The regression formula contains the particular coefficients for each variable group, weighing the individual impact of each respective variable and supplying a single index value to assess the financial health of the institution. The higher the FVI score, the greater the chance the institution will experience financial instability.

Covariate Variables

To account for the variances in the study of organizational activities, institutional differences are controlled for using a series of relevant variables. In this study, the covariate variables represent institutional characteristics or issues applicable to financial aid and tuition discounting. There are two groups of covariate variables: institutional

economic controls and institutional characteristics. The economic control is a source of institutional revenue, tuition and fees. This information, along with other revenue sources for the institution, is available in IPEDS. The type and source of the funding for an institution explains both the availability and limitations of resources to the institution, which is useful in tuition discounting decisions.

The other group of covariate variables comprises a series of institutional characteristics. There are three variables in this set. First, enrollment was used to control for institutional size. Second, the percentage of white students enrolled measure student racial diversity. A larger percentage signifies a larger amount of white students and, consequently, a less racially diverse student population at the institution. Racial diversity is significant to tuition discounting decisions. For example, institutions that serve mostly white student populations may be more affluent in terms of benefactors, levels of assets, and endowments than are their minority-serving colleagues (Cunningham & Cochi-Ficano, 2002). This affluence may be used to provide higher levels of tuition discounts. Third, the percentage of full-time first-time undergraduates awarded federal grant aid described student economic diversity. A larger percentage signifies a larger quantity of students from a low-income background and in greater financial need. The percent of students using federal aid is important to tuition discount decisions in that institutions serving a higher percentage of students who are economically underprivileged may not have the funds to give higher tuition discount rates to all students.

The dependent variable for this study is the tuition discount rate for the institution. IPEDS provided the information needed to calculate the tuition discount rate. As stated in Chapter 2, this research will use the scholarship allowance definition of tuition discount,

as provided by Allan (1999), in order to calculate the tuition discount rate. The tuition

discount rate was calculated by first taking the sum of the funded institutional grants and

the unfunded institutional grants. This amount was then divided by the sum of tuition and

fees (net of allowances) and allowances applied to tuition and fees. This variable is a

sound gauge of the tuition discount rate because of its comprehensive nature, considering

all sources of institutional grants, both funded and unfunded as discussed by Allan

(1999).

As discussed in Chapter 1, resource dependence theory presents a suitable

theoretical framework to illustrate and clarify the financial operations and decision

making of public higher education institutions. Resource dependence theory also helped

shape the development of the hypotheses tested in this study. This theory states external

forces and the need for resources limit and influence institutional behaviors (Nienhuser,

2008) and provides an outline that relates tuition discounting practices to public

institutions' attempts to sustain competitiveness and financial stability. Tuition discounts

provide a tool to help institutions compete for students. The hypotheses used in this study

state that institutions can and do alter their tuition discounting strategies based on the

availability of and the need for resources. The hypotheses for this study are:

Hypothesis 1

For the period prior to the 2008 financial recession (2006-07 year), the

relationship between the FVI (IV) and tuition discount rate (DV) will be linear and

negative, such that as the FVI decreases, the tuition discount rate will increase, when the

institution's financial position is stable (FVI < .10, according to the ten year average),

controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid.

Hypothesis 2

For the period following the 2008 financial recession (2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and negative, such that as the FVI decreases, the tuition discount rate will increase, when the institution's financial position is approaching stable or is stable (FVI < .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid.

Hypothesis 3

For the period prior to the 2008 financial recession (2006-07 year), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and positive, such that as the FVI increases, the tuition discount rate will increase, when the institution's financial position is not in a stable position (FVI ≥ .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid.

Hypothesis 4

For the period following the 2008 financial recession (2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and positive, such that as the FVI increases, the tuition discount rate will increase, when the institution's financial position is not in a stable position (FVI ≥ .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid.

Hypothesis 5

The relationship between FVI and tuition discount rate will be stronger in the time period after the 2008 recession (2013-14) than prior (2006-07).

The FVI acts as a representation for the financial stability of an institution. As previously discussed, Trussel et al. (2002) define the assessments of FVI as they relate to financial vulnerability of an institution declaring financial exigency or closing its doors and terminating operations. Some public institutions that have experienced a prolonged period of financially vulnerability may not cease operations, but instead require further financial help from the state in order to balance their budget and pay their debts. However, since the 2008 recession, it has become more difficult for states to have the financial ability to provide additional funding for financially vulnerable public institutions. For the intent of this research, institutional stability and financial vulnerability relate to the institution's ability to continue operations. An institution is stable in that it is not financially vulnerable to closing or having to declare financial exigency (FVI < .10).

It is logical to assume that the more financially stable an institution is, the more probable it is financially able to provide tuition discounts. Also, institutions might consider tuition discounts as an investment (Allan, 1999), and they may decide to invest deeply in tuition discounts, possibly trading short-term financial position for long-term advances in the form of larger enrollments. Some institutions will follow this tactic even when they have erratic growth rates or show financial vulnerability (Redd, 2000).

The first and second hypotheses assume that when an institution is financially stable (FVI < .10, according to the ten year average), the institution's tuition discount rate

will increase. A ten-year average FVI was calculated for each institution. This ten-year period was from 2004-05 to 2013-14. This assumption means that when an institution's financial position is healthy, they will be able to offer additional discounts. These institutions may use tuition discounts to meet their strategic initiatives. From a resource dependence standpoint, when an institution is financially stable, the institution does not have to depend as much on resources from its students. Therefore, in this case, institutions do not strain themselves beyond their resources when offering tuition discounts. Instead, institutions may select to offer tuition discounts as resources become available.

Understanding the nature of public higher education currently, not all institutions are in a financially stable situation. The third and fourth hypotheses assume that as an institution becomes financially less stable (FVI increasing), the institution's tuition discount rate will also increase. This assumption means that when an institution's financial position is not considered in a stable position (FVI $\geq$ .10, according to the ten year average), they will attempt to continue to offer additional discounts. Because they are resource dependent, they spend money on tuition discounts in an attempt to grow enrollment and to increase tuition revenue (N. W. Hillman, 2010a). Institutions may take excessive measures through discount policies to grow tuition revenue. Even though institutions need money in the short-term, they may sacrifice the short-term goals of producing revenue in the present in favor of a long-term strategy. In this case, the institution uses tuition discounts in the present as an investment for the future of the institution (Allan, 1999), irrespective of the institution's current financial position. Assuming that the loss of revenue through discounting is offset by the growth in student

enrollment, institutions produce more gross tuition revenue. Additionally, as those students graduate and are employed, they become possible future donors to the institution. Having a larger student body on an annual basis may lead to larger graduating classes, which may lead to a larger pool of donors in the future, thus funding growth and operations.

In the situation of investment for enrollment growth, an institution may remain on track and sacrifice short-term revenues for the long-term plan of enrollment growth. According to Redd (2000), handling the trade-offs between short-term funding needs and long-term institutional goals involves a sense of wisdom and balance. The institution must oversee tuition discounting amounts and composition carefully to meet its growth target. Understanding resource dependence theory, it is anticipated that institutions will not take into account their short-term financial position when deciding tuition discounting practices (Redd, 2000). Institutions are prone to use resources they currently have to increase the probability of reaching long-term institutional goals.

Assuming that an institution is financially vulnerable and in peril of ceasing operations, it will pursue strategies to stay in business by introducing crisis strategies (Sturm, 2005). To grow tuition revenues, the institution will aggressively recruit more students through numerous approaches, including tuition discounts. Enactment of such a strategy has the objective of growing net tuition revenue (gross tuition revenue less tuition discounts) in order to keep the institution functioning in the short-term and assure the long-term viability of the institution (Sturm, 2005).

The analytical strategy of this study included both descriptive and inferential statistics. The calculation of descriptive statistics summarized the information and

showed the relationship between institutional financial position and tuition discount rates. The inferential statistical model used for hypotheses one through four was a hierarchical multiple regression analysis in which the tuition discount rate was the dependent variable and the FVI was the independent variable. In addition, the covariate variables that were also used for this analysis were tuition, total enrollment, percent of white enrollment, and percent of federal aid. According to Mertler and Vannatta (2013), hierarchical multiple regression analysis may be used to examine the influence of several predictor independent variables in a specific order. First, the covariate variables were entered into the regression analysis as one block of predictor variables, and then the FVI was entered as a separate block of a predictor variable. This research was performed with the assumption that the FVI will account for more of the variance than the covariate variables in this set, and therefore, the FVI was entered into the regression analysis second and separately (Mertler & Vannatta, 2013).

For Hypothesis 5, the belief is that the relationship between the FVI and the tuition discount rate will be stronger in 2013-14 compared to 2006-07. The assumption is the financial shift caused by the 2008 recession has caused a more significant correlation between the financial position of the institution and the institution's tuition discount rate. A Fisher's r to z transformation will be conducted to compare the r values obtained in 2006-07 to the r values obtained in 2013-14. Fisher's r to z transformation converts r values to the normally distributed variable z. Fisher's z is used for computing confidence intervals on Pearson's correlation and for confidence intervals on the difference between correlations (Lane, 2013). The outcome of this analysis will shape Hypothesis 5 with the

assumption that the Fisher's z will indicate a stronger relationship between the FVI and tuition discount rate for the 2013-14 year.

Multivariate outliers involve unusual combinations of scores on two or more variables. To detect the multivariate outliers in the hierarchical multiple regression analysis, a statistical procedure known as Mahalanobis distance was utilized. Mahalanobis distance is defined as the distance of a case from the centroid of the remaining cases, where the centroid is the point established by the means of all the variables (Mertler & Vannatta, 2013). For multivariate outliers, Mahalanobis distance is assessed as a chi-square statistic with degrees of freedom equal to the number of predictor variables in the analysis. The accepted criterion for outliers is a value for Mahalanobis distance that is significant beyond $p < .001$, established by comparing the obtained value for Mahalanobis distance to the chi-square critical value (Mertler & Vannatta, 2013). The findings of the Mahalanobis distance for Hypotheses 1-4 are discussed in Chapter 4.

Normality of the variables used in this study was tested by looking at a histogram for each variable. Also, the P-P Plot in SPSS indicated a good fit and no major deviations from normality. A scatterplot was performed to view the distribution of the variables to assess that they are approximately elliptical. In addition to linearity, the scatterplot also helped test for homoscedasticity and identification of residual outliers. Based on the regression standardized residual scatterplot of the dependent variable, the dependent variable appeared to be normally distributed. Multicollinearity was also checked, which refers to the relationship among the independent and covariant variables (Mertler & Vannatta, 2013). To test for multicollinearity, the correlation matrix for the variables was

examined in SPSS, looking for moderate to high intercorrelations, using an r value of .7 or higher. There were no r values found to be in this range. Therefore, no redundant predictor variables were found. Additionally, under the coefficients section of the SPSS output and under the collinearity statistics, the tolerance values were well above .10, suggesting no multicollinearity issues with the independent and covariate variables. Also the FVI values were well below 10, indicating again, no multicollinearity issues.

CHAPTER 4

RESULTS

This chapter will present the results of the data analysis based on the methodology

described in the previous chapter. The analysis includes public, four-year institutions in

the United States ($N = 312$) as the population of interest. Both descriptive and inferential

statistics were used in this study. The data obtained from IPEDS were analyzed by using

SPSS. The descriptive statistics of the variables were first summarized, and next a two-

step hierarchical multiple regression analysis was performed after examining whether the

underlying assumptions for the multiple regression model were met. An alpha level of .05

was set for all statistical analysis ($p<.05$), except for t-test discussed below.

Descriptive Statistics

As discussed in the previous chapter, the period under examination in this study

was the academic years 2006-07 and 2013-14. These two years were chosen to give a

comparison of the information over time, as well as an opportunity to examine the data

pre-2008 recession and post-recession. The statistical analysis for this study was

considered according to these two years. Table 1 presents the descriptive statistics for the

variables in this study for both years. Also, independent samples t-tests were performed

for each of the six variables used in this study in order to compare the means for each

variable between the two years of this study. According to Mertler and Vannatta (2013),

since we are conducting multiple t-tests from the given sample, this will result in multiple

tests of significance, which will result in an inflated Type 1 error rate. To counteract the

possibility of an inflated error rate due to multiple tests, a modification was made to the

alpha level used for the tests. A Bonferroni-type adjustment was used. This adjustment

involves setting a more rigorous alpha level for each t-test so that the alpha for the entire

set of tests does not exceed some significant value. For t-test used in this study, $p = .008$.

The independent samples t-test was associated with a statistically significant effect with:

a) tuition discount rate, $t(622) = -3.74$, $p = .000$, b) tuition and fees, $t(622) = -15.65$, $p =$

$.000$, c) percent of white students enrolled, $t(622) = 3.64$, $p = .000$, and d) percent of

students receiving federal financial aid, $t(622) = -10.06$, $p = .000$. Thus, the difference in

the means was statistically significant between the two years for these four variables.

Table 1

Descriptive Statistics for Total Sample

Variable	2006-07 M(SD)	2013-14 M(SD)
TDR	.14(.09)	.16(.08)
FVI	.10(.04)	.10(.04)
Tuition and Fees	5,590(2,054)	8,349(2,341)
% White Enroll	67(21)	61(22)
Total Enroll	17,073(10,249)	18,754(11,269)
% Fed Fin Aid	28(13)	39(15)

Note. N = 312

Regression Assumptions

As discussed in the previous chapter, the underlying assumptions of

homoscedasticity, linearity, normality, and multicollinearity for the hierarchical multiple

regression analysis were tested before running the proposed models. Using bivariate

scatter plots, tests of normality, and preliminary multiple regression analysis, the

assumptions were tested and the evidence indicated the assumptions were met for both

years in the analysis.

Hierarchical Multiple Regression Analysis

A two-stage hierarchical multiple regression was calculated to assess what extent the financial position of a public institution, as determined by the FVI, influences the tuition discount rate. In the hierarchical multiple regression analysis, tuition discount rate was the dependent variable and the FVI was the independent variable. In addition, the covariate variables that were also used for this analysis were tuition, total enrollment, percent of white enrollment, and percent of federal aid. According to Mertler and Vannatta (2013), hierarchical multiple regression analysis may be used to examine the influence of several predictor independent variables in a specific order. First, the covariate variables were entered into the regression analysis as Step 1, and then the FVI was entered in as Step 2.

Hypothesis 1

Hypothesis 1 states that for the period prior to the 2008 financial recession (2006-07 year), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and negative, such that as the FVI decreases, the tuition discount rate will increase, when the institution's financial position is stable (FVI < .10, according to the ten-year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid. To identify the multivariate outliers, Mahalanobis distance was utilized. Since there are five predictor variables in the analysis, the degrees of freedom (df) was set at five. The criterion for outliers was a value for Mahalanobis distance that was significant beyond $p<.001$. Therefore, the cutoff score, using a chi-square distribution chart, was 20.52. A total of four cases in Hypothesis 1, out of 193 total, exceeded the cutoff score and were

considered outliers. These four outliers were removed from the analysis prior to running the hierarchical multiple regression analysis.

Table 2 presents the correlations among the dependent variable, independent variable, and the covariate variables, along with the means and standard deviations. Table 3 illustrates the results of hierarchical multiple regression for both steps for Hypothesis 1 with standardized coefficients (β), as well as the p values or significance of the variables used in the analysis. The four covariates were evaluated in Step 1 and explained 2.8% of the variance in tuition discount rate, $F(4, 184) = 1.34, p = .26, R = .17, R^2 = .03$. After entry of FVI at Step 2 the total variance explained by the model was 5.9%, $\Delta F(1, 183) = 5.91, p = .02, R = .24, \Delta R^2 = .03$. Therefore, FVI explained an additional 3.1% of the variance in tuition discount rate, after controlling for the four covariates. The results of the data analysis indicate that the model was statistically significant.

In Model 1 of Hypothesis 1, none of the variables were statistically significant predictors. In Model 2, percent of white students enrolled and FVI were statistically significant predictors, with the FVI resulting in a higher beta value (beta = -.192, $p = .02$) than percent of white students enrolled (beta = .190, $p = .04$). The unstandardized coefficient (B) for FVI was -.85, which indicated that there was a .85 decrease in the TDR for every 1 unit increase in the FVI. This coefficient indicated a negative relationship between the TDR and FVI. Therefore, Hypothesis 1 was supported since the relationship between FVI and TDR was linear and negative and the model was statistically significant.

Table 2

Descriptive Statistics and Correlations for Institutions with Lower FVI, 2006-07

Variable	M(SD)	TDR	Tuition and Fees	% White Enroll	Total Enroll	% Fed Fin Aid	FVI
TDR	.16(.09)	-	0.05	0.13	0.08	-0.09	-0.19
Tuition and Fees	5,693(1,833)	0.05	-	0.22	0.14	-0.31	-0.07
% White Enroll	69(19)	0.13	0.22	-	-0.12	-0.55	0.05
Total Enroll	20,481(10,995)	0.08	0.14	-0.12	-	-0.29	-0.39
% Fed Fin Aid	24(12)	-0.09	-0.31	-0.55	-0.29	-	-0.23
FVI	.07(.02)	-0.19	-0.07	0.05	-0.39	-0.23	-

Note. N = 189

Table 3

Model Summary for Institutions with Lower FVI, 2006-07

	B	F	ΔF	R	R^2	ΔR^2	p
Step 1:		1.34	1.34	0.17	0.03	0.03	0.26
Tuition and Fees	0.01						0.93
% White Enroll	0.17						0.08
Total Enroll	0.11						0.17
% Fed Fin Aid	0.04						0.71
Step 2:		2.29	5.91	0.24	0.06	0.03	0.02
Tuition and Fees	0.01						0.90
% White Enroll	0.19						0.04
Total Enroll	0.05						0.55
% Fed Fin Aid	0.08						0.43
FVI	-0.19						0.02

Hypothesis 2

Hypothesis 2 states that for the period following the 2008 financial recession

(2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be

linear and negative, such that as the FVI decreases, the tuition discount rate will increase,

when the institution's financial position is approaching stable or is stable (FVI < .10,

according to the ten-year average), controlling for a) tuition and fees, b) enrollment, c)

percentage of white students enrolled, and d) percentage of students awarded federal

grant aid. As discussed with Hypothesis 1, Mahalanobis distance was utilized to identify

multivariate outliers. The cutoff score was the same as in Hypothesis 1 and only one case

out of 193 exceeded the cutoff score and was considered an outlier. The outlier was

removed from the analysis prior to running the hierarchical multiple regression analysis.

Table 4 presents the correlations among the dependent variable, independent

variable, and the covariate variables, along with the means and standard deviations. Table

5 illustrates the results of hierarchical multiple regression for Hypothesis 2 with

standardized coefficients (β), as well as the p values or significance of the variables used in the analysis. The four covariates were evaluated in Step 1 and explained 2.6% of the variance in tuition discount rate, $F(4, 187) = 1.23$, $p = .30$, $R = .16$, $R^2 = .03$. After entry of FVI at Step 2 the total variance explained by the model was 2.9%, $\Delta F(1, 186) = .70$, $p = .40$, $R = .17$, $\Delta R^2 = .004$. Therefore, FVI explained an additional .4% of the variance in tuition discount rate, after controlling for the four covariates. The results of the data analysis indicate that the model was not statistically significant.

In the model, none of the variables were statistically significant predictors. The unstandardized coefficient (B) for FVI was -.28, which indicates that there was a .28 decrease in the TDR for every 1 unit increase in the FVI. This coefficient indicated a negative relationship between the TDR and FVI. Therefore, even though the relationship between FVI and TDR was linear and negative, Hypothesis 2 was not supported since the model was not statistically significant.

Table 4

Descriptive Statistics and Correlations for Institutions with Lower FVI, 2013-14

Variable	M(SD)	TDR	Tuition and Fees	% White Enroll	Total Enroll	% Fed Fin Aid	FVI
TDR	.18(.07)	-	0.02	0.06	0.13	-0.12	-0.12
Tuition and Fees	8,609(2,427)	0.02	-	0.23	0.22	-0.47	-0.18
% White Enroll	62(21)	0.06	0.23	-	-0.08	-0.64	0.05
Total Enroll	22,577(11,941)	0.13	0.22	-0.08	-	-0.29	-0.39
% Fed Fin Aid	35(14)	-0.12	-0.47	-0.64	-0.29	-	0.31
FVI	.08(.02)	-0.12	-0.18	0.05	-0.39	0.31	-

Note. N = 192

Table 5

Model Summary for Institutions with Lower FVI, 2013-14

	β	F	ΔF	R	R^2	ΔR^2	P
Step 1:		1.23	1.23	0.16	0.03	0.03	0.30
Tuition and Fees	-0.05						0.54
% White Enroll	0.02						0.87
Total Enroll	0.11						0.17
% Fed Fin Aid	-0.10						0.39
Step 2:		1.12	0.70	0.17	0.03	0.00	0.40
Tuition and Fees	-0.05						0.55
% White Enroll	0.04						0.71
Total Enroll	0.09						0.26
% Fed Fin Aid	-0.07						0.57
FVI	-0.07						0.40

Hypothesis 3

Hypothesis 3 states that for the period prior to the 2008 financial recession (2006-07 year), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and positive, such that as the FVI increases, the tuition discount rate will increase, when the institution's financial position is not in a stable position (FVI $\geq$ .10, according to the ten-year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid. Mahalanobis distance was utilized to identify multivariate outliers. The cutoff score was the same as in Hypothesis 1 and 2. There were no cases that exceeded the cutoff score and considered an outlier.

Table 6 presents the correlations among the dependent variable, independent variable, and the covariate variables, along with the means and standard deviations. Table 7 illustrates the results of hierarchical multiple regression for Hypothesis 3 with standardized coefficients (β), as well as the p values or significance of the variables used

in the analysis. The four covariates were evaluated in Step 1 and explained 7.2% of the variance in tuition discount rate, $F(4, 114) = 2.21$, $p = .07$, $R = .27$, $R^2 = .07$. After entry of FVI at Step 2 the total variance explained by the model was 10.3%, $\Delta F(1, 113) = 3.85$, $p = .05$, $R = .32$, $\Delta R^2 = .03$. Therefore, FVI explained an additional 3.1% of the variance in tuition discount rate, after controlling for the four covariates. The results of the data analysis indicate that the model was not statistically significant.

In Model 1 of Hypothesis 3, percent of white students enrolled and percent of students on federal financial aid were statistically significant predictors. In Model 2, these same two were again statistically significant predictors, with the percent of students on federal financial aid recording a higher beta value (beta = .36, $p = .01$) than percent of white students enrolled (beta = -.31, $p = .02$). However, FVI was not a statistically significant predictor. The unstandardized coefficient (B) for FVI was -.35, which indicated that there was a .35 decrease in the TDR for every 1 unit increase in the FVI. This coefficient indicated a negative relationship between the TDR and FVI. Therefore, Hypothesis 3 was not supported since the relationship between FVI and TDR was negative and the model was not statistically significant.

Table 6

Descriptive Statistics and Correlations for Institutions with Higher FVI, 2006-07

Variable	M(SD)	TDR	Tuition and Fees	% White Enroll	Total Enroll	% Fed Fin Aid	FVI
TDR	.10(.08)	-	0.00	0.09	-0.13	0.12	-0.14
Tuition and Fees	5,302(1,745)	0.00	-	0.32	-0.12	-0.38	-0.03
% White Enroll	65(22)	0.09	0.32	-	-0.28	-0.68	-0.04
Total Enroll	11,812(5,980)	-0.13	-0.12	-0.28	-	-0.04	-0.07
% Fed Fin Aid	33(13)	0.12	-0.38	-0.68	-0.04	-	0.13
FVI	.13(.04)	-0.14	-0.03	-0.04	-0.07	0.13	-

Note. N = 119

Table 7

Model Summary for Institutions with Higher FVI, 2006-07

	B	F	ΔF	R	R^2	ΔR^2	P
Step 1:		2.21	2.21	0.27	0.07	0.07	0.07
Tuition and Fees	0.03						0.80
% White Enroll	0.30						0.03
Total Enroll	-0.03						0.74
% Fed Fin Aid	0.33						0.02
Step 2:		2.58	3.85	0.32	0.10	0.03	0.05
Tuition and Fees	0.03						0.78
% White Enroll	0.31						0.02
Total Enroll	-0.04						0.68
% Fed Fin Aid	0.36						0.01
FVI	-0.18						0.05

Hypothesis 4

Hypothesis 4 states that for the period following the 2008 financial recession

(2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be

linear and positive, such that as the FVI increases, the tuition discount rate will increase,

when the institution's financial position is not in a stable position (FVI ≥ .10, according

to the ten-year average), controlling for a) tuition and fees, b) enrollment, c) percentage

of white students enrolled, and d) percentage of students awarded federal grant aid.

Mahalanobis distance was utilized to identify multivariate outliers. The cutoff score was

the same as in Hypothesis 1, 2, and 3. There were no cases that exceeded the cutoff score

and considered an outlier.

Table 8 presents the correlations among the dependent variable, independent

variable, and the covariate variables, along with the means and standard deviations. Table

9 illustrates the results of hierarchical multiple regression for Hypothesis 4 with

standardized coefficients (β), as well as the *p* values or significance of the variables used

in the analysis. The four covariates were evaluated in Step 1 and explained 5.8% of the variance in tuition discount rate, $F(4, 114) = 1.76$, $p = .14$, $R = .24$, $R^2 = .06$. After entry of FVI at Step 2 the total variance explained by the model was 11.4%, $\Delta F(1, 113) = 7.11$, $p = .01$, $R = .34$, $\Delta R^2 = .06$. Therefore, FVI explained an additional 5.6% of the variance in tuition discount rate, after controlling for the four covariates. The results of the data analysis indicate that the model was statistically significant.

In Model 1, none of the variables were statistically significant predictors. In Model 2, FVI was a statistically significant predictor (beta = -.24, $p = .01$). The unstandardized coefficient (B) for FVI was -.49, which indicated that there was a .49 decrease in the TDR for every 1 unit increase in the FVI. This coefficient indicated a negative relationship between the TDR and FVI. Therefore, even though the model was statistically significant, the relationship between FVI and TDR was negative and not positive, so Hypothesis 4 was not supported.

Table 8

Descriptive Statistics and Correlations for Institutions with Higher FVI, 2013-14

Variable	M(SD)	TDR	Tuition and Fees	% White Enroll	Total Enroll	% Fed Fin Aid	FVI
TDR	.14(.08)	-	-0.09	-0.22	0.14	0.11	-0.25
Tuition and Fees	7,917(2,142)	-0.09	-	0.24	-0.04	-0.37	-0.17
% White Enroll	58(23)	-0.22	0.24	-	-0.30	-0.72	0.08
Total Enroll	12,574(6,446)	0.14	-0.04	-0.30	-	-0.04	-0.13
% Fed Fin Aid	45(14)	0.11	-0.37	-0.72	-0.04	-	0.05
FVI	.13(.04)	-0.25	-0.17	0.08	-0.13	0.05	-

Note. N = 119

Table 9

Model Summary for Institutions with Higher FVI, 2013-14

	β	F	ΔF	R	R^2	ΔR^2	P
Step 1:		1.76	1.76	0.24	0.06	0.06	0.14
Tuition and Fees	-0.06						0.55
% White Enroll	-0.25						0.09
Total Enroll	0.06						0.57
% Fed Fin Aid	-0.10						0.53
Step 2:		2.90	7.11	0.34	0.11	0.06	0.01
Tuition and Fees	-0.10						0.31
% White Enroll	-0.21						0.15
Total Enroll	0.04						0.70
% Fed Fin Aid	-0.07						0.65
FVI	-0.24						0.01

Hypothesis 5

Hypothesis 5 states that the relationship between FVI and tuition discount rate

will be stronger in the period after the 2008 recession (2013-14) than prior (2006-07).

The assumption was the financial shift caused by the 2008 recession has brought about a

more significant correlation between the financial position of the institution and the

institution's tuition discount rate. A hierarchical multiple regression was conducted for

the entire sample of 2006-07 (N=312), and an additional hierarchical multiple regression

was conducted for the entire sample of 2013-14 (N=312). Table 10 illustrates the results

of the hierarchical multiple regression for each of the two years for Hypothesis 5. A

Fisher's r to z transformation was conducted to compare the r value obtained for Model 2

in 2006-07 (.39) to the r value obtained for Model 2 in 2013-14 (.30). Fisher's r to z

transformation converts r values to the normally distributed variable z. The resulting z

score of 1.27, when evaluated using a one-tailed test, was not significant (p =.10).

Therefore, Hypothesis 5 was not supported.

Table 10

Model Summary

2006-07	B	F	ΔF	R	R^2	ΔR^2	P
Step 1:		5.84	5.84	0.27	0.07	0.07	0.00
Tuition and Fees	0.10						
% White Enroll	0.20						
Total Enroll	0.19						
% Fed Fin Aid	0.07						
Step 2:		11.20	30.39	0.39	0.16	0.08	0.00
Tuition and Fees	0.10						
% White Enroll	0.22						
Total Enroll	0.09						
% Fed Fin Aid	0.16						
FVI	-0.33						

2013-14	B	F	ΔF	R	R^2	ΔR^2	P
Step 1:		4.14	4.14	0.23	0.05	0.05	0.00
Tuition and Fees	-0.06						
% White Enroll	-0.13						
Total Enroll	0.15						
% Fed Fin Aid	-0.16						
Step 2:		6.17	13.58	0.30	0.09	0.04	0.00
Tuition and Fees	-0.07						
% White Enroll	-0.08						
Total Enroll	0.08						
% Fed Fin Aid	-0.08						
FVI	-0.23						

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter presents a discussion and summary of the tendencies seen in the descriptive and inferential statistical results. Based on the outcomes, suggestions for practice, policy, and future research also are presented. The research question of this study was: To what extent does the financial position of a public institution, as determined by the Financial Vulnerability Index (FVI), influence the tuition discount rate?

Summary of Findings from Descriptive Statistics

Descriptive statistics were run on the variables included in this study for each of the two years of the study. Table 1, located in Chapter 4, lists the means and standard deviations for each variable for the two years. Also, independent samples t-tests were performed for each of the six variables used in this study in order to compare the means for each variable between the two years of this study. A Bonferroni-type adjustment was used to counteract the possibility of an inflated error rate due to multiple tests. For each t-test, $p = .008$. Each variable is discussed below.

Tuition Discount Rate

The t-test indicated a statistically significant effect, $t(622) = -3.74, p = .000$, for the difference between the means for the tuition discount rate for the 2006-07 year ($M=.14$) and the 2013-14 year ($M=.16$). This difference indicates that overall, the sample institutions were providing a higher tuition discount rate in 2013-14. This change in TDR

supports the recent literature that tuition discount rates have been on the rise in order for

higher education institutions to stay competitive in recruiting students (N. P. Davis,

2013).

Financial Vulnerability Index

The *t*-test did not indicate a statistically significant effect for the difference

between the means for the FVI. There was very little change in the overall FVI for the

two years. This finding for FVI was surprising considering the changes in state funding

of public higher education. This lack of change in FVI could be an indication that public

institutions have been able to diversify their revenue streams enough to offset the

declines in state funding. However, it could also be an indication that many institutions

have deferred expenditures (hiring, technological investments or upgrades, repairs and

maintenance of the physical plant) in order to operate in a surplus while providing

unfunded tuition discounts. According to Collins et al. (2016), this lack of change in FVI

could also be an indication of how some larger and more economically diverse states

have been able to reverse their previous cuts to public higher education, thus enabling

their public institutions to better weather the recent years of financial turmoil. The states

with the largest populations and a more diversified economy are more protected from

pressures on any one revenue source, which increases the likelihood of fiscal stability and

consistent higher education funding gains. States with less diversified economies are

more susceptible to fiscal instability and higher education funding reductions.

Total Tuition and Fees

The *t*-test indicated a statistically significant effect, $t(622) = -15.65, p = .000$, for

the difference between the means for the tuition and fees for the 2006-07 year ($M=5,590$)

and the 2013-14 year (M=8,349). This change indicates that overall, the sample

institutions had higher tuitions and fees in 2013-14. This finding would be expected since

most public institutions experienced cuts in state funding in recent years and attempted to

offset some of those cuts by raising tuition and fees (Zumeta, 2010).

Percent of White Enrollment

The t-test indicated a statistically significant effect, $t(622) = 3.64$, $p = .000$, for the

difference between the means for percent of white enrollment for the 2006-07 year

(M=67) and the 2013-14 year (M=61). This difference indicates that overall, there was an

increase in the diversification of the enrollment at the sample institutions. This finding

was in contrast to the assumption that growing tuition and fee amounts, as well as higher

levels of merit based tuition discounting could hinder diversification of public higher

education institutions (N. W. Hillman, 2010b; Seaborn, 2011). Institutions that mostly

serve white student populations may be wealthier in terms of donor pools and

endowments than are their minority-serving colleagues, and this wealth may be used to

grant higher levels of tuition discounts (Cunningham & Cochi-Ficano, 2002). However,

minority student populations may require higher levels of tuition discounting in order to

attend (Epple, Romano, & Sieg, 2002). Strategically, institutions may allocate the tuition

discount a) among all students to help the greatest number of students, b) based on merit,

or c) to attract certain segments of the population (Winston & Zimmerman, 2000). Also,

according to O'Shaughnessy (2015), public institutions have used tuition discounts to

attract international students, which could also impact the diversification of the

institution's enrollment mix.

Total Enrollment

The *t*-test did not indicate a statistically significant effect for the difference between the means for enrollment. Overall, the sample institutions have only grown slightly larger. This lack of large growth might be an indication that the emphasis placed on recruiting and growing enrollment in order to offset the cuts in state funding with tuition and fee revenue has not significantly grown overall college access and attendance. Some institutions might be struggling with their ability to fund influential amounts of tuition discounts. Larger institutions may have the flexibility to offer more selective and strategic tuition discounts, given there are more students to fund the discounts and potentially more alumni to also help fund tuition discounts (Winston & Zimmerman, 2000). During these changing times in public higher education, a growing institution is economically attractive only so long as that growth does not lead to an expanded, more costly instructional mission (Carmichael, 2015).

Percent of Federal Financial Aid

The *t*-test indicated a statistically significant effect, $t(622) = -10.06$, $p = .000$, for the difference between the means for percent of students receiving federal financial aid for the 2006-07 year ($M=28$) and the 2013-14 year ($M=39$). This difference indicates that overall, the percentage of the students at the sample institutions who received federal financial aid grew significantly. This growth is an indication that as the cost of public higher education increases, more students are having to turn to federal financial aid to fund their cost of attendance, and that the increase in institutionally supplied tuition discounts alone are not able to keep pace with the cost of higher education (Collins et al., 2016).

Results of the Hypotheses

A two stage hierarchical multiple regression was used for the hypotheses to assess

what extent the financial position of a public institution, as determined by the FVI,

influences the tuition discount rate. In the hierarchical multiple regression analysis,

tuition discount rate was the dependent variable and the FVI was the independent

variable. In addition, the covariate variables that were also used for this analysis were

tuition, total enrollment, percent white enrollment, and percent federal aid.

Hypothesis 1

Hypothesis 1 states that for the period prior to the 2008 financial recession (2006-

07 year), the relationship between the FVI (IV) and tuition discount rate (DV) will be

linear and negative, such that as the FVI decreases, the tuition discount rate will increase,

when the institution's financial position is stable (FVI < .10, according to the ten year

average), controlling for a) tuition and fees, b) enrollment, c) percentage of white

students enrolled, and d) percentage of students awarded federal grant aid. After entry of

FVI at Step 2 the total variance explained by the model was 5.9%, and the overall model

for Hypothesis 1 was statistically significant. In Model 2 of Hypothesis 1, percent of

white students enrolled and FVI were statistically significant predictors. The model also

indicated that the relationship between FVI and TDR was linear and negative. Therefore,

Hypothesis 1 was supported. The data indicate, for these 189 public four-year institutions

in 2006-07 that are considered to be in a stable financial position, that as these institutions

have become financially stable, they have been able to provide more tuition discounts for

their students. By looking at Tables 2 and 6 in Chapter 4, it is interesting to note the

differences in the means between the institutions that are in a stable position in

Hypothesis 1 and those that are not in a stable financial position in Hypothesis 3 in 2006-07. For example, these differences highlight that the institutions in a stable financial position have a larger enrollment, lower percentage of students receiving federal financial aid, and have a higher tuition discount rate.

Hypothesis 2

Hypothesis 2 states that for the period following the 2008 financial recession (2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and negative, such that as the FVI decreases, the tuition discount rate will increase, when the institution's financial position is approaching stable or is stable (FVI < .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid. Even though the model did indicate that the relationship between FVI and TDR was linear and negative, the overall model for Hypothesis 2 was not statistically significant. Therefore, Hypothesis 2 was not supported. This was surprising, given the results of Hypothesis 1. As was discussed above with Hypothesis 1, by looking at Tables 4 and 8 in Chapter 4, it is interesting to note the differences in the means between the institutions that are in a stable position in Hypothesis 2 and those that are not in a stable financial position in Hypothesis 4 in 2013-14. Similar to Hypothesis 1, these differences highlight that the institutions in a stable financial position have a larger enrollment, lower percentage of students receiving federal financial aid, and have a higher tuition discount rate.

Hypothesis 3

Hypothesis 3 states that for the period prior to the 2008 financial recession (2006-07 year), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and positive, such that as the FVI increases, the tuition discount rate will increase, when the institution's financial position is not in a stable position (FVI $\geq$ .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid. The model did not indicate that the relationship between FVI and TDR was positive, and it did indicate that the overall model for Hypothesis 3 was not statistically significant. The belief was that as the institutions that were not in a stable financial position attempted to attract students in order to grow their enrollment, they would increase their tuition discount rates. Therefore, the tuition discount rate would be correlated in the same direction as the FVI, but this was not the case. It appears that the institutions in Hypothesis 3 have not been able to provide the level of tuition discounting as their peer institutions that are considered financially stable. Therefore, Hypothesis 3 was not supported.

Hypothesis 4

Hypothesis 4 states that for the period following the 2008 financial recession (2013-14), the relationship between the FVI (IV) and tuition discount rate (DV) will be linear and positive, such that as the FVI increases, the tuition discount rate will increase, when the institution's financial position is not in a stable position (FVI $\geq$ .10, according to the ten year average), controlling for a) tuition and fees, b) enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal grant aid. After

entry of FVI at Step 2 the total variance explained by the model was 11.4%, and the overall model for Hypothesis 4 was statistically significant. In Model 2 of Hypothesis 4, FVI was a statistically significant predictor. However, the model indicates that the relationship between FVI and TDR was negative and not positive. As discussed above with Hypothesis 3, it appears that the institutions in Hypothesis 4 have not been able to provide the level of tuition discounting as their peer institutions that are considered financially stable. Therefore, Hypothesis 4 was not supported.

Hypothesis 5

Hypothesis 5 states that the relationship between FVI and tuition discount rate will be stronger in the time period after the 2008 recession (2013-14) than prior (2006-07). The assumption was the financial shift caused by the 2008 recession has brought about a more significant correlation between the financial position of the institution and the institution's tuition discount rate. The analysis determined that this was not the case, and therefore Hypothesis 5 was not supported. As previously discussed regarding the *t*-test of the means of the FVI, the results of Hypothesis 5 could be due to: a) public institutions have been able to diversify their revenue streams enough to offset the declines in state funding, b) many institutions have deferred expenditures (hiring, technological investments or upgrades, repairs and maintenance of the physical plant) in order to operate in a surplus while providing unfunded tuition discounts, or c) some larger and more economically diverse states have been able to reverse their previous cuts to public higher education, thus enabling their public institutions to better weather the recent years of financial turmoil.

Implications for Practice and Policy

As institutional administrators, individuals engaged in the accounting, budgeting, and strategic financial planning of institutions, need assistance and models to support them in their decision-making processes (Abraham, 2006). Without assistance or models, institutions may jeopardize their long-term viability. This problem can occur if institutional leaders decide to surrender to external and/or internal forces, such as the continued pursuit for resources, the advancement of the institutional mission, or the quest for excellence (most often, a mixture of the three). An unintended consequence could be that an institution discounts itself to the point of disaster (Redd, 2000). The distribution of tuition discounts by public institutions, as either need-based or merit based awards, should work in congruence with the institutional mission (Seaborn, 2011). This research draws attention to the reality that institutional financial aid policies must also take into regard the current and long-term financial health of the institution.

Particular to discounting policies, this research gives financial officers an enhanced knowledge of how their institution's financial position correlates to tuition discount rates. Financial officers can compute their FVI and then assess their institution's tuition discount rate to other institutions with a similar FVI score. Based on their examination, financial officers can obtain an improved appreciation of the consequences of particular tuition discounting practices by assessing themselves with peer institutions on the FVI score. Particularly, financial officers can evaluate how their tuition discounting policies influenced the institutional objectives of enrollment growth, enrollment access, and academic excellence based on the number and demographics of students that enrolled. This research also gives financial officers an improved sense of

how enrollment, race, and federal aid recipients correlate to tuition discount rates across a group of peer institutions. Financial officers can ascertain where their institution is positioned relative to others. They can then assess the need for changes to meet specific goals. Additionally, financial indicators are valuable in the decision-making process of managing the institution. This research indicates that, similar to for-profit businesses, higher education institutions can use financial ratios to comprehend the operations of the institution. An indication of the use of financial ratios was illustrated in Hypotheses 1 through 5 of this study, where it was shown that administrators could analyze how their institution's financial position might be impacting the tuition discounting practices or vice versa.

Higher education administrators can then use this understanding in carrying out the daily procedures of their institutions. For example, financial officers can use the FVI component ratios to detect possible vulnerabilities and matters of correction in the institution's financial position. When these areas are detected, administrators can examine the problem and make educated decisions to solve the problem.

The significance of financial analysis should not be underrated. The clear layout of financial ratios can allow practically any stakeholder to obtain a basic understanding of the most important financial policies of public higher education institutions and their financial condition (Buddy, 1999). This study provides useful decision-making information, such as financial indicators, for leaders on state coordinating boards of higher education, in state legislatures, and in public higher education institutions.

The capability to recognize and solve problems is particularly vital due to the fact that the economic situation brought about by the Great Recession of 2008 signifies a new

operating environment for public higher education institutions (Bruinicks et al., 2010). Current economic environments call for new, creative, and sensible ways to analyze data. The current research is a beginning point for advancing quantitative models to assess the financial position of public institutions. While this research has not shown causality and has only shown a limited amount of explanatory power, it may be beneficial to implement some of the procedures proposed. Further research is needed to identify the differences between institutions' policies and associated results.

This research also offers associations related to institutional policy. One implication, related to resource dependence theory, is that when an institution decides how much of its resources to assign to unfunded tuition discounts, it should evaluate its mission with other opposing priorities. Institutions must have a tuition discounting strategy in place to meet its varying goals, while spending within its budgeted parameters.

Another critical facet to understand is the increasing movement toward more accountability in higher education (Shin, 2009). For the intention of this research, the federal and state governments hold public institutions accountable due to the responsibility of government delivering financial aid in public higher education (Doyle, 2010). Given the present economic environment and the government's demand to deliver more inexpensive public higher education to all Americans, institutions may be under intensified accountability, mainly in regard to tuition price growths and escalated tuition discounting. Therefore, institutions must contemplate policy choices associated to tuition prices and tuition discounting in the present accountability atmosphere (Collins et al., 2016).

Implications for Future Research

There is a great amount of potential for further research on the topic of the relationship between public higher education's tuition discounting and its' financial position. Additional studies on the financial positions of public higher education institutions could provide an abundance of material about the means in which the financial characteristics of institutions correlate to institutional decision-making processes. Underlying the relationships between FVI and tuition discount rate that are described in this research are a set of management decisions reflecting the goals and constraints faced by administrators and policy makers. A future qualitative design might shed light on the decision-making process among institutional leaders regarding tuition discounting strategies. These strategies could be examined through the qualitative research methods of document analysis and individual interviews, perhaps sharing the findings from the present study to inform public higher education leaders. These leaders could utilize the findings presented in such a study to inform future decisions on funding or reorganizing tuition discount programs in order to meet their institutional mission in a financially responsible method.

Further research in this field could involve the effect of debt on public institutions of different enrollment sizes or Carnegie classifications. According to Carmichael (2015), there can be notable differences between institutions based on Carnegie classifications. Also, the impact of funded versus unfunded tuition discounts and the impact of funded versus unfunded employee retirement liabilities. Future research could also include combining the FVI indicators with other financial indicators, as the independent variable, for the potential of an even more comprehensive proxy for financial position. Another

option is to create a new indicator whose component pieces were reasonably attainable through secondary data sources such as IPEDS.

Another focus would be to study public institutions longitudinally. Research of this type could help strengthen comprehension of the institutional adjustments over time that lead to changes in FVI scores and discounting policies. For instance, studies could detect general variations in institutional characteristics that lead to FVI improvements or increases in tuition discount rates. Studies over a five or ten year period would provide a valuable trend analysis for the financial ratios of the public institutions.

Researchers could add to this current research all public institutions, regardless of enrollment size. This research was limited to institutions that were 5,000 or greater in enrollment. A wider net could be cast by including institutions within other Carnegie classifications. Another research area could be to compare private institutions with public institutions whose operations are funded at low percentage (maybe 25% or less) by the state government. Since state funding of public institutions has been cut significantly since 2008 and public institutions are having to operate more like private institutions, it could be beneficial to compare lesser state funded public institutions to the private institutions to see if there are common characteristics as it relates to the institution's FVI and tuition discount rates. Furthermore, research could focus on a state-by-state analysis of public institutions and their FVI and tuition discount rates. The results could vary by state based on the policies that have been enacted by the state leadership such as state provided financial aid for students and state funding for public higher education. Another impact on a state-by-state analysis could be the percentage of the population living in poverty.

Another possible research proposal would be to add to the covariate variables that were discussed in this research. To account for the differences in the analysis of organizational activities, institutional differences were controlled for using a series of relevant variables. In this study, the covariate variables were a) tuition and fees, b) total enrollment, c) percentage of white students enrolled, and d) percentage of students awarded federal financial aid. Other variables instead of or in addition to the variables listed above could be chosen based on the hypothesis regarding the degree of the relationship between the chosen covariate variables and the main independent variable and dependent variable.

Further research is also needed to understand whether the relationships between FVI and tuition discount rates for public institutions that are described in this research function bi-directionally. The primary research question in this study was: To what extent does the financial position of a public institution, as determined by the Financial Vulnerability Index (FVI), influence the tuition discount rate? One could also ask: To what extent does the tuition discount rate of a public institution influence the financial position, as determined by the FVI? Having the tuition discount rate become the independent variable and the FVI become the dependent variable could provide some interesting responses from SPSS.

Another interesting idea for research would be to treat the covariate variables as categorical variables instead of continuous variables. According to Mertler and Vannatta (2013), categorical variables may be used to separate continuous variables into categories. The average tuition discount rate for the entire year and for each category of the variable for each year could be calculated. Then, comparing the overall year's

average tuition discount rate and the average tuition discount rate for each category could

determine whether a pattern was present.

APPENDIX A

VARIABLES USED IN THE ANALYSIS

VARIABLES USED IN THE ANALYSIS

Independent Variables – FVI Ratio Components and Calculation
(Trussel, Greenlee, and Brady, 2002)

Variable Description	Data Source	Excel Cell	Calculation
Total assets	IPEDS	C	
Size ratio (Size)	Calc	D	LN (column C)
Total liabilities	IPEDS	E	
Debt ratio (Debt)	Calc	F	E/C
Revenue streams:			
Tuition and fees after deducting discounts and allowances	IPEDS	G	
Federal appropriations	IPEDS	H	
State appropriations	IPEDS	I	
Local appropriations	IPEDS	J	
Federal operating grants and contracts	IPEDS	K	
Federal nonoperating grants	IPEDS	L	
State operating grants and contracts	IPEDS	M	
State nonoperating grants	IPEDS	N	
Local/private operating grants and contracts	IPEDS	O	
Local operating grants and contracts	IPEDS	P	
Local nonoperating grants	IPEDS	Q	
Private operating grants and contracts	IPEDS	R	
Gifts including contributions from affiliated organizations	IPEDS	S	
Investment income	IPEDS	T	
Sales and services of auxiliary enterprises	IPEDS	U	
Sales and services of hospitals	IPEDS	V	
Sales and services of educational activities	IPEDS	W	
Independent operations	IPEDS	X	
Other sources – operating	IPEDS	Y	
Other nonoperating revenues	IPEDS	Z	
Total all revenues and other additions	IPEDS	AA	
Revenue concentration index (Concen)	Calc	AB	$\Sigma((G/AA)^2+(H/AA)^2+.....(Z/AA)^2)$

Independent Variables - FVI Ratio Components and Calculation, continued

Variable Description	Data Source	Excel Cell	Calculation
Administrative expenses:			
Academic support - current year total	IPEDS	AC	
Student services - current year total	IPEDS	AD	
Institutional support - current year total	IPEDS	AE	
Operation maintenance of plant - current year total	IPEDS	AF	
Administrative costs ratio (Admin)	Calc	AG	(AC+AD+AE+AF)/AA
Total expenses deductions - current year total	IPEDS	AH	
Surplus margin (Margin)	Calc	AI	(AA-AH)/AA
Z	Calc	AJ	$0.7754+(0.9272 \times Debt)+(0.1496 \times Concen)-(2.8419 \times Margin)+(0.1206 \times Admin)-(0.1665 \times Size)$
E	Calc	AK	2.718
FVI	Calc	AL	$1/(1 + e^{-z})$

Dependent Variable – Tuition Discount Rate
(Allan, 1999; Browning, 2011)

Variable Description	Data Source	Excel Cell	Calculation
Tuition and fees after deducting discounts and allowances	IPEDS	C	
Discounts and allowances applied to tuition and fees	IPEDS	D	
Gross tuition and fees	Calc	E	C + D
Institutional grants from restricted resources	IPEDS	F	
Institutional grants from unrestricted resources	IPEDS	G	
Total institutional grants/discounts	Calc	H	F + G
Tuition Discount Rate	Calc	J	H/E

Covariate Variables

Variable Description	Data Source	Excel Cell	Calculation
Percent awarded federal grant aid	IPEDS	K	
Percent that are white	IPEDS	L	
Total enrollment	IPEDS	M	
In-state average tuition for full-time undergraduates	IPEDS	N	
In-state required fees for full-time undergraduates	IPEDS	O	
Total tuition and fees	Calc	P	N + O

APPENDIX B

FINANCIAL VULNERABILITY INDEX (FVI) MODEL

FINANCIAL VULNERABILITY INDEX (FVI) MODEL

(Trussel, Greenlee, and Brady, 2002)

FVI Factors	How it is calculated...	This factor tells us that...
Debt Ratio	Total Liabilities/Total Assets	The higher the debt ratio, the more an instituiton is financially vulnerable
Revenue Concentration	Σ (Revenue$_i$/ Total Revenues)^2	An institution with fewer revenue sources is more vulnerable than an institution with multiple revenue sources. An institution that receives all of its revenue from one source will have a revenue concentration of one, while an institution with multiple sources of revenue will have a revenue concentration number approaching zero.
Surplus Margin Ratio	(Total Revenue - Total Expenses)/Total Revenue	An institution that is able to operate with a surplus, instead of a defecit, is less vulnerable.
Administrative Ratio	Administrative Expenses/Total Revenues	Recognizes the proportion of institutional spending made for non-operational activities. It signifies the amount of administrative costs in relation to total revenues. An institution with a lower ratio is not spending as much financial resources on administrative needs and can focus the resources on the core functions of the institution, like teaching and research.
Asset Size	Natural Logarithm of Total Assets	Larger institutions are less financially vulnerable than smaller ones.
FVI model equation	FVI = 1/1+e^{-z} where z = 0.7754 + (0.9272 x Debt) + (0.1496 x Concen) - (2.8419 x Margin) + (0.1206 x Admin) - (0.1665 x Size), where e = 2.718	
What the model tells us...	The FVI model uses five factors to predict whether or not an institution is financially stable or vulnerable, especially if faced with a financial shock. According to the model, an institution with an FVI score of less than .10 is financially stable.	

APPENDIX C

INSTITUTIONAL REVIEW BOARD DETERMINATION LETTER

LOUISIANA TECH
U N I V E R S I T Y

EXEMPTION MEMORANDUM

TO: Mr. Richard "Dickie" Crawford

FROM: Dr. Stan Napper, Vice President Research and Development
           san@latech.edu

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: November 1, 2016

TITLE: What is the Influence of the Financial Position of Public Institutions
           on Tuition Discount Rates?

STUDY: HUC 1468

Thank you for submitting your Human Use Proposal to Louisiana Tech's Institutional Review Board. It has been determined that your study uses data that is publically available and poses no risk to human subjects. This study is exempt.

If you have any questions, please contact Dr. Mary Livingston at 257-5066.

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