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Accounting for the Relationship of the Financial Position of Private, Baccalaureate-level and Above Institutions to Tuition Discount Rates

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Education

by

Julianna Francine Browning

March 2011

Dissertation Committee:

Dr. Luciana Dar, Chairperson
Dr. John Levin
Dr. Lindsey Malcom

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2011

The Dissertation of Julianna Francine Browning is approved:

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Committee Chairperson

University of California, Riverside

DEDICATION

This dissertation is dedicated to the men in my life.

To my husband, Sean, who means so much to me. He sacrificed a great deal while I traveled this long road to further my education. I know it was not easy for him to have me absent from him both mentally and physically on so many occasions. Without him, I would not have been able to take on this challenge and come out successful on the other side.

To my sons, Seth and Luke, who were both born while I was in the program. They have never known me as a normal person, only as a stressed-out PhD student. My hope is to give you both more time, love, fun, and memories than you know what to do with. And then give you some more.

I look forward to the time I will have to spend with you. I love you all.

ACKNOWLEDGMENTS

I would like to thank Dr. Luciana Dar, without whom I never would have been able to conquer this seemingly impossible task. She mentored me through this process and helped me find my inner academic. She helped and encouraged me through the writing process, and her “tough love” was invaluable. Her patience and calm instruction were truly appreciated. She was more than a professor, coach, or advisor. She was an answer to my prayers and was a gift to me from God. Thank you.

ABSTRACT OF THE DISSERTATION

Accounting for the Relationship of the Financial Position of Private, Baccalaureate-level and Above Institutions to Tuition Discount Rates

by

Julianna Francine Browning

Doctor of Philosophy, Graduate School of Education
University of California, Riverside, March 2011
Dr. Luciana Dar, Chairperson

Institutions have increased the practice of tuition discounting, that is, the strategic use of price discrimination. During the past 30 years, both the average percent discount given to students and the proportion of students receiving tuition breaks have increased. As this practice has increased, there are financial determinants and implications that must be addressed. The purpose of this study was to conduct a thorough investigation of one of the issues embedded within tuition discounting practices: the relationship between an institution's overall financial position and its price discrimination practices. The five component ratios of the financial vulnerability index (FVI)—debt ratio, revenue concentration index, surplus margin ratio, administrative costs ratio, and size ratio—served as a proxy for institutional financial position. Integrated Postsecondary Educational Data System (IPEDS), The Institute for College Access and Success (TICAS), and *Barron's Profiles of American Colleges* provided the financial and institutional data for the academic years of 2003-04 to 2007-08. Ordinary least-squares regression and analysis of variance were used to test the data. There were three main

findings. First, institutional financial position had a relationship to tuition discount rates for stable institutions (FVI < .10). As the FVI decreased for stable institutions, tuition discount rates increased, showing that institutions with financial resources used these resources to create a class that would further their mission, increase prestige, or use a combination of the two. Second, on average, unstable institutions with enrollment decreases over the five-year period did not demonstrate significant changes in discount rates. In this circumstance, unstable institutions had a limit to the amount that they could invest in their futures. Third, institutional financial position had a relationship to tuition discount rates for unstable institutions (FVI > .20). As the FVI increased for unstable institutions, tuition discount rates increased, indicating that institutions used their current resources as an investment in the future of the institution. In addition, descriptive statistics were used to understand the relationship between tuition discount rates and the four institutional control variables used in the study: total enrollment, percent white enrollment, percent Pell, and selectivity.

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CHAPTER 1

INTRODUCTION

In this chapter, the research study is introduced. The chapter begins with background information and the statement of the problem followed by the purpose of the study, the main research question, and the significance of the study. The chapter concludes with a discussion of resource dependence theory as the theoretical framework.

Background and Statement of the Problem

Due to increasing costs associated with higher education, the average cost of a college degree has increased over 100%, on average, over the past 30 years (Baum, 2001; Zumeta, 2010). These increased costs are associated with newly constructed or remodeled facilities (Ehrenberg, 2005), pressure to increase the size and prestige of faculty (Mumper, 2001), and the labor-intensive nature of higher education as an industry that requires highly skilled labor (Archibald & Feldman, 2008).

From 1990 to 2002, tuition at private, not-for-profit institutions increased on average by 95% (Lapovsky & Loomis-Hubbell, 2003), but family incomes have not kept pace; the median family income has increased only 16% over the same time period (Baum, 2001). To offset the cost of attendance and to attract students to pursue postsecondary education, institutions have increased the practice of tuition discounting, which is the strategic use of price discrimination related to students' differing individual costs of attending the same institution.

Tuition discounts are used to help bridge the gap between the tuition charged by an institution and what an individual student can afford to pay, based on criteria

established by the federal government. Tuition discounting is a significant budget item for institutions. The total dollars spent on institutional aid increased by 111% from 1987 to 1997 (Baum, 2001). For private institutions, the average discount rate rose from 23.8% in 1994 to 33.5% in 2004, a 40.7% increase in 10 years (Baum & Lapovsky, 2006). In addition, the percentage of students receiving tuition discounts has increased from 63% in 1990 to 81.4% in 2002 (Lapovsky & Loomis-Hubbell, 2003). As the practice of price discrimination evolves, it has become more fundamental to institutions' ability to fulfill the goals of access and excellence.

Traditionally, institutions have used tuition discounting as an institutional grant to promote the social mobility of financially needy students by increasing their access to the institution (Gladieux & King, 1999; Redd, 2000; Winston & Zimmerman, 2000). Tuition discounting can also increase diversity and social equity goals by offering financial aid to students meeting race, ethnicity, or gender criteria thought to be particularly sought after by the institution or a department (Baum & Lapovsky, 2006; Chabotar, 1989; Corey, 2005). However, access and diversity are no longer the only reasons for allocating institutional financial aid.

More recently, institutions have used tuition discounting to achieve not only access but also excellence, two competing and conflicting institutional goals (Pfeffer & Salancik, 1978). Colleges and universities use institutional aid as a tool to attract academically gifted students, promoting institutional competitiveness and prestige (Redd, 2000) that, in turn, attract academically gifted students. The growth in popularity of university rankings, such as those by *US News and World Report* or *Barron's Profiles of*

American Colleges, contributes to this process. These publications use complex methodologies, including SAT scores and admissions rates, to determine institutional rankings. Hence, these publications influence public perception related to institutional competitiveness, prestige, and academic excellence.

Generated in part by the conflict between access and excellence, institutions must decide to whom to offer discounts and what the tuition discount rate will be. The awarding of tuition discount dollars to individual students, however, involves significant equity and fairness issues. In this regard, one question is whether tuition revenue from higher-income students cross-subsidizes lower-income students to promote access or whether tuition revenue from lower-income students cross-subsidizes higher-income students to promote excellence (Hearn & Longanecker, 1985). Another question is whether tuition discounting policies are contributors to promoting social mobility or to perpetuating the status quo among the student population (Winston & Zimmerman, 2000).

The relative importance given to the goals of access and excellence, along with institutional characteristics, are drivers of student recruitment decisions and the amount of the institution's resources that should be allocated to tuition discounts. Factors affecting 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, 1999a; Baum & Lapovsky, 2006; Goral, 2003; Winston, 1999).

Understanding the relationship between various institutional characteristics may help to determine how much of its resources an institution allocates to institutional aid. For example, an institution with a large, high-return endowment and a small student population would be able offer higher tuition discount rates than would an institution with a small, low-return endowment and a large student population. No matter the age, size, or wealth of an institution, financial constraints limit the amount of tuition discounts that can be offered to the student population.

When deciding how much it is willing to spend on tuition discounts to attract students, based on its goals of access and excellence, under financial constraints, an institution must consider its financial position, that is, its ability to commit resources over longer periods of time. Therefore, institutional financial characteristics may be one of the primary determinants of average tuition discount rates. But institutions may focus so closely on long-term goals that they might place the short-term financial position of the institution at risk. To attract students to meet access and excellence goals, institutions may set the average discount rate too high. A discount rate that is too high could contribute to a financial crisis at the institution, to the point that the institution is at risk of failing and is forced to close its doors (Van der Werf, 2000).

Notwithstanding the growing relevance of tuition discounting, researchers know little about the long-term implications of this practice for institutions' financial stability and viability. Available research is scarce on issues related to how financial factors affect discount rates across different types of institutions under different financial constraints. Numerous studies have addressed tuition discounting (Allan, 1999a, 1999b; Baum &

Lapovsky, 2006; Davis, 2003; Goral, 2003; Lapovsky & Loomis-Hubbell, 2003; Martin, 2002; Redd, 2000; Winston & Zimmerman, 2000) and have used financial well-being to predict the failure of an entity or institution (Andrew & Friedman, 1976; Beaver, 1967; Feemster, 2000; Galicki, 1981; Gilmartin, 1984; Heisler, 1982; Kacmarczyk, 1985; Tamari, 1966; Wood, 1977). A few studies have shown that the systematic increase in the practice of tuition discounting has resulted in negative effects on net tuition revenue (Goral, 2003; Redd, 2000; Ruterbusch, 2004).

Despite the growing interest in this issue, the scholarly literature has yet to offer a more detailed analysis of the relationship between institutional finances (e.g., sources of revenue, financial position, and institutional characteristics) and tuition discounting practices. The goal of this dissertation is to contribute to the literature on tuition discounting by exploring the relationship between an institution's financial position and the tuition discount rates that it gives to students.

Statement of Purpose

The purpose of this study was to provide a thorough investigation of one of the issues embedded within tuition discounting practices: the relationship between an institution's overall financial position and its tuition discounting practices. The analysis not only provides a better understanding of the links between institutions' finances and tuition discount rates but also insight into how institutions differ in their practices. Previous studies on tuition discounting focused on topics such as differences in reporting and accounting (Baum & Lapovsky, 2006), political and policy implications (Hearn & Longanecker, 1985; Redd, 2000), and the underlying economic theory of price

discrimination in higher education (Martin, 2002). This study examined tuition discounting from a different and less-explored perspective: the relationship of internal institutional financial characteristics and tuition discount rates. The findings highlighted the many ways in which institutions utilize their scarce financial resources.

Research Question

One primary question guided this study: To what extent does the financial position of an institution, as determined by the financial vulnerability index (FVI), explain the average tuition discount rate? While controlling for standard institutional economic variables and characteristics shown in the literature to be important in institutions' financial decisions, the relationships between the financial position of institutions and their tuition discounting practices were examined using descriptive statistics and empirical tests. Informed by the findings, a framework for analyzing two of the conditional relationships between these two variables across different types of private institutions was proposed.

Significance of the Study

Since 2007, the financial crisis, often referred to as "the Great Recession" (Rampell, 2009), has magnified the financial constraints on college students. The decrease in available resources from all sources due to the credit crisis (Wilson, 2008) has continued to encourage the practice of tuition discounting, often favoring middle- and upper-middle-income students (Toutkoushian, 2001) and potentially bringing financial difficulties to an institution in future years (Davis, 2003; Redd, 2000). The findings in

this study contribute to an understanding of the links between financial position and tuition discounting practices and their consequences.

The first significant aspect of this study is in the area of budgeting, strategic planning, and decision making. Poor application of these elements can harm institutions to the point of closure (Meisinger, 1994; Van Der Werf, 2000). An institution may not have the tools necessary to identify and correct small problems before they become threatening to institutional viability. The study results provide institutional decision makers with more detailed information about the types and characteristics of institutions that are more likely to be financially vulnerable. Results also provide insights into how tuition discounting practices may compromise short-term financial position and, potentially, long-term stability.

A more comprehensive understanding of the financial underpinnings of tuition discounting, in light of the institutional financial position, may inform and guide individuals involved in the accounting, budgeting, and strategic financial planning of institutions. The quantitative model resulting from the study can help when examining an institution's tuition discount rate in relation to its financial performance.

The available research about tuition discounting is largely descriptive in nature and points to the problems associated with increasing discount rates (Lapovsky & Loomis-Hubbell, 2003; Redd, 2000). These studies are important to understanding tuition discounting in higher education, but they often neglect to explore other relevant financial indicators such as levels of debt or long-term financial prospects. These financial indicators are useful tools for strategic planning (Prager et al., 2005), and the for-profit

business environment has used them extensively (Block, Hirt, & Danielsen, 2009). Because higher education institutions have adopted practices common in for-profit enterprises, they reasonably and appropriately should take advantage of knowledge about the for-profit environment and apply it to the management of their own institutions (Bok, 2003; Deem, 1998; El-Khawas, 1994).

Financial indicators are useful not only to inform tuition discounting decisions but also for scholarly purposes. For example, researchers may use indicators common in the for-profit sector to explore the relationship between institutional financial position and various institutional resource allocation decisions, such as mean salary of full-time faculty, the change in full-time equivalent students, or the relationship of endowment market value to current fund expenditures (Gilmartin, 1984). Finally, institutions have compelling reasons to expand knowledge of the relationship between institutional financial position and other key factors linked to organizational survival and development. The current economic environment for institutions of higher education is unlikely to change in the near future, and this environment will probably become the new status quo (Bruinicks, Keeney, & Thorp, 2010).

Because simple financial indicators are valuable for understanding an institution's financial position, quantitative models, based on these indicators, are beneficial. Researchers have used analytical methods to understand the relationships between various aspects of higher education, such as meta-analysis for student price response (Leslie & Brinkman, 1987), market model for enrollment growth (Martin, 2002), and regression and logistic analysis for student financial aid and persistence (McPherson &

Schapiro, 1991; St. John & Starkey, 1995). Developing a model or conceptual framework to explain one relevant aspect of decisions on tuition discounting can be a useful tool for institutional administrators to use in their strategic planning and decision-making processes.

The second area of significance of the study concerns the application of tuition discounting policies. Institutions may use the findings from this study to determine which, if any, tuition discounting policies relative to specific institutional characteristics are problematic from a financial perspective, specifically related to institutional financial stability or viability. For example, institutions can determine whether the financial position and tuition discounting policies can support an institutional goal (Baum & Lapovsky, 2006) such as access. Research indicates that institutions use tuition discounts to increase enrollment (Lapovsky & Loomis-Hubbell, 2003; Redd, 2000), but increased enrollment does not necessarily lead to a better financial position (Meyer & Sikkink, 2004).

To ensure a tuition discounting policy's financial feasibility at, and desirability to, a particular institution, an institution must consider the costs and benefits of a tuition discounting policy prior to the implementation of such a policy. In some cases, the policy may result in no increase in net tuition revenue or, perhaps, even negatively affect the institution's net tuition revenue (Winston & Zimmerman, 2000). This may apply especially to enrollment-driven institutions (Redd, 2000), that is, institutions whose primary revenue source is tuition.

Following implementation of tuition discounting policies, the potential increase in enrollment may not compensate for the overall negative effect on an institution's financial situation (Redd, 2000). Institutions that take tuition discounting policies to the point of financial ruin will decrease access because there will be fewer institutions for students to attend, leaving fewer seats available in the industry as a whole. Instead, the long-term strategy of institutions should focus on the implementation of discount policies that take into consideration the long-term financial stability and viability of the institution (Goral, 2003; Redd, 2000). This strategy will ensure that an institution does not place itself in jeopardy of a financial crisis that could culminate in risk of failure, that is, closing or restructuring.

Theoretical Framework

In view of the main questions addressed in this research, resource dependence theory offered an appropriate theoretical framework to describe and explain the financial operations and decision making of higher education institutions. The general assumptions of this theory of institutional behavior under external constraints informed the hypotheses and guided the empirical analysis presented in subsequent chapters.

Resource Dependence Theory

Resource dependence theory (Pfeffer & Salancik, 1978) asserts that, based on the need for resources, demands and pressures from external actors constrain and shape organizational behavior. Resource dependence can significantly affect how an organization conducts business (Pfeffer & Salancik, 1978). This assumption is also valid for institutions of higher education (Slaughter & Leslie, 1997), making the theory a

useful tool to analyze and explain why such institutions frequently adapt to accommodate stakeholder needs and expectations, even if these conflict with the institution's primary mission or preferred course of action.

The role of resource dependence in the university.

Higher education institutions depend on a variety of revenue sources to survive. In addition to tuition revenue, they rely disproportionately on characteristically unstable sources of income to fund their operations, specifically, private donors, federal student aid programs, and state governments. For example, institutions are highly vulnerable to events such as the Great Recession. The state of the economy affects how much and how often donors give charitable gifts to educational institutions (Toutkoushian, 2003), constrains governments' ability to sustain direct and indirect support (Humphreys, 2000), and compromises students' ability to finance their education (Leslie & Brinkman, 1987).

Given that the price that higher education institutions charge students is already below the actual cost to educate them, these institutions are disproportionately dependent on external sources of revenue (Doyle, 2007; Schipper, 1977). Institutional operating costs continue to grow, while the availability of resources is often insufficient or unstable. Due to growing institutional complexity, institutions need to increase spending (Ehrenberg, 2005; Mumper, 2001). Therefore, as spending needs increase to accommodate student requirements and expectations, the institution must either cut other costs or increase revenue streams to survive.

Reducing other costs, especially instructional costs, is difficult due to the nature of higher education as an industry. Higher education suffers from what economists call

“cost disease,” that is, costs continue to increase over time in labor-intensive industries because the ability to increase productivity is limited and higher wages are necessary to attract highly skilled individuals (Archibald & Feldman, 2008; Massey, 1996). Because institutional prestige and survival require high-quality faculty for research and teaching, institutions rarely cut costs associated with these activities. Because the institutions cannot contain a large share of costs, the need for additional funds grows with each passing year.

Increasing revenue streams appears to be the method of choice to cope with increased spending needs, and higher education institutions have adopted numerous strategies to increase revenue streams. One method has been increasing institutional commercialization by exploiting some aspect of the institution, such as students, faculty, reputation, or brand, to generate revenue (Bok, 2003).

Institutions may instead adopt a strategy known as *academic capitalism* to meet their needs (Slaughter & Leslie, 1997). Academic capitalism occurs when the institution or professors engage in marketing efforts to secure funding from sources external to the institution. One example of academic capitalism is when professors pursue external grants and fellowships for obtaining research money otherwise not available through the institution.

A third method adopted has been to increase tuition prices well above the pace of inflation. The latter strategy has become increasingly more common in the past 30 years (Baum, 2001). While institutions cannot control the unstable revenue streams from donors or governments, they can control the published tuition charged to students.

Institutions are resource dependent on students as a stable revenue source through tuition payments.

Resource dependence theory can additionally describe how institutions adapt to meet their economic needs. More specifically, this theory informs how institutions address the need for increased revenues. Resource dependence theory also can inform an analysis of how institutions negotiate the relationship between price discrimination and increased tuition sticker price.

The role of resource dependence in tuition discounting.

Because institutions are dependent on students for a stable revenue source, they rely on them to cope with growing financial constraints (Slaughter & Rhoades, 2004). Institutions need students in attendance to produce tuition revenue. With the escalating costs of tuition, however, a larger share of students has been unable or unwilling to pay published tuition prices (Davis, 2003; Redd, 2000). As an incentive to encourage enrollment, institutions have offered and combined multiple sources of financial aid to students, including discounts on the sticker price of tuition: they give up a share of the expected revenue from an individual student.

Tuition discounting is a long-standing practice in higher education, but its use has increased significantly over the past 30 years (Baum & Lapovsky, 2006). Institutions have increased tuition discount rates in response to crises affecting their ability to maintain student quality and student numbers, namely, the rise in tuition costs (Baum, 2001; Gladieux & King, 1999; Lapovsky & Loomis-Hubbell, 2003) and the growing competition for students with other institutions (Goral, 2003; Redd, 2000).

Resource dependence theory offers an analytical framework capable of informing the understanding of tuition discounting practices and their links to institutions' efforts to maintain competitiveness. Tuition discounts function as a tool to compete with other institutions for high-quality students. These students not only contribute to increased revenues through tuition, but they also attract other desirable students: higher-quality students, in terms of academic preparedness, as reflected by higher grade point averages and SAT scores as compared to their less academically-prepared counterparts, can attract and interact with other high-quality peers, which can further elevate the prestige of the institution (Winston, 1999).

As a response to competitive pressures, numerous institutions have changed their tuition discounting policies to be more merit- than need-based (Baum & Lapovsky, 2006; Martin, 2002). By using these tactics to attract high-quality students, tuition discounting can quickly lead to a perverse type of competition among peer institutions, causing tuition discount rates to increase (Goral, 2003). Depending on the individual institution's financial situation, this may not be fiscally viable in the long-term and, if discounting practices are not managed properly, could lead to a problematic financial position (Goral, 2003).

As institutions become more like businesses, they increasingly use the business model to cope with limited resources and rely on many sources of revenue to ensure ongoing operations (Deem, 1998; El-Khawas, 1994). An organization is more stable and less financially vulnerable when it has highly diversified revenue streams (Froelich, 1999; Hodge & Piccolo, 2005; Taylor, Meyerson, & Massy, 1993; Toutkoushian, 2001),

where each stream constitutes a small percent of total revenue (Trussel, Greenlee, & Brady, 2002). Thus, institutions of higher education are more financially stable when they have highly diversified revenue streams.

In higher education, limited revenue sources are available and include the federal, state, and local governments; donors; endowment revenues; and tuition (Toutkoushian, 2001). Most sources are unstable revenue streams that are highly dependent on economic conditions (Humphreys, 2000; Toutkoushian, 2003). Tuition does not suffer from this dependence; it is controllable, and it has increased steadily. Consequently, in the competitive environment of education, institutions have increased their tuition discounting policies to incentivize students to attend, thereby increasing total revenue from this source.

Organization of the Dissertation

This dissertation has five chapters. This chapter provided an introduction to the dissertation. Chapter 2 presents a review of the tuition discounting and financial analysis literature. Chapter 3 contains the methodology and includes the hypotheses and analytical strategy. Chapter 4 provides the results of the analysis of the data. Chapter 5 concludes the investigation and presents implications for practice and future research.

CHAPTER 2

REVIEW OF RELATED LITERATURE

In this chapter, the literature relevant to this study is reviewed. The chapter begins with the literature of the various definitions of tuition discounting, followed by research on why institutions practice tuition discounting, how it is implemented, and the potential impact of tuition discounting. Finally, the literature on institutional financial position is presented, including how it is defined, measured, and analyzed.

Tuition Discounting

Tuition discounting is, in essence, a form of price discrimination. Universities charge different prices for different students while offering the same educational opportunities at the institution. Tuition discounting is a long-standing practice among private institutions of higher education (Baum & Lapovsky, 2006). The amount of the discount that each institution offers is dependent on its financial resources and choices made by its leadership. Institutions must decide how to allocate the limited funds available for all of its necessary functions, including instruction, construction, and maintenance of facilities as well as institutional financial aid, to name a few. As background to this discussion, the literature on how the concept has been operationalized and defined is presented.

Financial Definition of Tuition Discounting

From a financial perspective, institutions utilize at least three different definitions for tuition discounting. Each definition is successively broader and includes all items contained in the previous definition (Allan, 1999a). The *simple tuition discount* is a

waiver of some or all of the tuition due and is usually in the form of an institutional scholarship or grant. The simple tuition discount does not include internal sources such as gifts or endowments or external sources such as Pell or Federal Supplemental Educational Opportunity Grant (Allan, 1999a).

The *scholarship allowance* is the simple tuition discount plus tuition payments funded by gifts and endowments. Scholarship allowance is the tuition discount definition used by the National Association of College and University Business Officers in its tuition discount surveys. This is also the definition included in the Financial Accounting Standards Board rules on tuition discount reporting in institutional financial statements (Allan, 1999a).

The *student tuition discount* is the scholarship allowance plus all tuition that students do not have to pay themselves through loans or through work. It includes all federal, state, and private grants and scholarships. This is the definition used most frequently by admission directors and enrollment managers for recruiting purposes and by other administrators for public relations. This definition is also important to students and families, as it represents the amount of “free money” awarded to the student (Allan, 1999a; Figure 1).

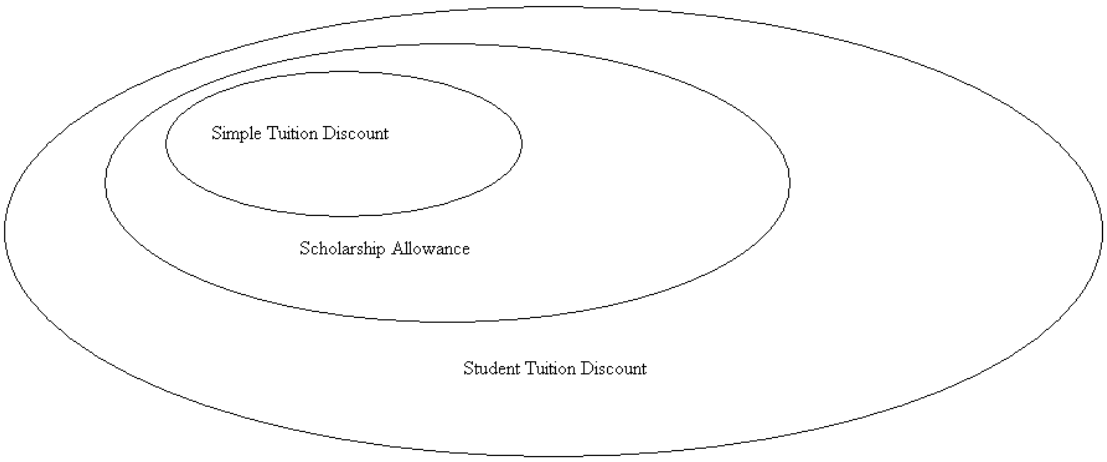

Figure 1. Tuition discounting definitions. Adapted from "Taxonomy of Tuition Discounting," by R. Allan, 1999a, *Journal of Student Financial Aid, 29*(2), p. 11.

Using the blanket term of "tuition discounting" often has unintended consequences for the institution (Allan, 1999b). The first consequence is that students may not understand what tuition discounting is or how it affects them. Uninformed students may not even know that the offer is a subsidy. Informed students may know that tuition discounting helps them, but they are usually indifferent about the source of the free money. While institutions may differ in their definitions of tuition discounting for accounting purposes, students care only about which institution can give them the best deal.

The second consequence is that the institution may try to capitalize on the monetary investment of the government to attract students. For example, an institution may advertise the average student tuition discount awarded to each student, even though the university does not fund all aspects of it. Some of the state and federal money travels with the student, regardless of school choice (Gladieux & King, 1999). Specifically, the

Pell grant has attachment to the student, not the institution (Kane, 2001). As a result, students may assume that they received more aid from the institution than they actually did. The total financial aid package (from both institutional and governmental sources) may influence students' choice of institutions because they do not understand the difference between the institutional aid available at that institution only and the government aid that will travel with them regardless of which school they attend. Using the term "tuition discounting" in this way may also increase and intensify the financial competition among institutions.

Third, within an institution, departments could presumably use one of the three definitions of tuition discounting that best suits their own purposes because institutions are loosely coupled systems (Weick, 1976). As such, executives and directors may not be able to communicate effectively or make the best business decisions for the institution because they talk around each other, based on the various definitions of tuition discounting in use (Allan, 1999a). For example, the accounting department may use one definition to report revenues, while the admissions department uses a different definition to report financial aid awarded to the incoming freshman class.

A comprehensive review of the literature shows that the most commonly used measure for tuition discounting is Allan's (1999a) definition of *scholarship allowance* (Baum & Lapovsky, 2006; Davis, 2003; Lapovsky & Loomis-Hubbell, 2003; Morgan, 2002; Redd, 2000), except by one scholar who utilized the simple tuition discount definition (Martin, 2002).

Tuition Discounting Definition for this Study

The *scholarship allowance* is the most useful definition for this particular study for two reasons. First, the institution has control over the components, such as the amount of tuition waived for the student and the dollars provided by gifts and endowments. (Allan, 1999). Second, it is the operationalization most commonly used by accountants working in the higher education sector, based on the requirements of the authoritative accounting literature (Statement of Financial Accounting Standard No. 117, 1993). Institutions use *scholarship allowance* to prepare financial information and, therefore, it is what is reported to IPEDS (2003, 2004, 2005, 2006, 2007). Based on the evidence that *scholarship allowance* is the most widely used definition among scholars and practitioners, the current study utilized it for the definition of tuition discounting as well.

Why Institutions Practice Tuition Discounting

In pre-colonial America, higher education was a luxury enjoyed only by the wealthy, as tuition was expensive and due in full prior to the start of the term. Institutions eventually started providing assistance to lower-income students who would not otherwise be able to go to college. This assistance was the initial form of institutional financial aid or tuition discounting (Nidiffer, 1999). Since the passing of the GI Bill, state and federal governments as well as individual institutions have increasingly provided financial aid to needy students in the form of grants, loans, and institutional financial aid (Levine & Nidiffer, 1996).

Currently, institutions implement financial aid policies including tuition discounting for a variety of reasons, which are discussed below, including college costs

outpacing inflation, college costs outpacing the availability of funds for government student aid, and components of financial aid packages changing over time. This is followed by a discussion of the disadvantages and benefits of tuition discounting.

College Costs Outpacing Inflation

Several studies have shown that institutional expenses and tuition rates have increased substantially in recent years. Baum (2001) found that tuition increased, on average, by 110% at private four-year institutions between 1971-72 and 1999-2000. Other studies found that private college tuition increased even more rapidly (Gladieux & King, 1999; Lapovsky & Loomis-Hubbell, 2003). These tuition increases have far outpaced inflation, as evidenced by the Consumer Price Index, which increased by only 32% over the same period, published by the Bureau of Labor Statistics (Lapovsky & Loomis-Hubbell, 2003).

Total expenditures at higher education institutions grew faster than the rate of inflation from 1975 to 1995 (Toutkoushian, 2003). One reason cited for the higher costs has been increased institutional complexity (Ehrenberg, 2005; Mumper, 2001; Paulsen, 2001). This includes newly constructed or remodeled facilities; pressure to increase the size and prestige of the faculty, leading to more dollars spent on salaries and benefits; and rising costs of student services resulting from a shift in ideology through which students have become customers of the institution.

Tuition discounting itself is a contributor to the observed increase in both tuition prices and institutional costs above the rate of inflation. Given that tuition revenue from some students subsidizes others, the average tuition charged to all students must grow to

pay for the subsidy, along with other program and overhead costs (Allan, 1999a). Under this model, the expectation is that, to cover increasing costs, the average tuition price will continue to spiral upward at a faster rate than the financial aid provided to students.

College Costs Outpacing Financial Aid

Federal and state financial aid support has kept pace with inflation since at least 1975, but, as discussed earlier, average tuition prices have outpaced inflation (Toutkoushian, 2003). However, even if tuition and aid grew at the same rate, the increase in aid dollars has not kept pace with the increase in tuition prices (Baum & Lapovsky, 2006; Gladieux & King, 1999); thus, there would continue to be unmet financial need. For example, suppose tuition at a particular institution was $5,000 and financial aid was $4,000, showing an unmet need of $1,000. If both grew at the same rate, 10%, tuition would be $5,500 and financial aid would be $4,400. The unmet need would then be $1,100. Therefore, even though both tuition and financial aid grew at the same rate, the aid dollars did not grow enough to meet the increased need. Not only has average tuition increased faster than has financial aid, but the structure of the financial aid awards has changed as well. This leaves a large share of students facing unmet financial need.

Changing Components of Financial Aid Packages

While total government financial aid expenditures have grown, the growth has not been in the form of increased scholarships or grants. Most of the growth has taken place in the form of loans (Gladieux & King, 1999). While some may argue that loans are an acceptable substitute in the face of the rising cost of college and shrinking government

resources, that is not a neutral policy choice. Students experience negative effects, such as increasing levels of debt and growing reluctance to borrow, from this policy (St. John, Asker, & Hu, 2001).

Students are sensitive to the type of financial aid that they receive. For example, students who receive grants are more likely to pursue post-secondary education than are students who receive loans (Heller, 1997). As expected, students perceive grant aid as more valuable (Kane, 1999, 2001) because it does not have to be repaid. Additionally, low-income students are reluctant to finance their educations through loans due to uncertainty about their future income, the higher overall costs that loans represent, and their overall unwillingness to borrow (Baum, 2001; St. John et al., 2001). These research findings contradict the commonly used argument that any kind of financial aid, including 529 college savings plans and other tax incentives for individuals (Long, 2004) as well as tuition discounting, in particular, is a means to help financially needy students (Gladieux & King, 1999; Redd, 2000).

Disadvantages of Tuition Discounting

The adoption of so-called high-tuition, high-aid policies has continued to increase in postsecondary institutions. These policies enact higher tuition for all students, regardless of financial need. They are based on the premise that the institution evaluates each student and provides more institutional aid to those students who could not otherwise afford the tuition price. This is done by transferring a portion of the higher tuition price from full-pay higher-income students to offset the tuition of lower-income

students through tuition discounting. Effectively, higher-income students cross-subsidize lower-income students (Hearn & Longanecker, 1985)

Researchers have made various arguments against these policies, particularly as they relate to lower-income students. One area of concern is the lack of clear knowledge about who is subsidizing whom. Are the rich subsidizing the poor or are the poor subsidizing the rich? Because institutions have differing goals and differing methods of reaching those goals, tuition discounting practices are different at each institution and have become increasingly complex. Because tuition discounts are institutional awards, the institution can give the awards at their discretion. While little is known about the process of awarding institutional financial aid in a high-tuition, high-aid environment at the student level, researchers have determined that lower-income students are disproportionately negatively affected (Baum & Lapovsky, 2006).

Research has shown that institutions increasingly use scholarships to improve the institution's academic profile (Baum & Lapovsky, 2006; Rizzo, 2006). In this case, the practice of tuition discounting is increasingly about raising student quality and, therefore, excludes lower-income students who are, on average, less academically prepared than are their higher-income counterparts (Martin, 2002).

Given the nature of tuition discounting practices, even though lower-income students have the greatest financial need, those students do not receive the greatest amount of financial aid. The average dollar amount of tuition discounting rose faster for higher-income students than for lower-income students at both public and private four-year institutions. At private institutions, in 1995, higher-income students received 39% as

large as the average institutional aid received by lower-income students. By 1999, aid to higher-income students increased to 82% of the average institutional aid given to lower-income students. Similarly, at public institutions, it was 29% in 1995 and 74% in 1999 (Goral, 2003).

There appears to be a disconnection between the students who have the greatest financial need for scholarships and the students who actually receive them. For example, from 1995-1996 to 1999-2000, the average tuition discount at private institutions increased 17%, from $3,446 to $4,027, for low-income students, while it increased 145%, from $1,359 to $3,321, for high-income students. At public institutions, average tuition discounts increased 1%, from $836 to $838, for low-income students, while it increased 159%, from $239 to $619, for high-income students (Davis, 2003).

The observed shift away from need-based aid toward merit-based aid significantly affects lower-income students. As institutions shift discounting policies from need-based to merit-based, they risk losing their ability to enroll lower-income students who are less likely to meet the merit-based aid criteria. Instead, merit-based aid tends to be awarded to students from higher-income families because, on average, they are more academically prepared than are their lower-income counterparts (Redd, 2000). Without institutional scholarships, lower-income students have decreased abilities to afford college.

Tuition costs for one year may be more than a lower-income student's family earns in an entire year. As a result, students may suffer from "sticker shock": students may not believe that they can afford college due to the published high tuition costs

(Heller, 1997; Leslie & Brinkman, 1987; McPherson & Schapiro, 1991; Mumper, 2001; Paulsen & St. John, 2002).

A distinct difference exists between the published price of tuition and the actual net price of tuition. Due to information disparities, many students do not know what they will actually pay for tuition until they have already made their enrollment decision (Lapovsky & Loomis-Hubbell, 2003). Lower-income students may not understand or have information about financial aid opportunities or the availability of institutional aid (St. John et al., 2001).

Tuition discounting, however, does not always raise institutional revenues (Davis, 2003). In 2000, 81.4% of students received some form of tuition discount, compared to only 63.0% in 1990 (Lapovsky & Loomis-Hubbell, 2003). When colleges increase their discount rate, they forgo tuition revenue, lowering the amount of funds available for educational programs. As institutions devote more funds to scholarships and financial aid, gross tuition (charge before discounts) must grow much more quickly to pay for program costs and overhead (Allan, 1999a). As tuition costs increase, the discounts must be deeper to attract students. This appears to be an increasing trend (Allan, 1999a; Redd, 2000).

While it is necessary to discuss its disadvantages, tuition discounting is used by most institutions. Thus, institutions believe that the benefits of high-tuition, high-aid policies, which brought about the need for tuition discounting, outweigh the disadvantages.

Benefits of Tuition Discounting

The rationale used by advocates of high-tuition, high-aid policies to justify these policies is that low-tuition, low-aid approaches to higher education finance are inefficient and inequitable as well as artificially reduce competition in the sector. Each of these justifications is discussed in more detail below.

First, providing all students with low tuition is inefficient because middle- and higher-income students can afford to pay for their education (Hearn & Longanecker, 1985). Instead of subsidizing all students, institutions could, instead, focus funds toward specific students, i.e., lower-income students who need help to meet their financial needs. In this case, high-tuition, high-aid policies benefit lower-income students, especially in an environment of increasing costs, whereby the high-tuition, high-aid policies could help maintain access to those students by serving as an alternative form of financial aid (Hearn & Longanecker, 1985; Mumper, 2001).

Second, for public institutions, in particular, providing low tuition to all students is inequitable when taxpayer money subsidizes the institution. Middle- and higher-income students already make up a disproportionate share of the students who attend higher education institutions; therefore, they would receive disproportionate benefits from the policy. In addition, if the price is lower for all students, more middle- and upper-income students benefit from the policy because they are also more likely to be more academically prepared and to gain admission more easily. Therefore, low-tuition, low-aid policies effectively reduce or limit access for lower-income students (Martin, 2002). For example, using a simple supply-and-demand model, when prices are lower, demand

typically increases. Because the supply of higher education (capacity) cannot usually increase at the same rate as demand in the short-term, institutions cannot accommodate all students who wish to attend. Therefore, in a competitive environment, institutions can be more selective in the admissions process and accept more academically prepared students over those who are less academically prepared (Mumper, 2001). In this scenario, because higher-income students tend to be more academically prepared than are lower-income students, a low-tuition, low-aid policy becomes an inequitable transfer of wealth from lower-income families to the middle- and higher-income families (Hearn & Longanecker, 1985).

Finally, the low-tuition, low-aid model artificially reduces competition. Subsidization insulates some institutions, generally public institutions, from market forces. Due to the low costs of public institutions, students are willing to attend there even if they are accepted at other institutions that are deemed higher quality but are less affordable. As low-tuition institutions raise prices, they become more susceptible to the same market forces as are more expensive institutions; hence, they must compete on the basis of quality as opposed to price (Mumper, 2001). That is why high-tuition, high-aid policies sometimes function as a strategy to increase institutional quality for students of all income levels.

In addition to these traditional arguments, high-tuition, high-aid policies have two other benefits: enrollment management and competitive advantage. Tuition discounting can help manage enrollments in two ways: by increasing absolute enrollment numbers and by shaping the composition of entering cohorts (Lapovsky & Loomis-Hubbell,

2003). If enrollment is below expectations, the institution can offer scholarships to attract students to attend. This practice would not only fill empty seats but also could increase net tuition dollars. Even if they receive scholarships, students will probably have to pay for a portion of their education out-of-pocket (Baum & Lapovsky, 2006). The interest of institutions is not in simply having bodies filling seats; they are also interested in who attends.

Institutions may also use tuition discounting to “craft a class” (Baum & Lapovsky, 2006). For example, they can offer scholarships to ensure access and diversity or to promote excellence. The available research shows mixed results about whether tuition discounting helps to meet any of these objectives. Redd (2000) demonstrated that institutions in general increased the number of lower-income students, but that institutional aid had been more successful with access than with excellence. Other studies have shown that tuition discounting has increased the number of higher-income, high-achieving students (Baum & Lapovsky, 2006; Goral, 2003; Martin, 2002; Winston & Zimmerman, 2000). In sum, much remains unknown about this practice, especially when and how it works.

Historically, a relatively small portion of private institutions used tuition discounting as a competitive advantage; it was merely a method to entice students to an institution (Baum, 2001). Presently, numerous institutions utilize it. For example, in a price-competitive market, institutions began offering scholarships as an incentive, but other institutions quickly adjusted their practices and offered scholarships to remain competitive. Each institution increased scholarships in response to the others, resulting in

a “price war” (Winston & Zimmerman, 2000). When discounting becomes a marketing tool for competitive advantage used by most universities, it is not a competitive advantage at all. The only advantage would be the extent to which institutions can provide discounts to students (Goral, 2003).

As discussed above, institutions implement tuition discounts for a variety of reasons. The way in which institutions implement tuition discounting policies has evolved over time. Currently, tuition discounting policies vary by institution as a result of institutional goals such as access and excellence.

How Institutions Adopt Tuition Discounting

The traditional strategy adopted by private institutions is for higher-income students to pay more tuition in order to subsidize the lower-income students. This allowed access to students who could not otherwise afford to attend. While this may have been the case in the past, institutions no longer use this as the only method by which they award financial aid (Allan, 1999a; Corey, 2005; Redd, 2000).

Smaller, less selective institutions may use financial aid packaging to meet enrollment goals. The public perceives the cost associated with this practice not only as an incentive for students to enroll but also as an investment in the future. The packages attract students, in general, and higher quality students, in particular, which, in turn, may increase the ranking, prestige, and perceived quality of the institution (Corey, 2005).

More selective or highly selective institutions can reach their enrollment goals with higher-income students who are in a position to pay full tuition. But such institutions also use scholarships to craft a class of students with a certain level of academic quality,

to increase student diversity on campus, and help those students who cannot afford to pay full tuition (Allan, 1999a; Corey, 2005). Many perceive these methods for awarding discounts as institutional altruism and as driven by the perception that institutions have a responsibility to promote access.

Conversely, there are at least three additional forces behind how institutions award tuition discounts that are more pessimistic and self-serving than those discussed above (Redd, 2000). First, because the middle class does not want to pay for the rising costs of tuition and student loan indebtedness, institutions have turned to merit-based grants. Second, institutions are under increasing pressure to award more aid to higher-income students to help offset the rising costs of attendance. In these first two cases, institutions do not use tuition discounts to help lower-income students who have a limited financial ability to pay for college. Instead, the tuition discounts help the middle- and upper-middle-income learner. Such learners are usually more academically prepared, and institutions view them as potential future donors to their alma mater. These students may have the financial ability to pay for college, but they benefit from a significant institutional subsidy.

Third, institutions often offer financial aid packaging for academically gifted undergraduate students in the increasingly competitive market, following merit as opposed to need criteria. Higher-income students are more likely to have stronger academic backgrounds, making them much more likely to benefit from tuition discounting in a merit system. In his analysis, Redd (2000) noted that enrollment goals and helping those with financial need have not been the main forces behind current

institutional aid trends. Regardless of the policies for awarding tuition discounts, institutions must have enough resources to offer tuition discounts.

Impact of Tuition Discounting on the Institution

Tuition discounts can be funded or unfunded. When the tuition discount is funded, the institution still receives the tuition revenue but from a source other than the student. Endowment earnings, donations, and other financial support pay the tuition. That money is restricted and is available only for the purposes of scholarships and grants; it can have no other use. Therefore, the university does not have to use its unrestricted money from the general operating fund for tuition support and can spend those funds in other ways (Allan, 1999a). This cycle of using endowments to fund scholarships can contribute to financial stability, but not all institutions have gifts and endowments to cover the entirety of the scholarships that the institutions offer.

When the tuition discount is unfunded, the institution must forgo the tuition revenue. This can jeopardize the financial position of the institution for two reasons. First, institutions do not receive 100% of the gross tuition when they offer a tuition discount, but their expenses do not decrease proportionately. Instead, the discount severely taxes the operating budget. To deal with this, institutions may either delay expenditures, such as faculty hiring, technological investments or upgrades, or repairs and maintenance of the physical plant, in the short term or delay them indefinitely. If the institution postpones these expenditures or does not address them at all, the infrastructure and physical plant can deteriorate to the point of future enrollment losses for the institution (Redd, 2000).

The scholarship is an informal financial commitment to the students for the time that they attend, usually four years. If the scholarships were to decrease, retention could become challenged (Redd, 2000). Institutions must find a balance so they can provide tuition discounts without jeopardizing their future financial stability. While the source of funding is an important financial pressure, institutions might not investigate how to fund the discounts and, instead, might concentrate on their expected results. This brings about the need to evaluate the financial effect of tuition discounting, particularly at the institutional level.

Financial Position

As discussed in the previous chapter, the relationship between tuition discounting and the financial stability of an institution has received little attention in the literature. Available research has examined tuition discounting trends, general differences between institutions, and the sustainability and viability of institutions, but not strictly the financial implications of various tuition discounting practices.

Definition

The financial position and stability of higher education institutions are often determined using financial ratios, which measure many aspects of an institution's fiscal soundness. These ratios, when properly analyzed, can bring to light the strength or weakness of institutional financial statement line items or ratios compared to industry standards. Financial ratios represent the effectiveness of the institution's use of resources, ability to live within its means, and ability to provide and maintain quality educational services and facilities, as measured by industry standards and benchmarks (Prager et al.,

2005). Specifically, this study uses the *FVI* as this ratio measure for financial position and stability. The rationale behind the use of ratio analysis and the *FVI* is discussed in detail below.

Trends

As discussed earlier, tuition discounting has increased steadily over time. It is a means for institutions to compete for the most qualified candidates (Goral, 2003; Winston & Zimmerman, 2000). The average discount rate for undergraduate students increased almost 10 points at private four-year institutions from 1994-95 to 2004-05 (Baum & Lapovsky, 2006). The percentage of students receiving scholarships increased almost 20 points from 1990-91 to 2002-03 (Lapovsky & Loomis-Hubbell, 2003). Scholars might argue that this reveals only that more students are receiving a discount but that the discount per student may be lower. If that is true, then institutions could spend the same dollars to help a larger group of people. This does not appear to be the case, however. The dollars spent on institutional aid increased nationally over 250% from 1977-78 to 1997-98 (Baum, 2001).

While institutions have offered discounts to more students and the discount rates have risen, increases in institutional expenditures have continually outpaced the rate of inflation (Toutkoushian, 2003). Researchers do not know precisely how institutions have been able to afford this because institutional financial statements do not indicate that expenses have outpaced net revenues. Tuition revenue increased, but the increases were offset by increased tuition discounts. Perhaps the accurate explanation of how institutions remain financially stable may be discernable only from student-level data, including the

mix of full-pay international students (Van Der Werf & Sabatier, 2009), which are not publicly available to researchers (Baum & Lapovsky, 2006).

An alternative explanation for why the financial statements do not indicate a potential problem may be that the tuition discounts are, in fact, unfunded. In this case, officials may stretch the operating budget to handle the institution's growing expenditures, thereby postponing ordinary and necessary expenditures. This would decrease expenses in the short-term so that the institution can sustain itself on its net revenue. If that were the case, it would cause neglect of the enterprise infrastructure or the physical plant and could have long-term ramifications, as discussed above (Redd, 2000; Wilson, 2008).

Financial Stability

Gifts and endowments do not fund the majority of tuition discounts. Instead, discounts decrease net revenue to the institution because they are unfunded and paid for through tuition from other students (Davis, 2003; Redd, 2000). This means that enough students must be full-paying to fund those who receive the scholarships. It also encourages institutions to increase their prices.

Sixty-eight cents of a one-dollar tuition increase funds discounts for other students (Redd, 2000). Data consistently show that sustaining this type of funding for discounts does not seem possible. Simply, not enough students are full-paying to enable funding for those who are not. The general fund must stretch too thin to meet the financial needs of the institution. With fewer funds for the institutions, spending on

programs is cut, which equates to fewer resources for academic and student support services (Davis, 2003; Redd, 2000).

In addition, institutions showing larger increases in discount rates are the ones most dependent on tuition and fee revenue to finance their basic educational operations. But that same category of institutions loses money on each student due to its increased spending on institutional grants. This loss is equivalent to negative tuition because the institution effectively pays students to attend instead of charging them to attend. One quarter of all four-year private institutions are in this situation (Redd, 2000). In addition, one recent study showed that four-year public institutions experience diminishing revenue returns when unfunded tuition discount rates exceed 13% (Hillman, 2010). While some may view unfunded discounts and the resulting negative tuition revenue as an investment in the future of the institution (Corey, 2005), this is unlikely to be accurate in the long term. Yet the literature does not fully elaborate on how the financial position of the institution affects its decisions related to the award of tuition discounts.

Financial Ratios

Ratio analysis is a common tool used in business to analyze financial relationships and production data to determine how well a company performs compared to itself, its competitors, and its industry. This information also can determine whether the business is performing up to a certain standard (e.g., budget compared to actual results). When the results are poorer than anticipated, changes are necessary within the company to improve the results (Block et al., 2009).

Scholars had widely believed that higher education was too different from the business world to utilize the same tools, such as ratio analysis techniques, for institutional performance analysis (Kramer, 1981). However, as institutional practices have evolved over time, that perception has changed. Institutions are increasingly exposed and more vulnerable to the condition of business and economic environments. They have responded by adopting new ways to generate revenue or cut costs (Deem, 1998).

For example, to generate revenue, institutions may resort to the commercialization of the university (Bok, 2003) or the academic capitalism of the faculty to procure research funds, that is, market and market-like efforts are used to secure external resources (Slaughter & Leslie, 1997). To cut costs, institutions may shift to the new managerialism approach to running the enterprise (Deem, 1998). Through all of these responses, common characteristics appear, such as seeking new sources of revenue and tightening the control over expenditures (El-Khawas, 1994), which closely parallel the contemporary business model.

Higher education institutions have become more and more business-like in their operations and control (Deem, 1998); and, as such, researchers can scrutinize and analyze them like businesses as well. To this point, the U.S. Department of Education (DOE) commissioned reports on the development of ratio analysis for higher education institutions as a means of determining whether the institutions were financially worthy of receiving federal financial aid funds (KPMG Peat Marwick LLP, 1996, 1997).

A number of financial ratios are available and appropriate to analyze a for-profit business organization. Block et al. (2009) discussed four major categories of ratios:

liquidity, debt utilization, asset utilization, and profitability. Liquidity ratios measure the entity's ability to pay short-term obligations as they become due. These ratios include the current ratio, quick ratio, and working capital. Debt utilization ratios measure the overall debt position of the entity related to its assets and earnings. These ratios include debt to total assets, times interest earned, and fixed charge coverage. Asset utilization ratios measure the productivity of the entity's assets. These ratios include accounts receivable turnover, average collection period, inventory turnover, day's sales in inventory, fixed asset turnover, and total asset turnover. Profitability ratios measure the entity's ability to earn a return on its activities, whether from sales, assets, or capital. These ratios include profit margin, return on assets, and return on equity.

These categories and ratios are relatively easy to understand because the goal or motivation of a company is usually profit centered or profit related. One can simply look at the ratios and determine, for example, if profit and profitability ratios have increased over time to determine how well the company has performed.

The mission of a higher education institution is different from that of a for-profit business. While making money and having an increase in net assets (the not-for-profit equivalent of positive net income) at the end of the year is important, the focus of the institution is not on profit as a mission. Not-for-profit entities have different objectives and categorize their financial resources differently than do for-profit entities. Not-for-profit institutions typically emphasize stewardship and accountability (Chabotar, 1989), which are more likely evaluated through the access and excellence missions of higher education.

This different focus makes using for-profit financial ratios difficult, as the goals and value systems of higher education institutions as not-for-profit entities are different. Using the same ratios to analyze a not-for-profit college or university in the same fashion as a for-profit business enterprise would yield results that appear unreasonable if viewed from the perspective of the for-profit entity. Based on a mission that is different than that of a for-profit entity, not-for-profit institutions would likely develop a different set of criteria for financial analysis to measure performance. In fact, specific financial ratios such as the available funds ratio, endowment income ratio, and instruction proportion ratio apply to the analysis of higher education institutions to accommodate their specialized missions and funding needs (Chabotar, 1989).

Financial Vulnerability Index

Trustees, presidents, and business officers take interest in the financial position of their institution. These officers are also interested in a more overarching evaluation of the institution, including whether it is financially vulnerable to an economic shock that could cause its closure. In other words, they believe in evaluating the financial stability of an institution. The financial vulnerability index (FVI; Trussell et al., 2002), a measure based on financial ratios, was designed to determine the financial vulnerability or stability of a not-for-profit institution. This is accomplished through comparing institutional FVI results to established benchmarks by not-for-profit subsectors, including higher education, to accommodate the differences between each subsector.

The purpose of the FVI is to analyze the financial vulnerability of an institution at one point in time. As with other ratio analyses, its use over a period of time (at least five

years) can help to determine a trend in an institution's financial position, i.e., whether the financial position of the institution is shifting and in what direction the shift is occurring (Block et al., 2009; Prager et al., 2005). Scholars have noted that the FVI provides only a gauge of the financial component of the institution's stability, which is the focus of this research. Researchers must consider other non-financial factors when determining the overall health of an institution (Chabotar, 1989; Prager et al., 2005). Discussion of the FVI appears in more depth in the methodology section.

Summary

The literature contains extensive research dealing with different aspects of tuition discounting. Literature is available regarding how college cost increases outpace inflation (Baum, 2001; Gladieux & King, 1999; Lapovsky & Loomis-Hummel, 2003) and how college cost increases outpace financial aid increases (Baum & Lapovsky, 2006; Gladieux & King; Toutkoushian, 2003). This, along with institutions changing their institutional financial aid policies from need-based to merit-based aid (Redd, 2000), has made the study of tuition discounting important, not only from the perspective of academia but also from the perspectives of students who must navigate the system.

Significant growth has occurred in recent years in the percentage of students receiving tuition discounts and the average tuition discount rate provided to students (Lapovsky & Loomis-Hubbell, 2003). On the surface, this appears to be a positive trend because more students have received help at higher rates. The problem is that a significant portion of institutional aid awarded is unfunded, meaning that institutions

simply forgo the revenue. At some point, unfunded tuition discounts can lead to financial instability (Corey, 2005; Redd, 2000).

The instability point remains unknown but raises interesting questions about how the institution itself is important in determining the level of tuition discounting. Few studies previously performed have dealt with this particular topic. The current research examines the relationship between tuition discounting and the financial position of four-year private, not-for-profit postsecondary institutions. Application of resource dependence theory serves to inform this study.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This chapter presents the methodology used to conduct the analysis. The key variables are informed by the tuition discounting literature. The chapter begins with a discussion of the data sources used to create the dataset, followed by a presentation of the time period of the study and the sample. Then the main independent variables, control variables, and the dependent variable are described, followed by the procedures used to handle missing data. Then the three hypotheses are presented, followed by a description of the preliminary exploratory analysis related to testing the assumptions of ordinary least-squares regression and then the analytical strategies and the related equation models employed to test the hypotheses. The chapter concludes with a summary.

Data Sources

A dataset was constructed using three main sources: (a) the U.S. Department of Education National Center for Educational Statistics (NCES) Integrated Postsecondary Educational Data System (IPEDS, 2003, 2004, 2005, 2006, 2007), (b) The Institute for College Access and Success (TICAS) database (CollegeInsight, 2003, 2004, 2005, 2006, 2007), and (c) *Barron's Profiles of American Colleges* (2003, 2005, 2007).

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 on the number of degrees completed, general institutional characteristics, enrollments, finances, graduation rates, student financial aid, and institutional human resources. IPEDS is a widely used data

source for research in various aspects of higher education institutions. The data are available to the public free of charge on the NCES website (http://nces.ed.gov/ipeds/).

TICAS also makes available a comprehensive dataset collected annually that includes institutional characteristics, student debt, financial aid, cost of attendance, economic diversity, student success, racial diversity, and enrollment. For the purpose of this study, TICAS' student economic diversity variable was used. The data are available to the public free of charge on the TICAS website (http://college-insight.org).

Barron's (2003, 2005, 2007) publication on American colleges and universities includes general institutional information, enrollment, application deadlines, faculty size, annual tuition, and selectivity. *Barron's* is a widely accepted and reputable source for institutional quality and selectivity (Kuh & Pascarella, 2004; Pascarella et al., 2006), that is, institutional excellence and admissions competitiveness. Barron's publishes the data semi-annually in book format, with a companion informational CD, which users may purchase for a nominal fee.

Time Period

The time period under examination was the academic years 2003-04 to 2007-08. Obtaining enough years' data to perform a trend analysis was critical for this study. Business and accounting industry literature (Block et al., 2009; Prager et al., 2005) recommends a minimum of five years of information for trend analysis. Academic year 2003-2004 was the first year that all of the variables of interest were available, and academic year 2007-2008 was the most recent year available. Therefore, this five-year period was the maximum number of years available for analysis, given the IPEDS and

TICAS datasets, and it fulfilled the recommended five-year minimum time period for trend analysis.

Sample

Private, not-for-profit, baccalaureate level and above institutions in the United States (*N* = 1,244) were selected as the population of interest for three reasons. First, private institutions have utilized institutional financial aid since their inception (Nidiffer, 1999), whereas it is a relatively new practice for public institutions. Private institutions have more experience adopting the practice of tuition discounting, and they have set the precedent for public institutions to follow (Corey, 2005).

Second, public institutions usually experience less financial stress, relative to private institutions, due to their state subsidies (Gilmartin, 1984). Because private institutions do not receive and are, therefore, not able to rely on, state funding, they must independently generate the funds needed to operate through multiple revenue sources (Froelich, 1999; Hodge & Piccolo, 2005). The need to self-fund makes the study of the financial components of private institutions more informative than a study of state-funded public institutions.

Third, the financial reporting method for public and private institutions was significantly different from 1995 to 2006. Consequently, strict comparison of the two institutional types is not possible (Toutkoushian, 2009). Because this research includes financial reporting data from that period, even if the first two issues were overcome, divergent accounting practices cause difficulties in comparing public and private institutions. Therefore, this study included data from private institutions only.

Missing data and reliability concerns make excluding certain data necessary, but this strategy may introduce selection bias into the study. This is especially problematic for smaller institutions that may not have the resources to provide accurate and reliable information to IPEDS or that do not want to provide the information to IPEDS based on some aspect of the institution, for example the size, selectivity, or financial position (Winston & Yen, 1995). The benefits of reducing missing data and reliability issues, however, outweighed the risk of potential selection bias (Allison, 2002). This is discussed in more detail in the missing values section.

Four categories of institutions that did not meet all necessary criteria for analysis were excluded. These criteria were full-time equivalent (FTE) students, financial information availability, tuition discount rate availability, and tuition discount rate errors/outliers. First, because of the voluntary nature of IPEDS reporting, institutions with student enrollment of less than 100 FTEs were excluded (Winston & Yen, 1995). These institutions might not have the capacity to provide detailed, reliable, accurate, and complete information to properly complete the annual IPEDS survey due to a lack of manpower, knowledge, or experience. Similarly, smaller institutions also could be the source of missing data; therefore, excluding them reduced the number of cases with missing and unreliable data. The average discount rate for this subset of excluded institutions was higher than the average tuition discount rates for institutions included in the analysis because several of these small institutions also had tuition discount rates above 100%. Had they not been excluded as a result of the size of the institution, these cases would have otherwise been excluded as outliers.

The second set of excluded institutions included those for which all of the financial information was unavailable, limiting the ability to calculate all FVI components and the tuition discount rate. Alternative strategies such as data imputation were not possible given that all five FVI component ratios were missing for these institutions.

The third category was institutions whose tuition discount rate was not calculable due to missing data. Most of these institutions were part of the second set of excluded variables above, in cases in which institutional financial information, including tuition and institutional grants, was not available. This category represents institutions that had other financial data but did not have data related to the tuition discount rate calculation. The tuition discount rate is the dependent variable; therefore, the components of the discount calculation could not be imputed (Allison, 2002).

The fourth category of excluded institutions were those with tuition discount rates over 100%. Such figures appeared to be either errors in data reporting or outliers. The numbers of institutions analyzed after excluding institutions with these four types of missing data are presented in Table 1.

Table 1

Cases Excluded From the Analysis

Item	2003	2004	2005	2006	2007
Total Population	1,244	1,244	1,244	1,244	1,244
Excluded:					
FTE < 100	64	68	69	69	75
Average Discount Rate	31%	30%	33%	30%	27%
Financial info not available	56	56	49	40	36
TD rate not available	1	2		1	
TD rate over 100% (outlier)	8	7	5	8	7
Total excluded	129	133	123	118	118
Total cases in the analysis	1,115	1,111	1,121	1,126	1,126
Average Discount Rate	26%	26%	26%	27%	27%

Variables

This section presents the rationale for including each set of variables by category. The independent variables that were categorized into two groups, the main independent variables and the control variables, are discussed, and this section ends with a discussion of the dependent variable.

Main Independent Variables

The financial vulnerability index (*FVI*) includes 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 *size ratio* (*Size*). The *debt ratio*, expressed as a percentage, describes the amount of debt in the institution's capital structure (Trussel et al., 2002). It represents the proportion of debt the institution had in its capital structure in relation to its assets. An institution with a lower ratio is financially stronger.

The *revenue concentration index*, expressed as a value between zero and one, expresses the number of revenue sources available and the diversification of the revenue streams of an institution (Trussel et al., 2002). As the number of revenue sources increases, the index approaches zero. If an institution had one revenue source, the index was one. Therefore, an institution with a lower number is financially stronger than an institution with a higher number.

The *surplus margin ratio*, expressed as a percentage, is a measure of profitability and shows whether the institution is operating within its means (Trussel et al., 2002). It represents the ratio of the excess of revenues over expenses divided by total revenues. An institution with a higher surplus margin ratio is stronger than an institution with a lower surplus margin ratio.

The *administrative cost ratio*, expressed as a percentage, identifies the proportion of institutional spending made for non-operational activities (Trussel et al., 2002). It represents the amount of administrative costs in relation to total revenues. An institution with a higher ratio is stronger than an institution with a lower ratio.

The *size ratio*, expressed as a number greater than one, identifies the institution's financial size as a function of its total assets (Trussel et al., 2002). A larger *size ratio* indicates a larger asset value for the institution. An institution with a higher *size ratio* is

stronger than an institution with a lower *size ratio*. Each of these five components is a continuous measure. Appendix A contains a listing of all variables in the analysis.

These five elements constitute the *FVI*, a representative composite measure of institutions' financial health.[1] A comprehensive measure such as the *FVI* identifies more sources of variability than does a univariate measure such as net tuition revenue (Ruterbusch, 2004) or ending endowment balances that, by themselves, do not reveal the depth of complexity of institutional financial position (Prager et al., 2005). FVI component ratios are a more inclusive and broad measure of the overall financial position of the organization. Therefore, combining the five measures of the *FVI* into a single score allows for a holistic viewing of the institution's financial position, in which the strength of one of the FVI components can offset the weakness of another component. For example, a specific institution may have a poor debt ratio position and a strong surplus margin ratio position. Evaluating an institution based on the results of one ratio (its poor debt ratio), would provide an erroneous picture of the financial position of the institution (the institution has a poor financial position). By using the *FVI* in this example, the

[1] I investigated an alternative index to use as the independent variable: the composite financial index (CFI), which is an industry benchmark utilized by institutional financial executives and independent auditors to determine the financial position of the institution (Prager et al., 2005). The CFI has four component ratios: the primary reserve ratio (PR), the viability ratio (V), the return on assets ratio (ROA), and the net operating revenues ratio (NOR). The CFI formula is

$$CFI = \left(\frac{PR}{.113} x\ 35\%\right) + \left(\frac{V}{.417} x\ 35\%\right) + \left(\frac{ROA}{.02} x\ 20\%\right) + \left(\frac{NOR}{.007} x\ 10\%\right)$$

Investigation into the use of the CFI revealed that none of the four component variables of the NOR ratio was available in IPEDS. Without this information, accurate calculation of the NOR and the CFI was not possible. Therefore, the CFI was not a viable option for this study.

strength of the surplus margin ratio would offset the weakness of the debt ratio and provide a more holistic perspective of the financial position of the institution.

Calculating the *FVI* is a three-step process. First, the values of the five component measures—*debt ratio*, *revenue concentration index*, *surplus margin ratio*, *administrative costs ratio*, and *size ratio*—were computed and then the values used to calculate the formula exponent, *z*. The value of *z* was used to calculate the *FVI*. Using this process, an institution will generally have an *FVI* score between 0 and 1. An *FVI* score of less than .10 indicates that the institution is not financially vulnerable: it is stable. An *FVI* score of more than .20 indicates the institution is financially vulnerable: it is not stable. An *FVI* score between .10 and .20 is inconclusive regarding institutional vulnerability: evaluation of stability is not possible (Trussell et al., 2002). These cut-off points were determined by the authors' using a multiple step process by which they first identified a sample of financially vulnerable institutions and a group of comparable institutions that were not financially vulnerable. Next, they analyzed the differences between the groups and used the five-component measure to develop an equation to explain the differences between the two types of institutions. The authors then tested the equation on a holdout sample of institutions to test the predictive power of the equation. Finally, they developed a decision rule ($FVI < .10$, $.10 \leq FVI \leq .20$, $FVI > .20$) that minimized the number of erroneous predictions (Trussell et al., 2002).

The IPEDS and TICAS variables used to calculate each of the FVI component measures appear in Appendix B. After calculating each individual measure, the *FVI* was calculated using the following formula (Trussell et al., 2002):

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

z = 0.7754 + (0.9272 x Debt) + (0.1496 x Concen) + (2.8419 x Margin) + (0.1206 x Admin) + (0.1665 x Size), where

$$e = 2.718$$

$$Debt = \frac{Total\ Liabilities}{Total\ Assets}$$

$$Concen = \sum\left(\frac{Revenue_i}{Total\ Revenues}\right)^2$$

$$Margin = \frac{Total\ Revenues - Total\ Expenses}{Total\ Revenues}$$

$$Admin = \frac{Administrative\ Expenses}{Total\ Revenues}$$

$$Size = \ln(Total\ Assets)$$

Control Variables

Organizational activities and outcomes are embedded in the context (Pfeffer & Salancik, 1978) of each institution and, as such, vary. To account for these differences in the analysis, institutional differences are controlled for using a series of relevant variables. The control variables represent institutional characteristics or context relevant to financial aid and tuition discounting studies previously performed. There are two groups of control variables: institutional economic controls and institutional characteristics.

Economic controls, the first group of control variables, include the various sources of institutional revenue (*tuition & fees*; Toutkoushian, 2001). The revenue stream

variables in IPEDS include tuition and fees; federal, state, and local appropriations; federal, state, and local grants and contracts; private gifts, grants, and contracts; contributions from affiliated entities; investment return; sales and services of education activities and auxiliary enterprises; independent operations revenue; and other revenue. The nature and source of the funding defines both the availability and restrictions of resources to the institution, which is useful in tuition discounting decisions.

The second group of control variables includes a series of institutional characteristics. There are four variables in this control group. First, *enrollment* was used to control for institutional size (Baum & Lapovsky, 2006; Lapovsky & Loomis-Hubbell, 2003). *Enrollment* is also an indicator of financial factors such as gross tuition revenue and fixed costs. The size of institutions' enrollment is useful in tuition discounting decisions in that this study focuses on average tuition discount rates. If two institutions provided the same tuition discount dollars to its students, but they had different enrollment sizes, the average discount rates would be different. For example, Institution A and Institution B both had the same tuition sticker price of $15,000 per year and provided $20 million in tuition discounts to their student populations. If Institution A had an enrollment of 5,000 students, the average tuition discount would be $4,000 per student or a tuition discount rate of 26.7%. If Institution B had an enrollment of 6,000 students, the average tuition discount would be $3,333 per student or a tuition discount rate of 22.2%. Ceritus peribus, enrollment would affect average tuition discount rates.

Second, the percentage of white, non-Hispanic (*percent white enrollment*) students enrolled was used to measure student racial diversity (Baum & Lapovsky, 2006;

Goral, 2003; Heller, 1997; Kane, 1999). A higher percentage represents a higher proportion of white students and, therefore, a less racially diverse student population at the institution. Racial diversity is important to tuition discounting decisions for several reasons. One reason is that institutions that serve primarily white student populations may be wealthier in terms of donor pools, levels of assets, and endowments than are their minority-serving counterparts (Cunningham & Cochi-Ficano, 2002). This wealth may be used to provide higher levels of average tuition discounts.

Third, the percentage of financial aid recipients who were awarded Pell grants (*percent Pell*) was used to capture student economic diversity (Baum, 2001; Davis, 2003; Goral, 2003; Redd, 2000). A higher percentage represents a higher proportion of students from a low-income background. *Percent Pell* is important to tuition discount decisions in that institutions serving a higher percentage of students who are economically disadvantaged may not have the resources to give higher-than-average tuition discount rates to all students. Institutions may, instead, have to offer strategic financial aid to benefit specific students (Lapovsky & Loomis-Hubbell, 2003).

Fourth, *Barron's* Admission Selector Rating (*selectivity*) was used as a proxy for institutional selectivity and prestige (*Barron's*, 2003, 2005, 2007; Baum & Lapovsky, 2006; Corey, 2005; Redd, 2000). The level of prestige of an institution is an indicator of the relative weight put on the access and excellence missions, which has the ability to affect tuition discounting policies. The *Barron's* rating is a proprietary rating system that considers numerous variables related to the selectivity of the institution and categorizes

the institutions into the following categories: most competitive, highly competitive, very competitive, competitive, less competitive, and noncompetitive.

The proprietary nature of the *Barron's* rating system leads to challenges in quantifying the distance between the values of the *Barron's* categories. As a result of that challenge as well as the uneven distribution of private institutions among the categories, *selectivity* was used as a dichotomous variable, with the values of nonselective (0) and selective (1). For the purposes of this study, the nonselective institution category included the *Barron's* categories of noncompetitive, less competitive, and competitive institutions. The selective institution category included very competitive, highly competitive, and most competitive institutions.[2]

Dependent Variable

The dependent variable for this study was the average *tuition discount rate* for the institution. It is not directly available through IPEDS; therefore, 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 were applied to tuition and fees (Duggan & Mathews, 2005). This variable is a good measure of the tuition discount rate not only because it has been used in the literature but also because it is comprehensive in that it takes into account all sources of institutional grants, both funded and unfunded. This calculation is also

[2] In future research, the *Barron's* institutional categories may be separated into four categories instead of two for a more thorough understanding of the relationship between selectivity and tuition discount rates. The four types should be as follows: Type 1 institutions include noncompetitive and less competitive institutions, Type 2 institutions include competitive institutions, Type 3 institutions include very competitive institutions, and Type 4 institutions include highly competitive and most competitive institutions.

conservative in that all tuition revenue sources are used, which could result in a lower average tuition discount rate. For example, if an institution had $20 in funded and unfunded institutional aid and $100 in tuition revenue net of allowances, the average discount rate would be 20%. If allowances of $10 were added back to net tuition revenue, gross tuition revenue would be $110, and the average discount rate would be 18.2%. Appendix C provides a listing of descriptive statistics for all of the variables.

Missing Data

Missing data must be considered when using secondary data sources such as IPEDS (Allison, 2002). After assembling the dataset for each year, there were missing data issues that needed to be addressed.

Issues Associated with Missing Data

To ensure external validity of the findings, that is, to be able to generalize the research findings to the entire population, the data used in the research must be reliable. As discussed above, cases were excluded based on four criteria to reduce the number of cases with unreliable information (Table 1).

Because of the voluntary nature of the IPEDS data collection procedures, institutions need not submit information for every data field. This may lead to data missing not at random, an external validity issue making the findings unreliable for generalizing to the entire population. For example, as briefly mentioned, institutions that are smaller and less prestigious may not report on variables such as SAT scores, endowment asset values, or institutional financial aid awarded. For this research, limiting

external validity issues was a priority so the findings could be generalized to the entire population.

Another issue with missing data is selection bias, that is, the bias that the results from an unrepresentative sample. The entire population of private, not-for-profit institutions in IPEDS was used for the data. Once cases based on the four criteria previously discussed were deleted, the sample remained large and essentially intact: over 1,100 institutions, out of the 1,244 institutions in the population, remained in the sample each year. Because a large sample was obtained from the population (over 88% of the population each year), there is minimal concern about selection bias. The only limitation introduced is based on the four categories of excluded cases. Caution must be taken when generalizing the research results to institutions legitimately meeting any of the four excluded categories, specifically institutions with fewer than 100 FTEs or with tuition discount rates over 100%. Given this, the benefits of reducing missing data and reliability issues to ensure external validity outweighed the risk of potential selection bias (Allison, 2002).

Missing Data Procedures

To address any problems posed by missing data issues, the SPSS Missing Value Analysis module was used, which helped to determine whether the data were missing completely at random or whether there was a pattern to the missing data. Most data were missing completely at random, but one variable was not: *percent Pell*. Whether data are missing completely at random, where there is no apparent pattern to the missing values; missing at random, where the missingness of one variable (X_a) is related to the value of

another variable (X_b) but not to the original variable (X_a) as it relates other cases in the dataset; or missing not at random, where the missingness of the variable (X_a) is related to the values of itself (X_a) as it relates to other cases in the dataset and one or more other variables (X_n), most strategies to manage the missing data will produce the same results if the sample size is large enough and the amount of missing data is relatively small (Croninger & Douglas, 2005). Because the entire population, except for the cases excluded in Table 1, was used, the sample size is acceptably large. Each year, the data missing for *percent Pell* was relatively small (2003 = 5.4%, 2004 = 4.6%, 2005 = 4.3%, 2006 = 4.6%, 2007 = 4.3%). Therefore, the same multiple imputation techniques were used on *percent Pell* as were used on the other independent variables.

After testing the missing data, the multiple imputation analysis tool in the SPSS Missing Values Analysis module was used to impute the missing data in the sample. The results presented in the following chapter represent the average of 10 imputations, which is higher than the program default setting of 5 imputations. This information was used in the empirical analysis to help test the hypotheses and to answer the research question.

Hypotheses

Resource dependence theory informed the development of the hypotheses tested in this study. Resource dependence theory asserts that external forces and, ultimately, the need for resources constrain and shape institutional behaviors (Pfeffer & Salancik, 1978). The hypotheses suggest that institutions can and do adjust their tuition discounting policies based on the availability of and the need for resources.

To test the hypotheses, regression analysis and ANOVA were used. An innovation of this study is its use of variables (the *FVI* and its component measures) historically reserved for ratio and trend analysis in for-profit enterprises and their application to the analysis of not-for-profit organizations, specifically institutions of higher education. The *FVI* and its component ratios serve as a proxy for the financial stability of an institution and will, therefore, help me to test my hypotheses.

In view of what we know about higher education finance, the financial stability of an institution should constitute a key factor in pricing decisions. As previously discussed, Trussel et al. (2002) define the values of *FVI* as they relate to financial vulnerability of an institution closing its doors and ceasing operations in three groups, as follows:

- $FVI < .10$ indicates an institution that is not financially vulnerable to closing,
- $FVI > .20$ indicates an institution that is financially vulnerable to closing, and
- $.10 \leq FVI \leq .20$ is inconclusive regarding institutional vulnerability to closing: an evaluation of financial stability cannot be made.

For the purpose of this research, institutional stability relates to financial vulnerability to closing its doors as well as negative changes in enrollment. An institution is stable in that it is not financially vulnerable to closing ($FVI < .10$). Additionally, it is assumed that, when an institution is stable, any changes in enrollment are small and inconsequential. Conversely, an institution is not stable when it is financially vulnerable to closing ($FVI > .20$). Further, when an institution is not stable, negative changes in enrollment may significantly affect the institution's ability to remain in operation.

As discussed in the previous chapter, institutions traditionally view tuition discounts as a means to provide access to students (Lapovsky & Loomis-Hubbell, 2003). As a result, it is reasonable to expect that the more financially stable an institution is, the more likely it is to offer tuition discounts. Conversely, institutions also consider tuition discounts as an investment (Allan, 1999a; Corey, 2005), and they may choose to spend heavily on tuition discounts, potentially exchanging short-term financial position for long-term benefits in the form of larger enrollments and/or high-paying students. Recent data show that some institutions will pursue this strategy even when they have unstable growth rates or have shown growing financial vulnerability (Corey, 2005; Goral, 2003; Redd, 2000).

Hypothesis 1

Hypothesis 1 assumes that a particular institution has a stable financial and operating position, that is, an $FVI < .10$. These institutions can use tuition discounts as a means to increase access for students from low-income backgrounds (Goral, 2003; McPherson & Schapiro, 1999; Slaughter & Rhoades, 2004). From a resource dependence perspective, because the institution is not struggling, the institution does not strive for resources from its students. Therefore, from a resource dependence perspective, institutions do not overextend themselves beyond their means when offering tuition discounts. Instead, institutions may choose to offer tuition discounts as resources become available (Figure 2).

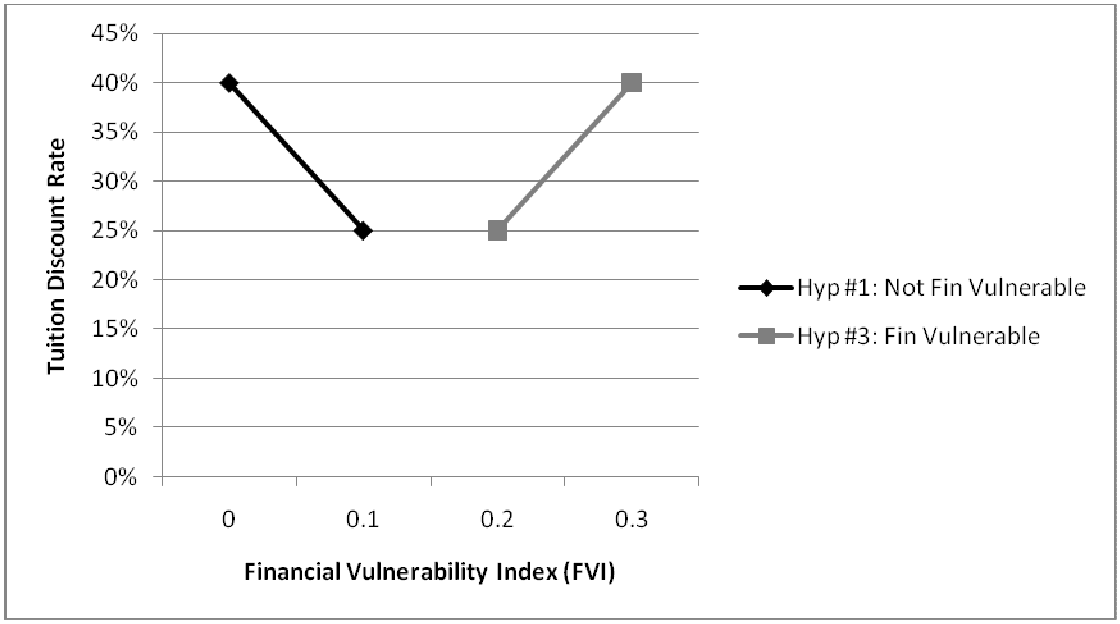

Figure 2. Hypothesized general relationship between institutional financial position and tuition discount rates.

Hypothesis 1: If institutions are financially stable (*FVI* < .10), then as financial position increases (*FVI* decreases), the average *tuition discount rate* increases.

Given the nature of higher education, as previously discussed, not all institutions are in a financially stable situation. Instead, they struggle in some way to change or improve their institution's position in the higher education market. Because they are resource dependent, they spend money on tuition discounts to increase tuition revenue through larger enrollments or full-paying students (Van Der Werf, 2000).

Hypothesis 2

Institutions may take extreme measures through discount policies to increase net tuition revenue. Even though institutions need money in the short-term, they may forgo the short-term goals of generating revenue in the present for the sake of a long-term strategy. In this case, they use tuition discounts in the present as an investment for the

future of the institution (Allan, 1999a; Corey, 2005), regardless of the institution's current financial position.

One common situation arises when the institution needs to offer tuition discounts as a means to achieve enrollment growth and, hence, more paying students. Assuming that the loss of revenue through discounting is compensated by the growth in student enrollment, institutions generate more gross tuition revenue. Moreover, as those students graduate and enter the workforce, they become potential future donors to the institution. Having a larger student body on an annual basis equates to a larger and increasing alumni donation pool in the future, which could then fund growth and operations. Tuition discounting can be an incentive for students (a) who would otherwise not go to college at all (Lapovsky & Loomis-Hubbell, 2003), (b) to attend one institution over another (Goral, 2003), or (c) who fall into both categories.

In the case of investment for enrollment growth, an institution can stay its course and forgo short-term revenues for the long-term strategy of growth. Managing the trade-offs between short-term funding needs and long-term institutional goals involves a delicate balance. The institution must manage tuition discounting levels and composition carefully to meet its growth target. Informed by resource dependence theory, it is expected that institutions will not consider their short-term financial position when deciding tuition discounting practices (Allan, 1999a; Corey, 2005; Redd, 2000). They are likely to use resources currently at their disposal to increase the likelihood of achieving long-term institutional goals.

Hypothesis 2: If institutions are financially unstable (*FVI* > .20) and enrollment numbers decrease over time, then average *tuition discount rates* will increase over time.

Hypothesis 3

Assuming that an institution is financially vulnerable and in danger of having to close its doors, it will seek ways to stay in business by initiating emergency policies to continue operating (Van Der Werf, 2000). To increase tuition revenues, the university will actively recruit more students through various strategies, including tuition discounts. Implementation of such a policy has the goal of increasing net tuition, that is, gross tuition revenue less tuition discounts, to keep the institution operational in the short-term and guarantee the long-term viability of the institution (Van Der Werf, 2000; Figure 2).

Hypothesis 3: If institutions are financially unstable (*FVI* > .20), then as financial position decreases (*FVI* increases), the average *tuition discount rate* increases.

Preliminary Exploratory Analysis

Preliminary analysis showed that the data were linear; therefore, ordinary least-squares regression analysis was one of the analytical methods used. Prior to the regression analyses, exploratory data analyses were performed to test for violations of the assumptions of ordinary least-squares regression (Ethington, Thomas, & Pike, 2001).

While most of the assumptions were met without violation, extreme collinearity (r^2 > .80) was present between several revenue variables. Four separate revenue variables showed extreme collinearity each year (*tuition & fees* and *sales and auxiliary enterprises* [r^2 = .83 in 2007-08, for example] and *federal grant* and *contracts and private gifts, grants, and contracts* [r^2 = .88 in 2007-08, for example]). Regressions were conducted

with all 15 of the revenue variables and then again with only one revenue variable: *tuition & fees*. The coefficient of multiple determination (R^2) for the models with only *tuition & fees* were only slightly lower than for the models with all 15 of the revenue variables. Due to the extreme collinearity and because it is more parsimonious and more statistically powerful to have fewer variables in the model, *tuition & fees* was the only revenue variable in the model.

Analytical Strategy

The analytical strategy included both descriptive statistics and analytical methods. Descriptive statistics were run because the current "quantitative" literature on tuition discounting is primarily analyzed through descriptive statistics (Lapovsky & Loomis-Hubbell, 2003; Redd, 2000). Analytical methods of regression and ANOVA were then performed. These methods are not currently seen in the literature but are needed as the next step to further our knowledge about the relationship between institutional financial position and tuition discount rates. Both strategies are discussed in more depth below.

Descriptive Statistics

Following Redd (2000), descriptive statistics were run to inform the understanding of the relationship between institutional financial position and tuition discount rates. Graphs were created to examine the bivariate relationship of the dependent variable (*tuition discount rate*) to each of the control variables (*total enrollment*, *percent white enrollment*, *percent Pell*, and *selectivity*). By introducing these control variables and exploring their relationships to *tuition discount rates*, patterns of

institutional characteristics were developed. These patterns informed the understanding of the results of institutions with similar characteristics.

For the purposes of this section of the analysis, the control variables were treated as categorical variables instead of continuous variables (Lapovsky & Loomis-Hubbell, 2003 and Redd, 2000). The category rationale is discussed below. Next, the average *tuition discount rate* for the entire year and for each category of the variable for each year was determined. Then, the overall year's average *tuition discount rate* was compared to the average *tuition discount rate* for the category to determine whether a pattern was present.

Total enrollment was categorized consistent with the five IPEDS categories for the number of FTEs attending an institution (less than 1,000; 1,000 to 4,999; 5,000 to 9,999; 10,000 to 19,999; and over 20,000 FTEs). For *percent white enrollment*, 20% ranges of the percentage of white student enrollment in relation to the entire population of the institution were used. This shows the distribution of the percentage of white enrollment in equal intervals for ease of visual comparison of discount rates among the categories.

Percent Pell was examined by looking at 20% ranges of the percentage of students in the institution receiving Pell grants. One study used Pell grant dollars but did not have percent of Pell grant recipient details by institutions (Baum, 2001). To examine economic diversity, other studies used family income in $20,000 intervals (Davis, 2003) or dollar intervals ranging from $5,000 to $15,000 (Lapovsky & Loomis-Hubbel, 2003). Another study examined the distribution of need-based aid at the 10th, 25th, 50th, 75th, and

90th percentiles (Baum & Lapovsky, 2006). Because there appears to be no standard method of reporting economic diversity in the tuition-discounting literature, 20% ranges were selected for simplicity and understandability. For *selectivity*, the collapsed *Barron's* (2003, 2005, 2007) selectivity categories of selective and nonselective established for hypotheses 1 and 3 were used.

Analytical Methods

The model used for hypotheses 1 and 3 was an ordinary least-squares regression equation in which the *tuition discount rate* was the dependent variable and the *FVI* was the independent variable. Regression was used for the analysis because (a) all of the variables were continuous variables and (b) the hypotheses expected linear data within the relevant range. Because it was hypothesized that the outcomes of the dependent variable would be different based on the FVI score, the dataset was examined from a data discontinuity perspective and split into three groups. The three groups were (a) Stable: $FVI < .10$, (b) Undetermined: $.10 \leq FVI \leq .20$, and (c) Unstable: $FVI > .20$. Therefore, the equation model is

$$\text{TD rate}_1 = \alpha + (\beta_{FVI} \text{ x } FVI) + (\beta_{econ} \text{ x Institutional economic controls}) + (\beta_{inst} \text{ x Institutional characteristics}) + \varepsilon$$

where:

$TD\ rate_1$ = Average tuition discount rate for an institution

FVI = Financial Vulnerability Index score for an institution

Institutional economic controls = Institutional revenue sources

Institutional characteristics = *Total enrollment, percent white enrollment, percent Pell, selectivity*

Because the *FVI* is a score made up of five separate measures, a second model with these five measures as five independent variables was developed. The alternate equation model is a regression equation wherein the *tuition discount rate* is the dependent variable and the five FVI component measures are the main independent variables. Included were additional control variables for institutional economic controls and institutional characteristics. Therefore, the equation model is

$$\text{TD rate}_2 = \alpha + (\beta_{\text{Debt}} \text{ x } \textit{Debt}) + (\beta_{\text{Concen}} \text{ x } \textit{Concen}) + (\beta_{\text{Margin}} \text{ x } \textit{Margin}) + (\beta_{\text{Admin}} \text{ x } \textit{Admin}) + (\beta_{\text{Size}} \text{ x } \textit{Size}) + (\beta_{\text{econ}} \text{ x Institutional economic controls}) + (\beta_{\text{inst}} \text{ x Institutional characteristics}) + \varepsilon$$

where:

TD rate$_2$ = Average tuition discount rate for an institution

Debt = Debt ratio

Concen = Revenue concentration index

Margin = Surplus margin ratio

Admin = Administrative costs ratio

Size = Institutional size in terms of assets

Institutional economic controls = Institutional revenue sources

Institutional characteristics = *Total enrollment, percent white enrollment, percent Pell, selectivity*

The results for these two models for hypotheses 1 and 3 were then compared to determine whether they yielded results that were significantly different. This comparison of the results determined which model would be used for the analysis.

For hypothesis 2, an ANOVA model was used to compare mean *tuition discount rates* from two time periods: 2003-04 and 2007-08. Because the hypothesis was for the institutions with unstable *FVI* (*FVI* > .20), that group was examined. The data were split, and institutions where *FVI* > .20 in 2003-04 were examined. Changes in enrollment from 2003-04 to 2007-08 were calculated, and then it was determined which institutions had decreased enrollment during that period. A total of 194 institutions had *FVI* > .20 in 2003-04. In 2007-08, 181 of those institutions reported information to IPEDS; 13 did not. Of the 181 comparative institutions, 64 institutions reported decreased enrollment from 2003-04 to 2007-08. An ANOVA was performed to determine whether significant differences were present between mean *tuition discount rates* from 2003-04 to 2007-08 for the 64 institutions with decreased enrollment. Therefore, the ANOVA equation model is

$$TD\ rate_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

where:

$TD\ rate_{ij}$ = Average tuition discount rate for the year

μ = Grand mean

α_i = Group effect for the year

ε_{ij} = Error

Summary

This chapter presented the data sources, time period, variables, hypotheses, and methodology of the study. Descriptive statistics provided a greater understanding of the relationship between *tuition discount rates* and the four control variables. Regression analysis and ANOVA also were employed to address the three hypotheses related to the research question. In the next chapter, the descriptive statistics and main findings are presented.

CHAPTER 4

DATA ANALYSIS

This chapter presents the results of the analysis of the data based on the methodology described in the previous chapter. The analysis includes private, not-for-profit, baccalaureate level and above institutions in the United States (*N* = 1,244) as the population of interest. For each year of the study, institutions were excluded from the analysis for four reasons, discussed in Chapter 3 and detailed in Table 1.

The chapter is organized in two sections. The first section presents an analysis of descriptive statistics. The second section includes the analysis of the data related to the main research hypotheses.

Trends in Tuition Discount Rates over Time

Similar to Redd (2000), analyses using descriptive statistics were conducted to gain a better understanding of the bivariate relationship between each of the four control variables that represented institutional characteristics (*total enrollment*, *percent white enrollment*, *percent Pell*, and *selectivity*) and the dependent variable, *tuition discount rate*. For each year, the average *tuition discount rate* for the entire sample and for each control variable category were examined. The results are presented by variable below.

Total Enrollment

The mean *tuition discount rates* for the entire sample and the FTE ranges as determine by IPEDS for the five years in the analysis were compared (Table 2 and Figure 3). For each enrollment category, the *tuition discount rate* had a generally increasing trend. The exceptions occurred in 2004-05, for which the results showed a decrease of

0.5% and 1.0% for the 10,000-19,999 and ≥ 20,000 categories, respectively. After the dip in the 2004-05, *tuition discount rates* increased again in those two categories by 1.1% and 1.4% for the 10,000-19,999 and ≥ 20,000 categories, respectively.

Table 2

Average Tuition Discount Rate by Enrollment Category by Year

Enrollment Category	2003	2004	2005	2006	2007
All	25.7%	26.1%	26.3%	26.5%	26.9%
N	1115	1111	1121	1126	1126
< 1000	23.0%	23.6%	23.9%	24.1%	24.4%
n	353	342	353	353	347
1,000 - 4,999	27.8%	28.1%	28.4%	28.6%	29.1%
n	623	628	622	620	623
5,000 - 9,999	22.3%	22.9%	22.6%	22.7%	23.0%
n	84	83	87	93	95
10,000 - 19,999	24.6%	24.1%	25.2%	25.7%	26.3%
n	43	45	44	45	45
≥ 20,000	19.8%	18.8%	20.2%	21.0%	22.2%
n	12	13	15	15	16

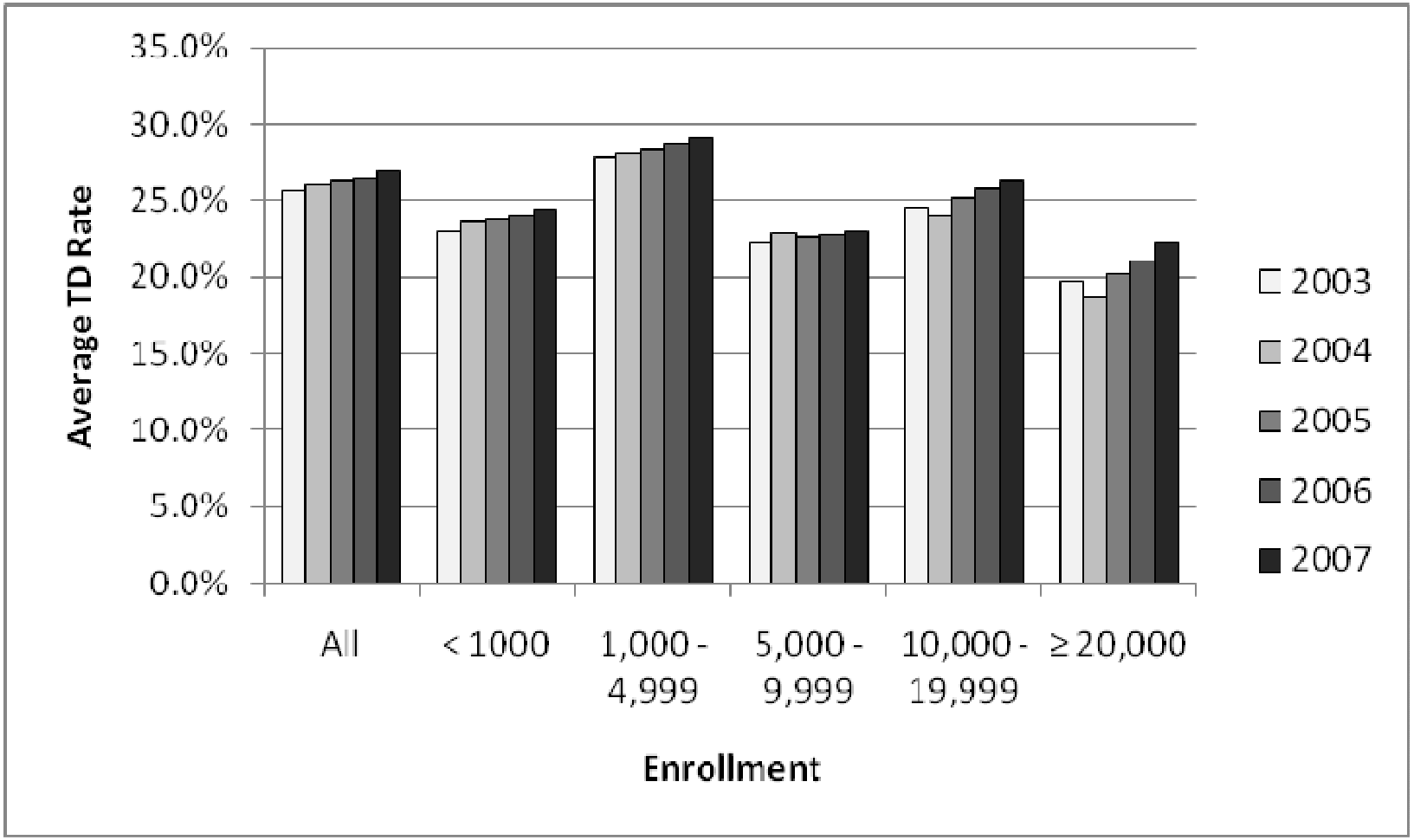

Figure 3. Average tuition discount rate by enrollment category by year.

In comparing the categories, institutions with FTEs of 1,000-4,999 had the highest average *tuition discount rates*, 2.2% higher than the average for all institutions in 2007-08, which may be caused by well-established and highly selective liberal arts institutions within this enrollment category. In contrast, the lowest average *tuition discount rates* were in the largest institutions, those with FTEs ≥ 20,000, and were 4.7% lower than the average for all institutions in 2007-08. These institutions may not have the financial capacity to offer high discount rates to all of their students but may, instead, offer higher tuition discount rates to selected students or to student groups through strategic financial aid (Lapovsky & Loomis-Hubbell, 2003).

Percentage of White Enrollment

The mean *tuition discount rates* for the entire sample and the ranges of the percentage of white students in the institutions' populations for the five years in the analysis were compared (Table 3 and Figure 4). For each range, the *tuition discount rate* generally increased each year, except for the 20-39% range. In the 20-39% range, the results showed an overall decrease in the *tuition discount rate* over the five-year period.

Table 3

Average Tuition Discount Rate by Percentage of White Population Category by Year

Percent White	2003	2004	2005	2006	2007
All	25.7%	26.1%	26.3%	26.5%	26.9%
N	1115	1111	1121	1126	1126
0 - 19	14.2%	16.6%	15.4%	17.9%	17.0%
n	65	67	68	69	68
20 - 39	20.3%	18.8%	19.1%	18.4%	18.6%
n	49	44	44	53	60
40 - 59	21.9%	23.5%	22.9%	23.8%	24.4%
n	178	179	198	191	202
60 - 79	26.2%	25.9%	26.6%	27.1%	28.0%
n	376	393	402	415	425
80 - 100	28.9%	29.5%	30.2%	29.8%	30.3%
n	447	428	409	398	371

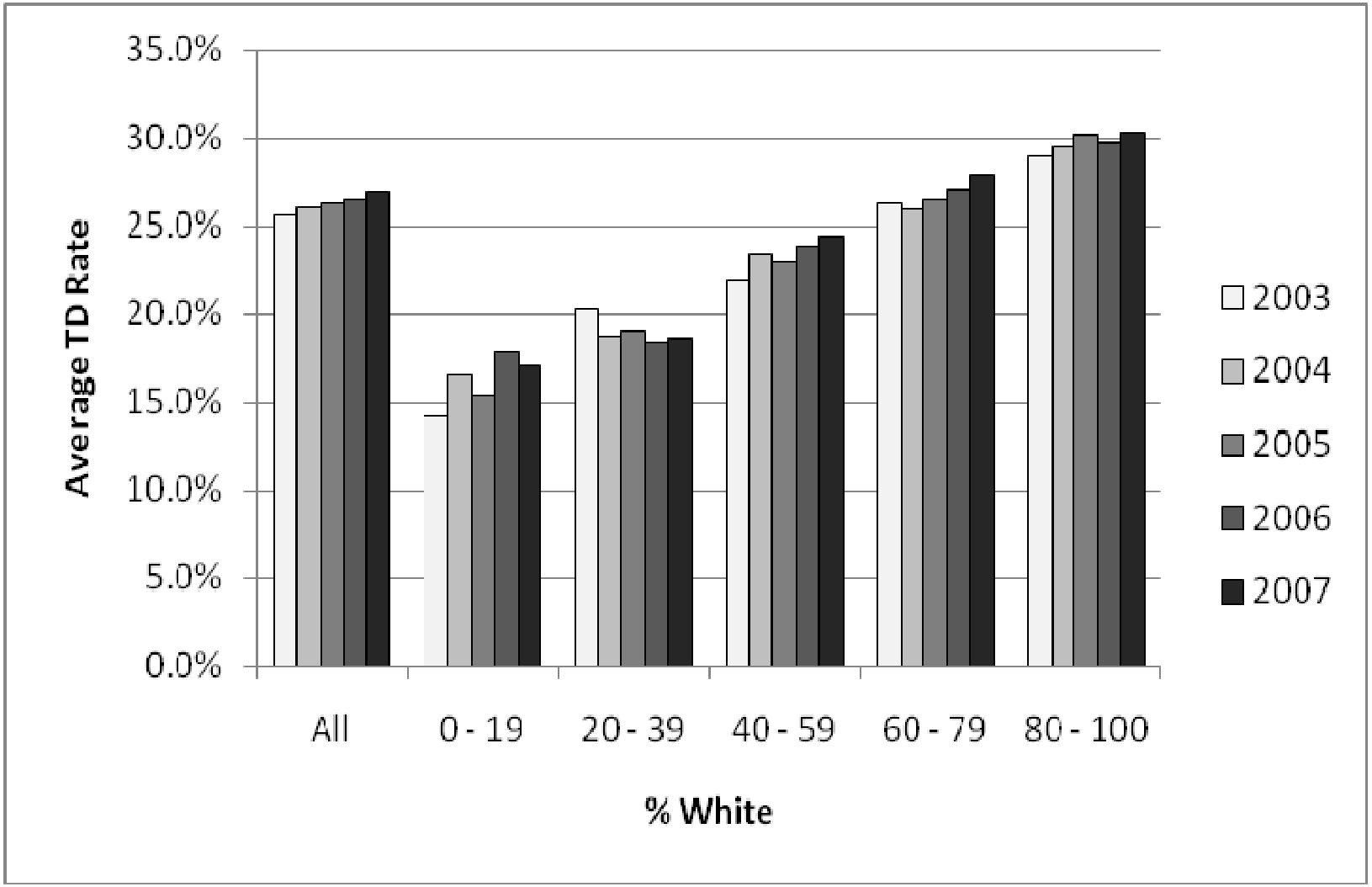

Figure 4. Average tuition discount rate by percentage of white population category by year.

In comparison, institutions with the lowest proportion of white students in the population had the lowest *tuition discount rates*. The *tuition discount rate* increased as the percentage of white students in the population increased, so that institutions with the highest populations of white students had the highest average *tuition discount rates*. One potential explanation for this phenomenon may be the high correlation between white students and high SAT scores. An institution desiring more academically prepared students will provide higher average tuition discount rates (Martin, 2002).

Percent Pell

The mean *tuition discount rates* for the entire sample and the ranges of the percentage of Pell recipients in the institutions' populations, which represents economic diversity, for the five years in the analysis, were compared (Table 4 and Figure 5). For each range, results showed a general upward trend in the *tuition discount rates*.

Table 4

Average Tuition Discount Rate by Percentage of Pell Recipients in the Student Population by Year

Percent Pell	2003	2004	2005	2006	2007
All	25.7%	26.1%	26.3%	26.5%	26.9%
N	1115	1111	1121	1126	1126
0 - 19	20.7%	22.8%	24.3%	30.6%	29.1%
n	166	164	200	95	75
20 - 39	28.8%	29.1%	29.3%	29.4%	29.8%
n	492	510	544	567	574
40 - 59	25.4%	24.5%	23.9%	24.4%	25.2%
n	344	321	271	268	284
60 - 79	19.8%	20.6%	20.3%	18.3%	21.9%
n	68	69	60	55	55
80 - 100	21.0%	23.2%	21.3%	25.0%	25.5%
n	43	45	44	38	41

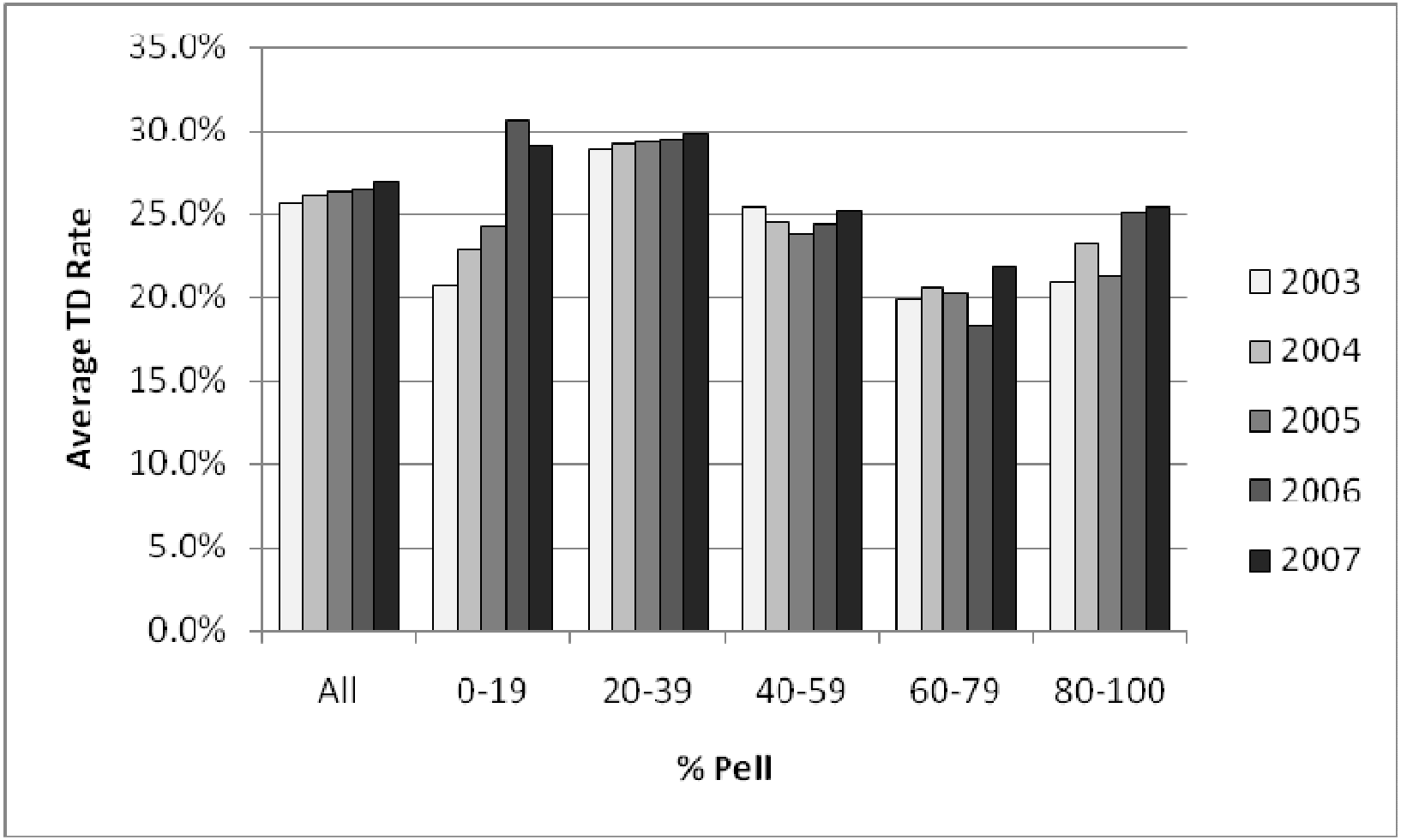

Figure 5. Average tuition discount rate by percentage of Pell recipients in the student population by year.

For the 0-19% range, the results showed a gradual increase from 2003-04 to 2005-06. From 2005-06 to 2006-07, the results showed a relatively large increase of 6.3%. From 2006-07 to 2007-08, the results showed a decrease of 1.5%.

Except for 2006-07, the 20-39% range has the highest *tuition discount rates* each year, and the rates increased gradually each year. Unlike the other ranges, the 20-39% range did not have negative year-to-year changes.

For the 40-59% range, the *tuition discount rate* was its highest in 2003-04. It decreased for the next two years, reaching its lowest point in 2005-06. It again increased over the next two years. In 2007-08, the *tuition discount rate* was slightly lower than the initial tuition discount rate in 2003-04.

For the 60-79% range, the year-to-year results were mixed, but the range had an overall upward trend. The results showed an increase in the *tuition discount rate* from 2003-04 to 2004-05. There was then a small decrease from 2004-05 to 2005-06. Then the results showed a 2.0% decrease from 2005-06 to 2006-07, which was more than offset by a 3.6% increase in 2007-08, ending with its highest value of 21.9%.

The 80-100% range also had an overall upward trend, but there was a decrease in the *tuition discount rate* in 2005-06. The results showed a decrease of 1.9% from 2004-05 to 2005-06 followed by an increase of 3.7% from 2005-06 to 2006-07.

In comparing the ranges, except for the 40-59% range, all had an overall increasing trend. Additionally, institutions in the 20-39% range had the highest *tuition discount rates*. The 60-79% range had the lowest *tuition discount rates*. The 0-19% range initially was the lowest range in 2003-04, but it surpassed the 20-39% range in 2006-07,

and ended 2007-08 with the second highest *tuition discount rates*. While the 40-59% range and the 80-100% range fluctuated differently over the five-year period, both ranges had average *tuition discount rates* within 0.3% of each other in 2007-08.

Selectivity

The mean *tuition discount rates* for the entire sample and the two *Barron's* institutional selectivity rating types for the five years in the analysis were compared (Table 5 and Figure 6). For each type, the *tuition discount rate* had an increasing trend over the five-year period. For nonselective, the average *tuition discount rate* in 2005-06 was slightly lower than the 2004-05 level but then increased in the following two years. For selective institutions, the average *tuition discount rate* in 2006-07 was slightly lower than the 2005-06 levels but then increased in the following year. Despite this dip, both institution types had an overall increase in *tuition discount rates* over the five-year period.

Table 5

Average Tuition Discount Rate by Institutional Selectivity Category by Year

Barron's Inst. Type	2003	2004	2005	2006	2007
All	25.7%	26.1%	26.3%	26.5%	26.9%
N	1115	1111	1121	1126	1126
Nonselective	26.1%	26.1%	25.9%	26.5%	26.9%
n	771	767	778	784	783
Selective	25.9%	25.9%	27.1%	26.4%	27.2%
n	344	344	343	342	343

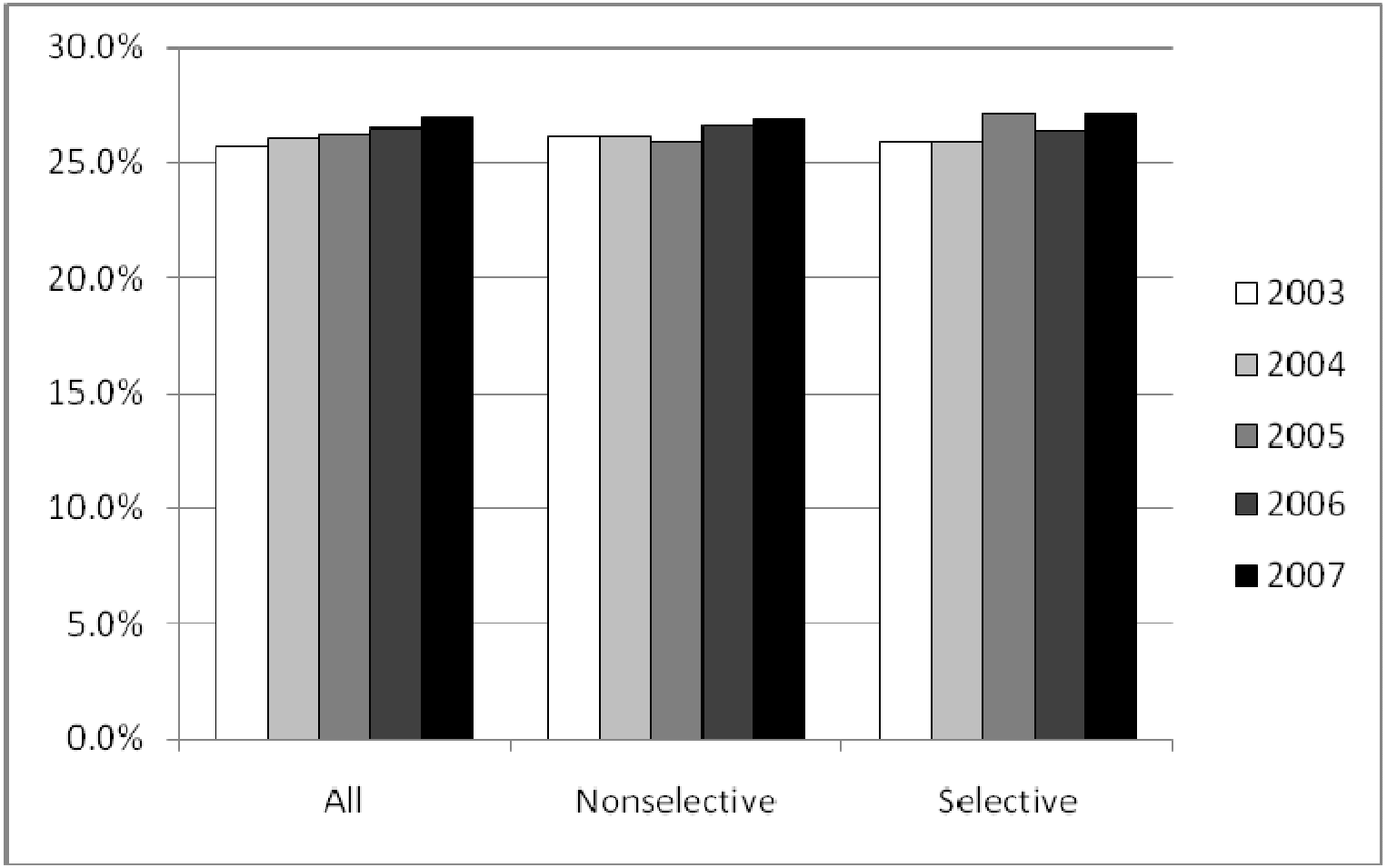

Figure 6. Average tuition discount rate by *Barron's* institutional selectivity category by year.

In a comparison of institutional types, nonselective institutions had higher tuition discount rates in three of the five years of the study. The differences between the *tuition discount rates* for each type each year appeared to be small; thus, it does not appear that one institutional type has relatively larger discount rates than the other.

Analysis of Empirical Tests

Statistical software (SPSS) was used to conduct the analysis and to test the main research hypotheses. For hypotheses 1 and 3, an ordinary least-squares regression analysis on each year individually was performed and then the information was compiled for trend analysis. For hypothesis 2, an ANOVA comparing data from two years was performed. Testing of all three hypotheses included control variables to further inform the understanding of the relationship between financial position and tuition discounting. The findings related to each hypothesis are discussed in more detail below.

Hypothesis 1

For hypothesis 1, institutions with an *FVI* < .10 were identified. An ordinary least-squares regression on that subset using two different models was performed. Model 1 used the *FVI* as the main independent variable along with the five control variables. The summary of the regression analysis for Model 1 is presented in Tables 6 and 7. Model 2 used the five FVI component measures (*debt ratio*, *revenue concentration index*, *surplus margin ratio*, *administrative costs ratio*, and *size ratio*) as the main independent variables along with the five control variables. The summary of the regression analysis for Model 2 is presented in Tables 8 and 9.

Table 6

Model 1: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI as the Main Independent Variable for FVI > .20 for 2003-04 to 2005-06

	2003			2004			2005		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	0.39	0.05		0.34	0.03		0.32	0.04	
FVI	-1.23	0.41	-.19**	-1.58	0.26	-.27**	-1.48	0.23	-.28**
Tuition & fees	3.11E-10	0.00	.25	2.00E-10	0.00	.12	1.09E-10	0.00	.07
Total enroll	-7.49E-06	0.00	-.37*	-8.26E-06	0.00	-.31**	-6.36E-06	0.00	-.23*
Percent white enroll	4.19E-04	0.00	.07	1.37E-03	0.00	.19**	1.56E-03	0.00	.20**
Percent Pell	-0.10	0.05	-.13*	-0.01	0.04	-.01	-0.02	0.04	-.02
Selectivity	-0.01	0.02	-.04	5.87E-04	0.01	.00	0.01	0.01	.03

Note. In 2003, $R^2 = .09$, $F(6,238) = 3.82$, $p = .00$. In 2004, $R^2 = .14$, $F(6,493) = 14.84$, $p = .00$.
In 2005, $R^2 = .13$, $F(6,485) = 13.15$, $p = .00$.
* $p < .05$, ** $p < .01$

Table 7

Model 1: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI as the Main Independent Variable for FVI > .20 for 2006-07 to 2007-08

	2006			2007		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	0.27	0.03		0.32	0.03	
FVI	-1.64	0.28	-.26**	-1.80	0.22	-.32**
Tuition & fees	1.96E-10	0.00	.13	-1.95E-11	0.00	-.01
Total enroll	-7.89E-06	0.00	-.30**	-4.28E-06	0.00	-.16
Percent white enroll	2.05E-03	0.00	.29**	1.36E-03	0.00	.20**
Percent Pell	0.09	0.05	.09	0.05	0.04	.05
Selectivity	0.00	0.01	.00	4.78E-03	0.01	.02

Note. In 2006, $R^2 = .16$, $F(6, 520) = 17.10$, $p = .00$.
In 2007, $R^2 = .15$, $F(6,631) = 19.61$, $p = .00$.
* $p < .05$, ** $p < .01$

Table 8

Model 2: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI Component Measures as the Main Independent Variables for FVI < .10 for 2003-04 to 2005-06

	2003			2004			2005		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	-0.67	0.15		-0.12	0.14		-0.49	0.15	
Debt	-0.18	0.06	-.17**	-0.09	0.05	-.08	-0.15	0.05	-.12**
Concen	0.00	0.00	.23	-0.45	0.05	-.37**	-0.25	0.05	-.23**
Margin	0.02	0.04	.25	0.16	0.05	.14**	0.07	0.05	.06
Admin	0.07	0.08	.35	0.08	0.07	.05	-0.03	0.08	-.02
Size	0.05	0.01	.65**	0.03	0.01	.27**	0.04	0.01	.42**
Tuition & fees	2.77E-11	0.00	.02	-1.71E-10	0.00	-.11	-2.60E-10	0.00	-.16
Total enroll	-8.11E-06	0.00	-.40**	-5.15E-06	0.00	-.19*	-5.38E-06	0.00	-.19*
Percent white enroll	7.83E-04	0.00	.13*	1.08E-03	0.00	.15**	1.63E-03	0.00	.21**
Percent Pell	0.04	0.05	.06	0.01	0.04	.01	0.06	0.05	.06
Selectivity	-0.01	0.02	-.03	1.80E-03	0.01	.01	1.64E-03	0.01	.01

Note. In 2003, $R^2 = .30$, $F(10,238) = 9.14$, $p = .00$. In 2004, $R^2 = .30$, $F(10,493) = 19.76$, $p = .00$.
In 2005, $R^2 = .26$, $F(10,485) = 18.04$, $p = .00$.
* $p < .05$, ** $p < .01$

Table 9

Model 2: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI Component Measures as the Main Independent Variables for FVI < .10 for 2006-07 to 2007-08

	2006			2007		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	-0.80	0.16		-0.81	0.13	
Debt	-0.15	0.05	-.12**	-0.05	0.05	-.04
Concen	-0.30	0.05	-.26**	-0.31	0.04	-.26**
Margin	0.04	0.06	.04	0.09	0.05	.09
Admin	0.13	0.07	.09	0.06	0.07	.04
Size	0.05	0.01	.52**	0.05	0.01	.57**
Tuition & fees	-9.21E-11	0.00	-.06	-3.61E-10	0.00	-.25**
Total enroll	-7.73E-06	0.00	-.29**	-4.41E-06	0.00	-.16*
Percent white enroll	2.20E-03	0.00	.31**	1.68E-03	0.00	.24**
Percent Pell	0.28	0.06	.26**	0.20	0.04	.20**
Selectivity	-3.55E-03	0.01	-.01	5.68E-04	0.01	.00

Note. In 2006, R^2 = .28, F(10,520) = 23.66, p = .00.
In 2007, R^2 = .25, F(10,631) = 27.71, p = .00.
* p < .05, ** p < .01

The two models yielded differences in the coefficient of multiple determination (R^2). There was less explanatory power and loss of information with Model 1 as evidenced by the lower R^2 each year. For example, in 2007 for Model 1, R^2 = .15, and for Model 2, R^2 = .25. This is expected with the use of a composite variable such as the *FVI*. As a result of the loss of information in Model 1, Model 2 was chosen for the analysis.

While using Model 2 with the five component measures was necessary, it provided for a less straightforward evaluation of the results due to the complexity of the model.

The analysis of Model 2 regression results for hypothesis 1 is discussed in two ways. First, the results of the regression analysis for each year, including the variables that are statistically significant at the .01 and .05 levels, are presented. The discussion is focused on the unstandardized beta coefficients (*B*). Then, the trends and fluctuations of the main coefficients over the five-year period are discussed based on the results from the standardized beta coefficients (β).

The results using standardized or unstandardized coefficients are the same but are used in different ways. The unstandardized coefficients are more useful for practical purposes, such as using the model to plug in the data to evaluate substantive significance. The standardized beta coefficients, alternatively, are standardized to be based on the same unit of measure, the standard deviation, making the comparison of coefficients more straightforward (Agresti & Finlay, 1997). In addition, the regression analysis produced small unstandardized beta coefficients for at least three variables each year, making the use of the standardized beta coefficient necessary for a meaningful trend analysis.

Statistical analysis by year.

The analysis by year was based on the unstandardized beta coefficients (*B*) in Tables 8 and 9. For 2003-04, *percent white enrollment* (*M* = .69, *SD* = .20) was individually statistically significant to the regression model at the .05 level. *Debt ratio* (*M* = .23, *SD* = .12), *size ratio* (*M* = 19.36, *SD* = 1.65), and *total enrollment* (*M* = 4,972, *SD* = 6,003) were individually statistically significant to the regression model at the .01 level.

The effect sizes of the other variables were small. For instance, the variable values for *debt ratio*, *surplus margin ratio*, *administrative costs ratio*, *percent white enrollment*, and *percent Pell* are all expressed as a percentage. For example, in 2003-04 the *surplus margin ratio* beta coefficient was .02. The implication is that an institution's ratio value would have to change by 50 points, from 5% to 55% for instance, to observe a 1 point change in the *tuition discount rate*, from 23% to 24% for instance. A change of this size in a ratio value is unusual and unlikely.

For 2004-05, *total enrollment* (M = 3,973, SD = 5,084) was individually statistically significant to the regression at the .05 level. *Revenue concentration index* (M = .34, SD = .11), *surplus margin ratio* (M = .23, SD = .12), *size ratio* (M = 19.13, SD = 1.38), and *percent white enrollment* (M = .71, SD = .19) were individually statistically significant to the regression at the .01 level.

For 2005-06, *total enrollment* (M = 3,997, SD = 5,140) was individually statistically significant to the regression at the .05 level. *Debt ratio* (M = .24, SD = .12), *revenue concentration index* (M = .36, SD = .13), *size ratio* (M = 19.20, SD = 1.41), and *percent white enrollment* (M = .71, SD = .19) were individually statistically significant to the regression at the .01 level. For 2006-07, *debt ratio* (M = .24, SD = .11), *revenue concentration index* (M = .35, SD = .12), *size ratio* (M = 19.24, SD = 1.39), *total enrollment* (M = 4,016, SD = 5,232), *percent white enrollment* (M = .69, SD = .20), and *percent Pell* (M = .31, SD = .13) were individually statistically significant to the regression at the .01 level.

For 2007-08, *total enrollment* (*M* = 3,859, *SD* = 5,021) was individually statistically significant to the regression at the .05 level. *Revenue concentration index* (*M* = .35, *SD* = .11), *size ratio* (*M* = 19.16, *SD* = 1.41), *tuition & fees* (*M* = 56,803,243, *SD* = 93,440,281), *percent white enrollment* (*M* = .69, *SD* = .20), and *percent Pell* (*M* = .32, *SD* = .13) were individually statistically significant to the regression at the .01 level.

As stated above, numerous variables were statistically significant to the model each year. These individual variables are important to the model each year, but the main goal was to analyze the validity of the model as a whole and its explanatory power. Therefore, as discussed below, two statistics were examined each year for the model: the coefficient of multiple determination (R^2) and the *F*-statistic.

Trend analysis by variable.

The trend analysis by variable was based on the standardized beta coefficients (β). This information is presented in Tables 8 and 9. Graphical presentation of the average standard beta coefficients (β) for 2003-04 to 2007-08 for Model 2 is in Figures 7 and 8.

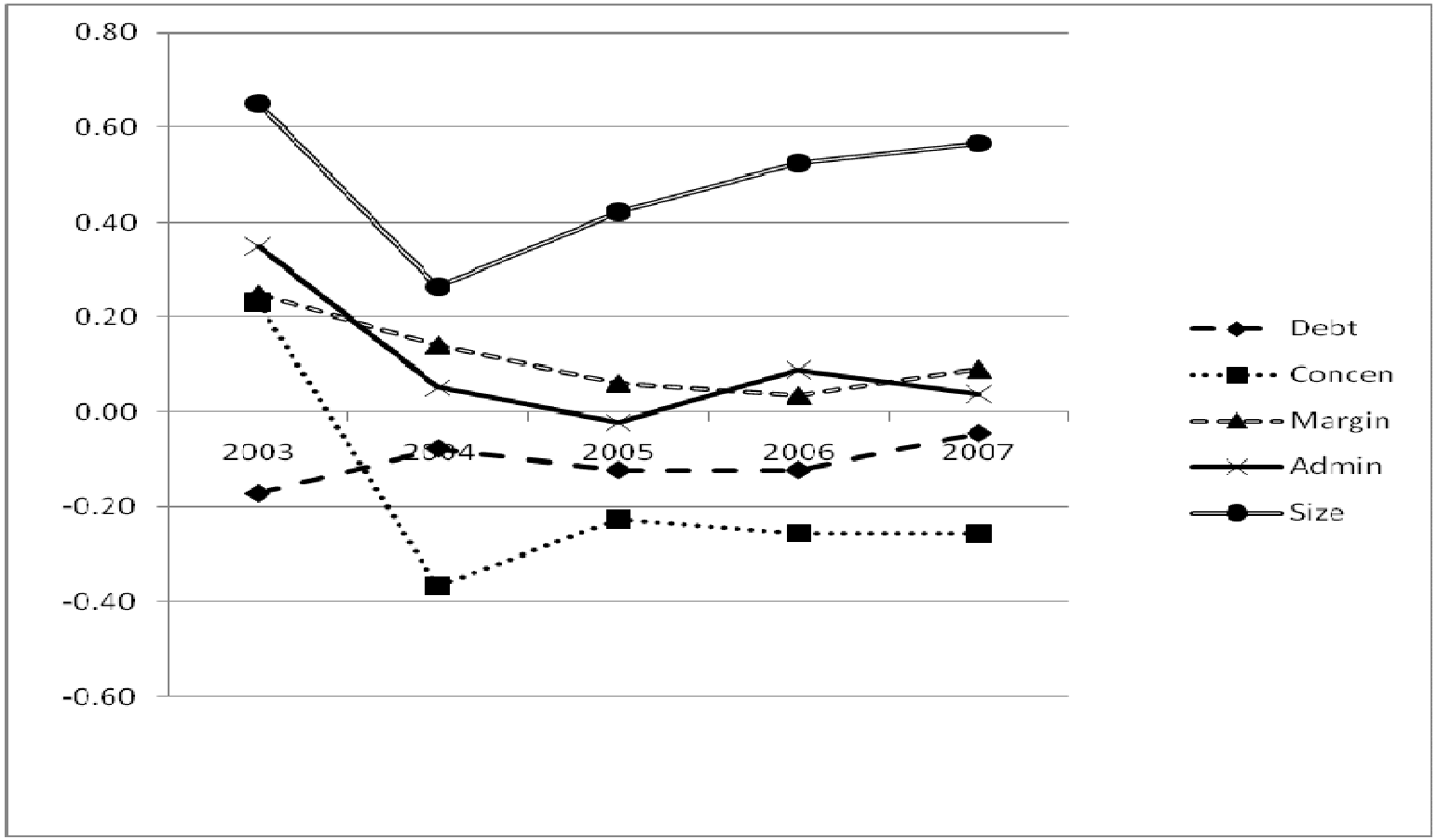

Figure 7. Model 2 main independent variable trends by standardized beta coefficients (β): FVI < .10: Stable.

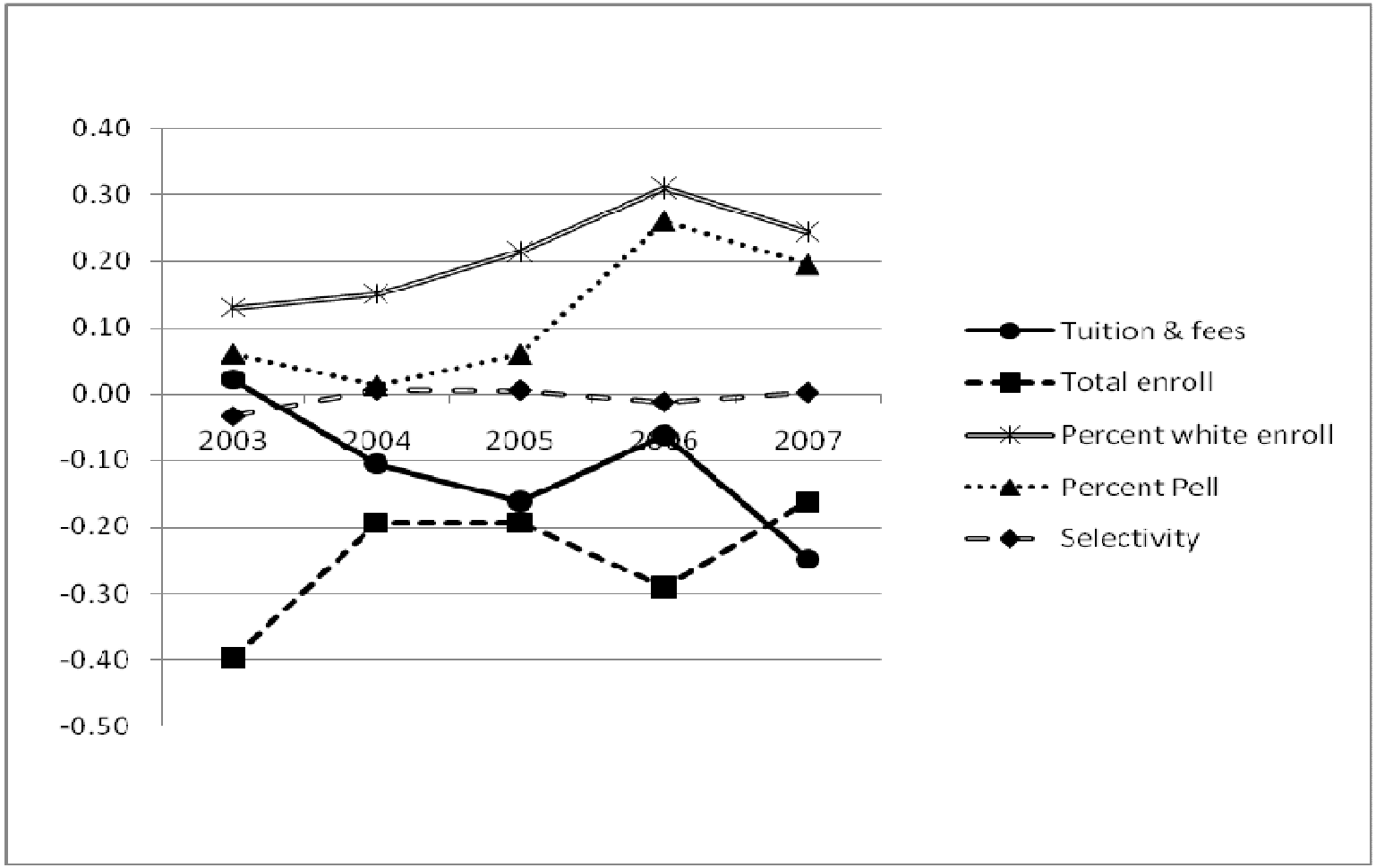

Figure 8. Model 2 control variable trends by standardized beta coefficients (β): FVI < .10: Stable.

The coefficient for the *debt ratio* fluctuated very little year-to-year. The largest changes were from 2003-04 to 2004-05 and 2006-07 to 2007-08, showing increases of .09 and .08, respectively. One explanation may be that the end of the recession of 2001 and the economic boom that ended in 2007 caused higher consumer and institutional confidence in regard to repaying debt (De Boef & Kellstedt, 2004; Lamdin, 2008). Changes of this nature in the *debt ratio* coefficient, coupled with institutional confidence in repaying debt, may indicate an increasing trend of *debt ratio* coefficients. If this is the case, increased relative debt at an institution may decrease the institution's ability to provide tuition discounts to their students for two reasons: (a) institutional resources are used to fund the unleveraged portions of large-scale capital projects or (b) institutional resources are used to service the debt. In either situation, institutional resources available for tuition discounts would most likely decrease with increased *debt ratios*.

The coefficient for *revenue concentration index* had a relatively large decrease from 2003-04 to 2004-05, from .23 to -.37, a change of -.60. The cause of this change could have been an institutional reaction to the recession of 2001. Institutions may have experienced a lag time between the recession and its effect on the institution because of the long-term nature of some revenue streams such as grants or research contracts (Breneman, 2002).

The coefficient for *surplus margin ratio* had a general decreasing trend over the time period of the study. This may be the result of increased financial confidence from

the economic boom that ended in 2007, which may have brought about increased hiring or other spending relative to income dollars (Zumeta, 2010).

The coefficient for *administrative costs ratio* decreased from 2003-04 to 2004-05, from .35 to .05, a change of .30. This decrease may have been an institutional reaction to the recession of 2001. There may have been lag time between the recession and the institution decreasing its administrative costs due to issues such as employee contracts (The Conference Board, 2011; Dadkhah, 2009).

The coefficients for *size ratio* decreased by a relatively large amount from 2003-04 to 2004-05, where it went from .65 to .27, a change of -.38. This, again, may have been an institutional response to the recession of 2001. Assets may have been used and not replaced to manage institutional financial needs while administrators analyzed the direction of the economy and the institution (Goldstein & Meisinger, 2004). In subsequent years, this coefficient appeared to be recovering and showed an increasing trend. *Size ratio* ended at .57, which was .07 short of the 2003-04 coefficient value.

The coefficient for *tuition & fees* had some relatively large year-to-year fluctuations, which ranged from a change of -.05 from 2004-05 to 2005-06 to a change of -.19 from 2006-07 to 2007-08. One argument is that these fluctuations may have been caused by the controllable nature of *tuition & fees* (Heller, 1997; Mumper, 2001; Paulsen & St. John, 2002). Institutions may have increased *tuition & fees* in 2006-07 due to the economic boom and perceived price elasticity among their student populations (Leslie & Brinkman, 1987). Then, institutions may have decreased *tuition & fees* in 2007-08

because endowments yielded higher-than-expected returns in the prior year (Van Der Werf, 2007).

The coefficient for *total enrollment* also had some relatively large year-to-year fluctuations, specifically a change of .21 from 2003-04 to 2004-05. The coefficients for *tuition & fees* and *total enrollment* fluctuated in opposite directions each year in almost mirror images of each other. It appears that the coefficients for these two variables are negatively related in that, as tuitions increased (decreased), total enrollment decreased (increased). One argument may be that institutions control *tuition & fees*, but students react to it through enrollment in a cause-effect relationship despite economic conditions (Leslie & Brinkman, 1987).

The coefficient for *percent white enrollment* had a generally increasing trend each year up to 2006-07. The percent of white students (racial diversity) enrolled at institutions is a variable that is long-term in nature, meaning that one would not expect to see large changes in the variable value or the beta coefficient effect size in a one-year period as is indicated here for four years.

The coefficient for *percent Pell* had relatively small changes each year except for the change from 2005-06 to 2006-07 of .20. During an economic boom, one would expect the percentage of Pell recipients to decrease each year as households, specifically lower-income households, increase their incomes. This coefficient increase appears to be an anomaly because Pell grants are awarded based on prior year's family income.

The coefficients for *selectivity* did not have relatively large changes year-to-year. This is expected, as selectivity is an institutional characteristic that varies very little over time (Martin, 2004).

As noted in the discussion above, most of the coefficients had relatively large fluctuations from 2003-04 to 2004-05, as is apparent in Figure 7. As discussed, this year-to-year fluctuation may have been the result of the institutional response lag time from the recession of 2001.

The coefficients of multiple determination (R^2) for 2003-04 to 2007-08 are included in Tables 8 and 9. The R^2 remained relatively consistent all five years, with only a .05 fluctuation from 2003-04 and 2004-05, the years with the highest value (in 2003-04, $R^2 = .30$, $F[10,238] = 9.14$, $p = .00$; in 2004-05, $R^2 = .30$, $F[10,493] = 19.76$, $p = .00$), to 2007-08, the year with the lowest value ($R^2 = .25$, $F[10,631] = 27.71$, $p = .00$).

For hypothesis 1, numerous coefficients were statistically significant each year as noted in the discussion above and in Tables 8 and 9. In addition, the coefficients generally did not have relatively large fluctuations, except in 2003-04, and the model indicated a good fit. These findings offer some support for hypothesis 1.

Hypothesis 2

For hypothesis 2, the institutions with an *FVI* > .20 in 2003-04 whose enrollment decreased from 2003-04 to 2007-08 were identified. An omnibus ANOVA was conducted on the subset to determine whether mean *tuition discount rates* increased over the five-year period (Table 10). Based on this analysis, the mean *tuition discount rate* for

2007-08 (M = 23.8%, n = 64) was not significantly higher than that of 2003-04 (M = 23.7%, n = 64), resulting in no statistically significant difference between the mean *tuition discount rates* for the two time periods, $F(1, 126) = 0.00$, $p = .97$.

Table 10

Analysis of Variance for Tuition Discount Rates from 2003-04 to 2007-08 for FVI > .20

Source	*df*	*SS*	*MS*	*F*	*p*	*Partial* η^2
Year	1	0.00	0.00	0.00	.97	.00
Within groups	126	4.20	0.03			
Total	127	11.45				

The findings do not offer evidence to support hypothesis 2. Instead, it appears that financially unstable institutions that have shrinking enrollment did not increase tuition discounts rates to attract students to attend. One possible explanation is that institutions in this situation did not have the financial resources in the short-term to invest in the institutions for the long-term through higher average *tuition discount rates* (Corey, 2005).

Hypothesis 3

For hypothesis 3, institutions with an *FVI* > .20 were identified, and an ordinary least-squares regression was conducted on that subset, using two different models. Similar to the analysis of hypothesis 1, for hypothesis 3, Model 1 used the *FVI* as the main independent variable along with the five control variables. The summary of the regression analysis for Model 1 is presented in Tables 11 and 12. Model 2 used the five FVI component measures (*debt ratio, revenue concentration index, surplus margin ratio,*

administrative costs ratio, and *size ratio*) as the main independent variables along with the five control variables. The summary of the regression analysis for Model 2 is presented in Tables 13 and 14.

Table 11

Model 1: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI as Main Independent Variable for FVI > .20 for 2003-04 to 2005-06

	2003			2004			2005		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	-0.04	0.06		0.05	0.08		0.05	0.07	
FVI	0.16	0.12	.10	-0.09	0.18	-.05	0.04	0.15	.03
Tuition & fees	-3.78E-09	0.00	-.27	-5.55E-09	0.00	-.54	1.89E-09	0.00	.11
Total enroll	5.71E-05	0.00	.38*	6.89E-05	0.00	.61	-7.83E-06	0.00	-.11
Percent white enroll	2.46E-03	0.00	.29**	1.19E-03	0.00	.18	2.04E-03	0.00	.32**
Percent Pell	0.06	0.06	.08	0.11	0.07	.18	0.07	0.07	.09
Selectivity	0.01	0.03	.02	0.01	0.04	.02	-0.07	0.04	-.16

Note. In 2003, $R^2 = .09$, $F(6,193) = 4.32$, $p = .00$. In 2004, $R^2 = .04$, $F(6,100) = 1.77$, $p = .11$.
In 2005, $R^2 = .09$, $F(6,112) = 2.75$, $p = .02$.
* $p < .05$, ** $p < .01$

Table 12

Model 1: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI as Main Independent Variable for FVI > .20 for 2006-07 to 2007-08

	2006			2007		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	0.25	0.08		0.17	0.07	
FVI	-0.07	0.14	-.04	-0.05	0.11	-.04
Tuition & fees	-8.93E-10	0.00	-.08	9.01E-10	0.00	.12
Total enroll	4.46E-06	0.00	.03	-1.49E-05	0.00	-.13
Percent white enroll	8.38E-04	0.00	.14	1.43E-03	0.00	.26*
Percent Pell	-0.16	0.09	-.17	-0.10	0.08	-.13
Selectivity	-0.08	0.04	-.19*	-0.07	0.04	-.17

Note. In 2006, $R^2 = .04$, $F(6,117) = 1.90$, $p = .10$.
In 2007, $R^2 = .09$, $F(6,104) = 2.78$, $p = .02$.
* $p < .05$, ** $p < .01$

Table 13

Model 2: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI Component Measures as Main Independent Variables for FVI > .20 for 2003-04 to 2005-06

	2003			2004			2005		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	-0.79	0.16		-0.53	0.25		-1.03	0.23	
Debt	0.00	0.03	.01	-0.01	0.05	-.03	-0.04	0.05	-.06
Concen	-0.25	0.05	-.29**	-0.24	0.07	-.34**	-0.03	0.03	-.15
Margin	-0.03	0.06	-.03	-0.19	0.13	-.20	-0.15	0.10	-.23
Admin	0.08	0.07	.07	-0.08	0.11	-.08	-0.25	0.10	-.25**
Size	0.06	0.01	.56**	0.05	0.01	.41**	0.08	0.02	.60**
Tuition & fees	-3.27E-09	0.00	-.23	-5.11E-09	0.00	-.49	-4.98E-09	0.00	-.29*
Total enroll	1.43E-05	0.00	.10	4.38E-05	0.00	.39	2.22E-06	0.00	.03
Percent white enroll	1.36E-03	0.00	.16**	1.11E-03	0.00	.17	1.95E-03	0.00	.31**
Percent Pell	0.02	0.04	.03	0.02	0.06	.03	0.05	0.06	.07
Selectivity	0.00	0.02	-.01	-0.03	0.03	-.07	-0.06	0.04	-.12

Note. In 2003, $R^2 = .44$, $F(10,193) = 19.54$, $p = .00$. In 2004, $R^2 = .39$, $F(10,100) = 6.11$, $p = .00$.
In 2005, $R^2 = .39$, $F(10,112) = 8.25$, $p = .00$.
* $p < .05$, ** $p < .01$

Table 14

Model 2: Summary of Regression Analysis for Variables Predicting Tuition Discount Rate Using FVI Component Measures as Main Independent Variables for FVI > .20 for 2006-07 to 2007-08

	2006			2007		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	-0.49	0.25		-0.54	0.22	
Debt	0.03	0.04	.05	0.02	0.03	.04
Concen	-0.34	0.07	-.41**	-0.24	0.06	-.36**
Margin	-0.08	0.06	-.51	-0.06	0.04	-.18
Admin	-0.11	0.09	-.14	-0.04	0.06	-.05
Size	0.05	0.01	.37**	0.05	0.01	.45**
Tuition & fees	-1.20E-09	0.00	-.11	-1.18E-09	0.00	-.15
Total enroll	9.92E-06	0.00	.07	9.15E-06	0.00	.08
Percent white enroll	5.78E-04	0.00	.09	1.20E-03	0.00	.22**
Percent Pell	-0.07	0.08	-.07	0.02	0.07	.03
Selectivity	-0.05	0.03	-.10	-0.03	0.03	-.07

Note. In 2006, R^2 = .34, F(10,117) = 8.45, p = .00.
In 2007, R^2 = .49, F(10,104) = 9.05, p = .00.
* p < .05, ** p < .01

The two models yielded differences in the coefficient of multiple determination (R^2). Each year, Model 2 yielded higher R^2 values than did Model 1. For example, in 2007 for Model 1, R^2 = .09, and for Model 2, R^2 = .49. Even though this is expected with the use of a composite variable such as the *FVI*, it was important to perform the comparison analysis because there were different users of information. Practitioners such as financial executives would use the *FVI* composite measure for simplicity and comparability among peer institutions, whereas researchers would use the component measures for the higher explanatory value. As a result of the loss of information in Model 1, Model 2 was chosen for the analysis. While using Model 2 with the five component measures was necessary, it provided for a less straightforward evaluation of the results due to the complexity of the model.

As with hypothesis 1, the analysis of Model 2 regression results for hypothesis 3 is presented in two ways. First, the results of the regression analysis for each year, including the variables that are statistically significant at the .01 and .05 levels, are discussed, with a focus on the unstandardized beta coefficients (*B*). Then, the trends and fluctuations of the main coefficients over the five-year period are discussed based on the results from the standardized beta coefficients (β).

Similar to hypothesis 1, the results using standardized or unstandardized coefficients are the same, but are used in different ways. The unstandardized coefficients are more useful for practical purposes, such as using the model to plug in the data to evaluate substantive significance. The standardized beta coefficients, alternatively, are

standardized to be based on the same unit of measure, the standard deviation, making comparison of coefficients more straightforward (Agresti & Finlay, 1997). In addition, the regression analysis produced small unstandardized beta coefficients for three variables each year, making the use of the standardized beta coefficient necessary for trend analysis.

Statistical analysis by year.

The analysis by year was based on the unstandardized beta coefficients (*B*) in Tables 13 and 14. For 2003-04, *revenue concentration index* (*M* = .51, *SD* = .22), *size ratio* (*M* = 16.53, *SD* = 1.75) and *percent white enrollment* (*M* = .70, *SD* = .23) were individually statistically significant to the regression at the .01 level.

For 2004-05, *revenue concentration index* (*M* = .52, *SD* = .24) and *size ratio* (*M* = 15.78, *SD* = 1.36) were individually statistically significant to the regression at the .01 level. For 2005-06, *tuition & fees* (*M* = 7,365,921, *SD* = 11,111,613) was individually statistically significant to the regression at the .05 level. *Administrative costs ratio* (*M* = .54, *SD* = .19), *size ratio* (*M* = 16.18, *SD* = 1.45), and *percent white enrollment* (*M* = .62, *SD* = .30) were individually statistically significant to the regression at the .01 level.

For 2006-07, *revenue concentration index* (*M* = .49, *SD* = .22) and *size ratio* (*M* = 16.27, *SD* = 1.24) were individually statistically significant to the regression at the .01 level. For 2007-08, *revenue concentration index* (*M* = .50, *SD* = .23), *size ratio* (*M* = 16.16, *SD* = 1.47), and *percent white enrollment* (*M* = .63, *SD* = .28) were individually statistically significant to the regression at the .01 level. Similar to hypothesis 1, the

coefficient of multiple determination (R^2) and the F-statistic for the model each year were examined to analyze the validity of the model as a whole and its explanatory power.

Trend analysis by variable.

The trend analysis by variable was based on the standardized beta coefficients (β). This information is presented in Tables 13 and 14. A graphical presentation of the average standard beta coefficients (β) for 2003-04 to 2007-08 for Model 2 is seen in Figures 9 and 10.

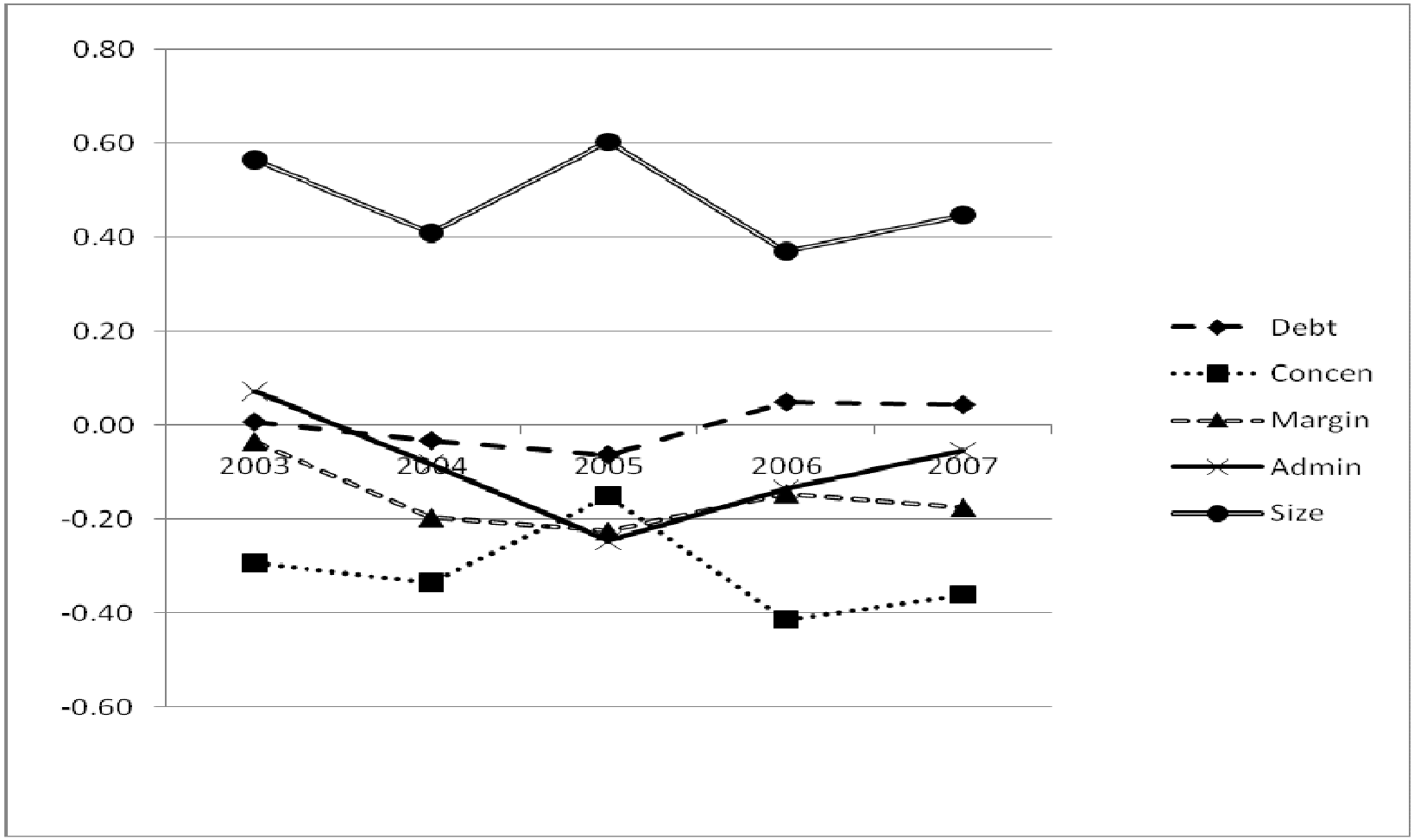

Figure 9. Model 2 main independent variable trends by standardized beta coefficients (β): FVI > .20: Unstable.

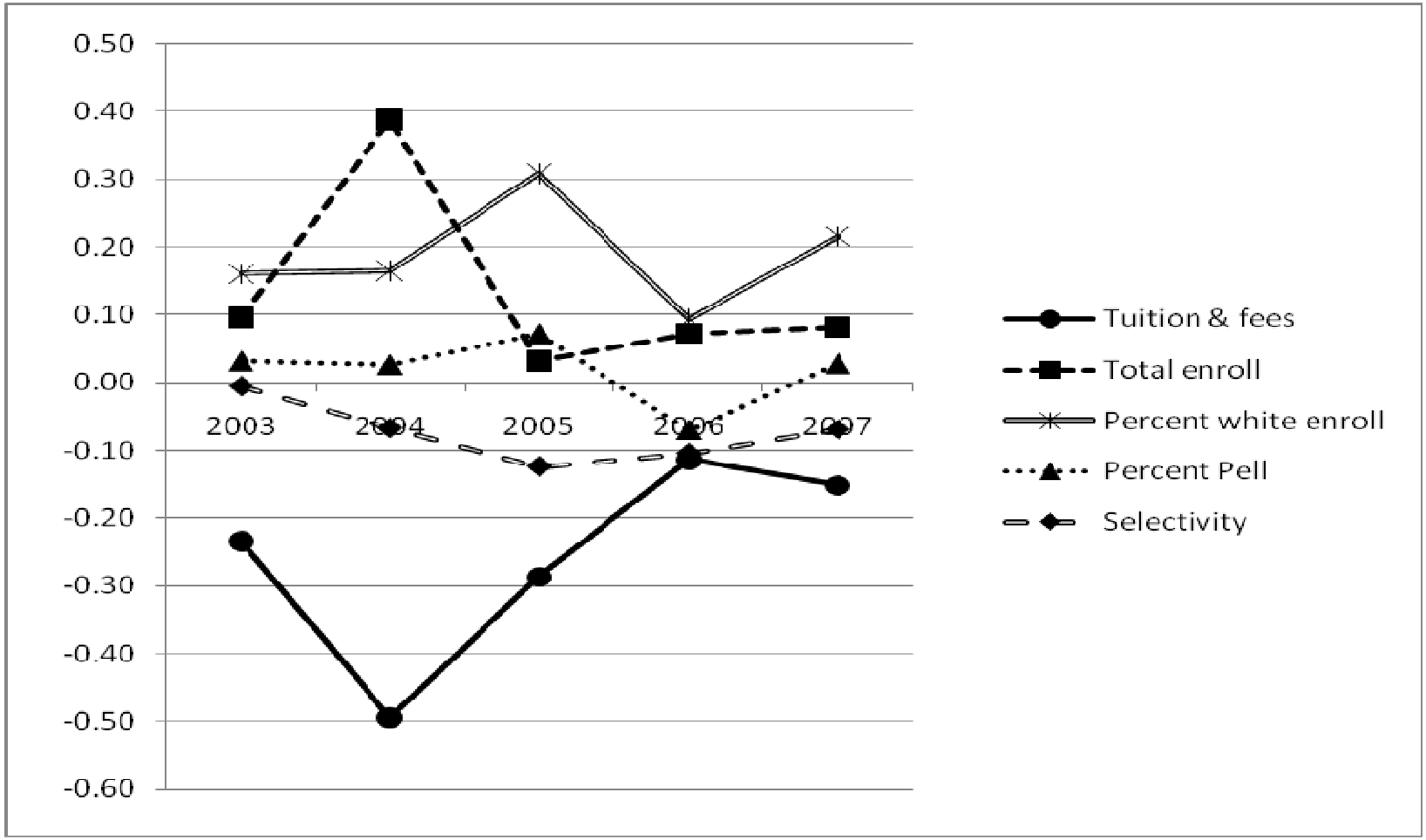

Figure 10. Model 2 control variable trends by standardized beta coefficients (β): FVI > .20: Unstable.

The coefficient for the *debt ratio* did not change much year-to-year. The largest change was from 2005-06 to 2006-07, increasing from -.06 to .05, a change of .11. Similar to hypothesis 1, one explanation may be that, up until the economic boom ended in 2007, there was high consumer and institutional confidence in repaying debt, even for financially unstable institutions. A change of this nature in the *debt ratio* coefficient, coupled with institutional confidence in repaying debt, may indicate higher *debts ratios*.

The coefficient for *revenue concentration index* changed each year, decreasing and increasing in alternate years to form a distinct "W" shape. The largest changes occurred from 2004-05 to 2005-06 and 2005-06 to 2006-07, when the changes were .19 and -.26, respectively. The cause of these fluctuations may be related to the instability of the institutions within this group. Unstable institutions may find additional short-term revenue sources but may not be able to maintain them.

The coefficient for *surplus margin ratio* was relatively consistent, with a high value of -.03 and a low value of -.23 over the period, except for one year. In 2003-04, the coefficient for *surplus margin ratio* had its highest value of -.03. One cause of this may be a financial consequence of the recession of 2001. Unstable institutions may generate less revenue and/or incur higher expenses than their financially stable counterparts, which leads to lower surplus margins.

The coefficient for *administrative costs ratio* changed each year, forming a distinct "V" shape. In 2003-04, the coefficient was positive. In 2004-05 and 2005-06, the coefficients decreased to negative values. In 2006-07 and 2007-08, the values increased, but maintained negative values. Stable and unstable institutions alike grow and expand

their administrative structure during times of economic prosperity. The cause of the "V" shaped curve may be that the *administrative costs ratio* is a lagging indicator of the economic cycle in unstable institutions. The coefficient decreased after the economy came out of the recession of 2001 and then increased after the economic boom began.

The coefficient for *size ratio* had relatively large changes every year, decreasing and increasing in alternate years to form a distinct "W" shape. The largest changes occurred from 2004-05 to 2005-06 and 2005-06 to 2006-07, when the changes were .19 and -.23, respectively. Since the *size ratio* is related to the institutions' assets; it will fluctuate with the size of the institutional asset base. The distinct upward and downward changes in the coefficient may be related to the economic boom and the administration's subsequent decisions on how to manage those assets (i.e., whether to invest or spend the resources). If this is the case, it appears that institutions saved and spent in alternating years.

The coefficient for *tuition & fees* showed relatively large changes from 2003-04 to 2004-05 and again from 2004-05 to 2005-05, where the changes were -.26 and .20, respectively. The coefficient for *total enrollment* also showed relatively large changes from 2003-04 to 2004-05 and again from 2004-05 to 2005-05, where the changes were .29 and -.36, respectively. The coefficients for *tuition & fees* and *total enrollment* fluctuated in opposite directions each year in almost mirror images of each other. It appears that the coefficients for these two variables are negatively related in that, as tuitions increased (decreased), total enrollment decreased (increased). One argument may

be that the institutions control *tuition & fees* but that students react to it through enrollment in a cause-effect relationship despite economic conditions.

The coefficient for *percent white enrollment* generally increased over the five-year period, with a relatively large increase from 2004-05 to 2005-06 of .14 to .31 and a relatively large decrease from 2005-06 to 2006-07 of -.22 to .09. The results showed another increase in 2007-08, bringing the coefficient in line with 2003-04 and 2004-05. The percentage of white students (racial diversity) enrolled at institutions is a variable that is long-term in nature, meaning that one would not expect to see large changes in the variable value or the beta coefficient effect size in a one-year period. The cause of the fluctuation may be an anomaly. An alternate explanation may be that it was a self-correcting error in the reporting of this information to IPEDS, with an error made in 2005-06 by which white enrollment was reported as too high. Then the error corrected itself by reporting white enrollment correspondingly too low in 2006-07. In 2007-08, the error was cleared, and the coefficient was aligned with the trend from the years prior to the error.

The coefficient for *percent Pell* was generally stable over the five-year period at .03, with an increase from 2004-05 to 2005-06 of .04 to .07 and a relatively large decrease from 2005-06 to 2006-07 of -.14 to -.07. The results showed another increase in 2007-08, bringing the coefficient back to .03, in line with the 2003-04 and 2004-05 coefficient values.

The coefficient for *selectivity* stayed relatively consistent each year. This is expected, as selectivity is an institutional characteristic, which is long-term in nature and should not have large changes year-to-year (Martin, 2004).

As noted in the discussion, some of the coefficients changed year-to-year, and in opposite directions, creating “W” and “M” shapes, while other coefficients changed relatively little. As discussed earlier, these patterns may be the result of institutional responses to economic conditions or the changing nature of unstable institutions. These patterns are apparent in Figures 9 and 10.

The coefficients of multiple determination (R^2) for 2003-04 to 2007-08 are included in Tables 13 and 14. The R^2 had a .15 fluctuation from 2007-08, the years with the highest value (R^2 = .49, F[10,104] = 9.05, p = .00), to 2006-07, the year with the lowest value (R^2 = .34, F[10,117] = 8.45, p = .00).

For hypothesis 3, numerous coefficients were statistically significant each year, as noted in the discussion above and in Tables 13 and 14. Additionally, the model coefficients generally showed relatively large fluctuations each year. In spite of this, the model R^2 indicated a good fit each year. These factors offer support for hypothesis 3.

Summary

This chapter presented descriptive statistics related to each of the four institutional control variables. The trend was mixed for *total enrollment*, but the highest *tuition discount rate* each year was at institutions having FTEs between 1,000 and 4,999. For *percent white*, the trend was an increasing *tuition discount rate* as the proportion of the white population at the institution increased. The trend was mixed for *percent Pell*, but,

in general, the 20-39% range had the highest *tuition discount rate* each year. For *selectivity*, the *tuition discount rate* generally was not different between selective and nonselective institutions.

The chapter also included the statistical results for each of the three hypotheses. Hypothesis 1 was supported in that, as *FVI* increased at stable institutions, the *tuition discount rate* increased as well. The analysis showed that hypothesis 2 was not supported. Unstable institutions with enrollment decreases did not increase their tuition discount rates. Hypothesis 3 was supported in that, as *FVI* decreased at unstable institutions, the *tuition discount rate* increased. The following chapter presents a discussion of the results and their implications.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter presents a summary and discussion of the trends seen in the descriptive statistics as well as the main empirical results. Based on the findings, implications for practice, policy, and future research also are presented.

Summary of Findings from Descriptive Statistics

A series of descriptive statistics were run to determine the relationship, on a categorical basis, of the four institutional control variables included in this study to the average *tuition discount rates*. Each is discussed below.

Total Enrollment

Institutions in the second enrollment category, FTEs between 1,000 and 4,999, had the highest tuition discount rates (Figure 3). This indicates that the institutions in this category are large enough to provide higher-than-average tuition discounts to its students (i.e., enrollment has reached a critical mass). It also indicates that institutions with enrollments within that range have the resources to maintain tuition discounting policies over time either by funding discounts through endowment and scholarship funds or by having the financial ability to forgo revenue through unfunded discounts.

One explanation of this phenomenon is that well-established, highly selective (*Barron's* highly competitive and most competitive institution categories), and highly endowed institutions in this enrollment category, such as Amherst College, Beloit College, DePauw University, Swarthmore College, Williams College, and Vassar College, may skew the tuition discount rates up. For example, of the institutions that

provided endowment information, the average ending endowment in 2007 was over $5.4 billion. An endowment of this size, coupled with a relatively small enrollment size, would allow for the potential of higher tuition discount rates funded through endowment earnings. Additional research is needed to understand the extent to which these institutions may have skewed the results.

Institutions in the fourth enrollment category, FTEs between 10,000 and 19,999, had the second highest tuition discount rates over the time period covered in this study. This suggests that the institution is able to continue to offer higher-than-average discounts; that is, a larger student population allows an institution the flexibility to provide higher discount rates by any number of means, including student cross-subsidization, endowment earnings, or forgone revenue.

An institution may be very large, in which case it may not have the resources to award high average *tuition discount rates* to every student. This is evident in the fifth enrollment category, FTEs > 20,000, which had the lowest *tuition discount rates* each year. An institution of this size is a prime candidate for offering strategic financial aid, given that there are large numbers of students to accommodate (Lapovsky & Loomis-Hubbell, 2003; Winston & Zimmerman, 2000).

Enrollment size is one factor that has a strong relationship with tuition discount rates. An institution with a higher enrollment has more students to cross-subsidize other students. Additionally, an institution with a smaller enrollment may have the resources to use endowment earnings to fund tuition discounts at higher-than-average rates than do other institutions.

Percentage of White Enrollment

The information presented in Figure 4 indicates that institutions have higher-than-average tuition discount rates when they increasingly serve primarily white, non-Hispanic students, which is the case in all five years of the study. There may be numerous causes for this phenomenon, but three possible explanations are presented here.

Institutions that primarily serve white student populations may be wealthier in terms of donor pools, levels of assets, and endowments than are their minority-serving counterparts (Cunningham & Cochi-Ficano, 2002). This wealth may be used to provide higher levels of average tuition discounts.

Another explanation could be that minority-serving institutions may have a lower tuition sticker price than primarily white-serving institutions. Therefore, the tuition discount rate necessary to make the institution financially accessible to students would be lower at minority-serving institutions (Swail, 2003).

Finally, as a historically disadvantaged population, minority students may require higher levels of financial aid and tuition discounting (Epple, Romano, & Sieg, 2002, 2003). If this is the case, institutions may not be able to keep up with the demand for discounts as the percentage of minorities in the student population increases. The institution may allocate the discount over all students to help as many students as it can or offer strategic financial aid, given that there are large numbers of students to accommodate (Lapovsky & Loomis-Hubbell, 2003; Winston & Zimmerman, 2000).

Percent Pell

The discount rates for the economic diversity ranges are mixed, as seen in Figure 5. The results indicate that institutions serving the range in which 20-39% of student population is low-income and receives Pell grants generally have the highest discount rate each year, and the discount rate is stable, increasing slightly each year. The other four ranges provide lower discount rates and are not as stable, showing a decrease in tuition discount rates in at least one year, although they are generally increasing.

Institutions with higher proportions of students receiving Pell grants have lower tuition discount rates. This suggests that institutions serving a higher percentage of students who are economically disadvantaged may not have the resources to give higher-than-average tuition discount rates. Hence, an institution may allocate the discount over a large proportion of the students to help as many students as it can or offer strategic financial aid to benefit specific students because there are high numbers of students to accommodate (Lapovsky & Loomis-Hubbell, 2003; Winston & Zimmerman, 2000). While student-level information is not available to confirm which strategy an institution may use to distribute tuition discounts across students, the literature suggests that these two strategies are the most commonly employed. The outcome of both of these potential strategies is lower-than-average tuition discount rates at the institutional level.

In regard to low-income students, institutions strike a balance between providing access to higher education and maintaining the financial health of the institution by limiting institutional aid. Due to limited resources, a higher proportion of low-income students in the population may limit the average tuition discount rate. If the proportion of

low-income students is high, the average tuition discount rate may decrease to accommodate higher numbers of students with financial need.

Selectivity

As noted in Figure 6, generally, there are not large differences in tuition discount rates between selective and non-selective institutions. This general trend was not expected, given that more selective institutions use tuition discounts to entice students to attend, make attendance more affordable, or craft a class of diverse students (Baum & Lapovsky, 2006; Martin, 2002).

Results of the Main Hypotheses

Hypothesis 1

The measure of financial health used to test hypotheses 1 and 3 is the *FVI*, a proxy for the independent variable. The *tuition discount rate,* calculated with IPEDS data, was the dependent variable. The results indicated that Model 2 provided more explanatory power, as indicated by the R^2 and model fit.

An analysis determined how the component measures reflect improvement in financial position. A challenge arose in analyzing the model due to the nature of the component measures with respect to the hypothesized relationship of the model. Hypothesis 1 asserted that, as the financial position of stable institutions increases, the tuition discount rate also increases. That is, there is a negative relationship between the independent variables and the *tuition discount rate* since the *FVI* score decreases as institutional financial stability increases. Because the individual component measures become more favorable by moving in opposite directions, it could not be determined

whether the data supported the hypothesis simply by examining every variable for, in this case, a negative coefficient. In response to this constraint, it should be noted that, for hypothesis 1, *surplus margin ratio*, *administrative costs ratio*, and *size ratio* indicate a more favorable financial position when they are larger, and *debt ratio* and *revenue concentration index* indicate a more favorable financial position when they are smaller. The component measures that are more favorable when they increase (decrease) should show a positive (negative) coefficient in the model. Therefore, the results were examined by variable in terms of the sign of the coefficients (positive or negative) each year to determine whether the data supported hypothesis 1.

The sign of the standardized beta coefficients (β) for each of the FVI component variables, as shown in Tables 8 and 9 and Figure 7, met these criteria in at least four of the five years in this study. This information is summarized in Table 15.

Table 15

Summary of Signs and Criteria for β Coefficients for Hypothesis 1: Stable

Variable	Variable More Favorable When	Years Coefficient Meets Criteria
Debt	-	5
Concen	-	4
Surplus	+	5
Admin	+	4
Size	+	5

Between 2003-04 and 2004-05, 6 of the 10 independent variables had large fluctuations in their coefficients. A potential explanation for this is the national economic

downturn in 2003. Higher education institutions appear to have responded to the downturn and then adjusted their practices in the subsequent economic upswing.

Different individual variables were statistically significant to the model each year. For example, in 2006, *debt ratio, revenue concentration index, size ratio, total enrollment*, *percent white enrollment*, and *percent Pell* were statistically significant, but in 2003, only *debt ratio, size ratio, total enrollment*, and *percent white enrollment* were statistically significant. While differences existed each year, of most interest was the explanatory power of the main models as measured by the R^2 and the model fit. As noted in Tables 8 and 9, the mean R^2 = .28 for the combined years suggests a reasonable degree of explanatory power.

In summary, the regression for Model 2 under hypothesis 1 shows overall negative coefficients for *debt ratio* and *revenue concentration index* and overall positive coefficients for *surplus margin ratio*, *administrative costs ratio*, and *size ratio*. The R^2 indicated reasonable explanatory power, and the model provided a good fit for explanatory purposes as well, as evidenced by the *F*-statistic (Table 16). Therefore, Model 2 supports hypothesis 1 in that the relationship between *tuition discount rate* increases and financial position increases (*FVI* decreases) is statistically significant.

Table 16

Summary of Goodness of Fit Measures by Hypothesis

	Hypothesis 1: Stable			Hypothesis 3: Unstable		
Year	R^2	F	p	R^2	F	p
2003	0.30	9.14	.00	0.44	19.54	.00
2004	0.30	19.76	.00	0.39	6.11	.00
2005	0.26	18.04	.00	0.39	8.25	.00
2006	0.28	23.66	.00	0.34	8.45	.00
2007	0.25	27.71	.00	0.49	9.05	.00

More financially stable institutions used their resources to attract students. When an institution was more stable, as indicated by a lower *FVI*, the *tuition discount rate* increased. This outcome supports previous research that institutions used tuition discounts as a form of charity or philanthropy for financially needy students (Goral, 2003; McPherson & Schapiro, 1999; Slaughter & Rhoades, 2004), but this outcome extends the findings of previous research and indicates that financially stable institutions used tuition discounts in this manner.

Hypothesis 2

In regard to hypothesis 2, unstable institutions (*FVI* > .20) with decreasing enrollments in the five-year period showed no significant between-subjects differences in *tuition discount rates* between 2003-04 (M = 23.7%, n = 64) and 2007-08 (M = 23.8%, n = 64). As such, the results did not support the hypothesis. More financially unstable institutions did not increase *tuition discount rates* to attract students when enrollment decreased. One possible explanation for this is that unstable institutions with decreasing

enrollment did not have the resources to offer higher *tuition discount rates* to attract additional students. As the number of students decreased, fewer students were at the institution to cross-subsidize other students. Alternatively, the financial position of the institution might have been such that it could not afford additional unfunded discounts and continue to operate at the same time.

Contrary to the original hypothesis, unstable institutions with decreasing enrollment appeared to consider their short-term financial position when making tuition discount decisions. As a whole, unstable institutions with decreasing enrollment did not use discounts as an investment in the future as originally hypothesized in this study.

Hypothesis 3

An analysis determined how the component measures reflect deterioration in financial position. A challenge arose in analyzing the model due to the nature of the component measures with respect to the hypothesized relationship of the model. Hypothesis 3 asserted that, as the financial position of unstable institutions worsens, the tuition discount rate increases. That is, there is a positive relationship between the independent variables and the *tuition discount rate* since the *FVI* score increases as institutional financial stability decreases. Because the individual component measures become less favorable by moving in opposite directions, it could not be determined whether the data supported the hypothesis simply by examining every variable for, in this case, a positive coefficient. In response to this constraint, it should be noted that, for hypothesis 1, *surplus margin ratio*, *administrative costs ratio*, and *size ratio* indicate a less favorable financial position when they are smaller, and *debt ratio* and *revenue*

concentration index indicate a less favorable financial position when they are larger. The component measures that are less favorable when they increase (decrease) should show a positive (negative) coefficient in the model. Therefore, the results were examined by variable in terms of the sign of the coefficients (positive or negative) each year to determine whether the data supported hypothesis 3.

The sign of the standardized beta coefficients (β) for each of the FVI component variables, as shown in Tables 13 and 14 and Figure 9, met these criteria, as summarized in Table 17.

Table 17

Summary of Signs and Criteria for β Coefficients for Hypothesis 3: Unstable

Variable	Variable More Favorable When	Years Coefficient Meets Criteria
Debt	+	3
Concen	+	0
Surplus	-	5
Admin	-	4
Size	-	0

Because the sign criteria are not met in all of the years of the analysis, this provides for less-straightforward conclusions related to the validity of the hypothesis. While the *debt ratio*, *surplus margin ratio*, and *administrative costs ratio* coefficients were, individually, the expected sign (positive or negative) in at least three out of five years, the variables were not statistically significant to the model.

In contrast, *revenue concentration index* and *size ratio* coefficients, the only main independent variables statistically significant in the model, did not produce the expected sign in any of the years in the study. The unexpected positive coefficient for the *revenue concentration index* may be related to the semi-controllable nature of this measure. Even though an institution may perform poorly in other financial areas, management may be able to limit some of its risk by diversifying its revenue streams so as not to rely on one or a few sources of revenue to operate the organization. Unstable institutions may have favorable results for this measure if financial executives apply a concerted effort to diversify revenue streams.

The unexpected positive coefficient for the *size ratio* may be the result of the importance of this measure to the institution. An institutional characteristic such as the value of the assets (*size ratio*) is likely to be closely monitored and protected by the institution to ensure that it has the necessary assets and financial resources to operate the institution. In addition, the long-term nature of the *size ratio,* along with the organizational controls in place over institutional assets, typically allows for limited changes on a yearly basis. Large fluctuations and reductions in the level of assets may occur over time.

With respect to all of the independent variables, including the main independent and control variables, the size of the coefficient fluctuations each year ranged from no change to a relatively large change (.36). Variables whose coefficients varied slightly year-to-year appear to be those that are long-term in nature. Institutional characteristics such as the indebtedness of the institution and the racial and economic make-up of the

student population are unlikely to fluctuate considerably year-on-year; rather, large changes occur over time.

Variables whose coefficients had large variations year-to-year appear to be those that are short-term in nature. *Enrollment* and *tuition & fees*, for example, can all experience large fluctuations each year. The results indicated that the coefficients for these two variables may have a negative relationship because students may react to changes in tuition through their enrollment decisions. Otherwise, large fluctuations in the coefficients of these variables are related to the fact that unstable institutions are more likely to suffer fluctuations that may result from a number of different factors. The variation is most likely due to the unstable state of the institution and the administrative policies enacted in the attempt to reinvigorate the institution. The policies, while thoughtfully enacted using a particular approach or methodology, may be overly simplistic strategies for short-term cost saving or revenue generation but do not effectively address the underlying business issues of the institution (Cavanaugh & Graves, 2010). Each year, the approach may change until the institution discovers the correct mix of policies to the point where it is no longer unstable. The state of being an unstable institution accounts for the large fluctuations in the variable coefficients each year.

Despite the size of the fluctuation each year, three of the FVI component variable coefficients maintained the same sign over the five-year period. Only the *revenue concentration index* and *administrative costs ratio* fluctuated to the point of changing

signs. For both variables, the change in sign may be the result of economic conditions related to the recession of 2001 (Dadkhah, 2009; The Conference Board, 2011).

Additionally, four of the five control variable coefficients maintained the same sign each year. The exception, *percent Pell*, was positive in four of the years, but was negative in 2006-07. This may have been caused by an anomaly or an error, as previously discussed. Aside from the size of the fluctuation, most variables maintained the same sign over the time period of the study. In this respect, the coefficient values appear to be stable.

While different individual variables were statistically significant to the model each year, of greatest interest was the explanatory power of my main models as measured by the R^2 and the model fit. Based on the information provided in Tables 13 and 14, on average, the R^2 = .41, suggesting a high degree of explanatory power. The model provided a good fit for explanatory purposes as well, as evidenced by the *F*-statistic (Table 16).

In summary, for hypothesis 3, the regression results for Model 2 showed expected coefficient signs for *debt ratio*, *surplus margin ratio*, and *administrative costs ratio*. Additionally, the signs of the coefficients were generally stable year-to-year. Further, the R^2 indicated that the model has a high degree of explanatory power. Therefore, Model 2 established that the relationship of hypothesis 3 appears to be valid in that *tuition discount rates* increase as institutions financial position decreases (*FVI* increases). Hence, unstable institutions used their resources to attract students, similar to the strategy of stable institutions. When an institution was more unstable, indicated by a higher *FVI*, the

tuition discount rate increased. This outcome supports the hypothesis that unstable institutions spent resources on discounts, which attracted additional students and generated additional revenue (Van Der Werf, 2000).

Conclusions

Resource dependence theory informs our understanding of the relationship between an institution's financial position and its tuition discount policies. Institutions use their resources through tuition discounts to generate tuition revenue for operations. The discounting policies implemented reflect the relative importance of access and excellence in a continuum of institutional goals in relation to the financial position of the institution.

Two types of institutions, financially stable and financially unstable, were examined. As financially stable institutions become more financially stable, they increase their *tuition discount rates* presumably to attract academically gifted students and to provide access to lower-income students. Alternatively, as financially unstable institutions become more financially unstable, they also increase their *tuition discount rates* to attract students to attend. In each instance, institutions used their resources to attract students, but financially unstable institutions may compromise their long-term financial stability in the process. If financially unstable institutions stretch their financial position too far through tuition discounting policies, they may face financial ruin and may need to close the doors of the institution. This would be detrimental not only to the institution but also to the students due to the decrease in access associated with an institutional closure. Therefore, it is important for higher education administrators to

understand the relationship between institutional financial position and tuition discount rates to maintain access for students, especially low-income and disadvantaged students, who may have limited opportunities for their college education.

Tuition discounting is particularly important to low-income and disadvantaged students because it provides the means to attend college when these students might not have been able to otherwise. As discussed, these students are particularly sensitive to pricing and price increases (Leslie & Brinkman, 1987; McPherson & Schapiro, 1991; Mumper, 2001). They could benefit from tuition discounting to offset high costs or cost increases, which may allow them to attend. However, low-income and disadvantaged students will have access and opportunity only if institutions remain operational and use their financial resources to benefit their long-term financial position.

Implications for Practice

As practitioners, individuals involved in the accounting, budgeting, and strategic financial planning of institutions need guidance and models to assist them in their decision-making processes (Goldstein & Meisinger, 2004). Without guidance or models, and if they choose to succumb to external and/or internal pressures, such as the continued search for resources, advance institutional mission, or the pursuit of excellence (most often, a combination of the three), institutions may compromise their long-term viability. An unchecked outcome could be that an institution "discounts towards disaster" (Redd, 2000). This research highlights the fact that institutional financial aid policies must also take into consideration the present and long-term financial health of the institution.

Specific to discounting policies, this research provides financial officers with a better understanding of how their institution's financial position relates to tuition discount rates. Financial officers can calculate their FVI to determine in which FVI group they fit. They can then compare their institution's tuition discount rate to other institutions with a similar FVI score. Based on their analysis, financial officers can gain a better understanding of the implications of certain tuition discounting practices by comparing themselves with peer institutions on the FVI score. Specifically, financial officers can assess how their tuition discounting policies affected the institutional goals of access and excellence based on the number and demographics of students that enrolled.

This research also offers financial officers a better understanding of how enrollment, race, Pell recipients, and selectivity relate to tuition discount rates across a large set of peer institutions. Financial officers can determine where their institution stands in relation to others. They can then assess the need for financial or business model changes relative to their environment to meet specific goals.

A third implication is that financial indicators that are already common in business, such as the *debt ratio* and *surplus margin ratio*, and in academia, such as *percent Pell* and *percent white enrollment*, are helpful in the decision-making process of operating the enterprise. This research demonstrates that, similar to for-profit businesses, higher education institutions can use financial ratios to understand enterprise operations. Higher education administrators can then apply this knowledge to performing the day-to-day operations of their institutions. For example, financial officers can use the FVI component ratios to identify potential weaknesses and areas of improvement in the

institution's financial position. Once identified, financial officers can investigate the issue and make informed decisions to resolve it.

The ability to identify and resolve issues is especially important given that the economic environment brought about by the Great Recession of 2008 indicates a new status quo for higher education institutions (Bruinicks et al., 2010). Current economic conditions warrant new, resourceful, and practical ways to analyze data. The current research is a starting point for developing quantitative models to evaluate the financial position of institutions. While this research has not established causality, there are indications that the model has some degree of explanatory power, and it may be useful to adopt some of the practices suggested. Additional research is needed, especially more experimental designs, to understand the differences between institutions' policies and related outcomes.

A fourth implication for practice is the robustness of financial indicators to provide information to decision makers. While individuals can use them specifically to inform tuition discounting decisions or a variety of other decisions at the institution level, they are also applicable in a broader scope. Researchers may use financial indicators to explore the relationships between institutional financial position and various resource allocation decisions, such as debt burden, average tuition revenue per FTE, instructional expenditures per FTE, or mean salary of full-time faculty. The versatility of financial indicators is limited only in how scholars choose to apply them in their research.

Implications for Policy

This research provides implications related to institutional policy. One implication, related to resource dependence theory, is that, when an institution chooses how much of its resources to allocate to unfunded tuition reductions, it must balance its mission with other competing priorities. As for other competing priorities, such as expected enrollment size, if growth is a priority or pressure for higher incoming freshman SAT scores when selectivity is a priority, an institution must have a tuition discounting strategy in place to satisfy its competing and conflicting goals, while spending within its limits.

Another important element to consider is the growing trend toward more accountability in higher education, both public and private (Alexander, 2000). For the purpose of this research, the government holds private institutions accountable due to the increasing role of government in providing financial aid in higher education, specifically Pell grants. A previous study found that, as government grants to students increased, tuition prices increased so that the institution could fully benefit from the increased grant dollars (Dynarski, 2000). Given the current economic circumstances and the federal government's desire to provide more affordable higher education to all Americans, institutions may be under increased government scrutiny, particularly in regard to tuition price increases and increased tuition discounting. As such, institutions must consider policy decisions related to tuition prices and tuition discounting in the current accountability environment.

Implications for Future Research

While there is a great deal of potential for future research, the following five recommendations may be considered the most important. First, further studies on the financial aspects of higher education institutions should be done because research in this area has yet to be the focus of scholars, and it would provide a wealth of information about the ways in which the financial aspects of institutions relate to institutional decision making processes. Additional research in this area could include the effect of debt on institutions of different enrollment sizes, selectivity categories, or Carnegie classifications; the impact of funded versus unfunded programs and liabilities on the institution, such as tuition discounts or employee retirement liabilities; and the adherence to contractual requirements related to account transfers performed between funds, especially with regard to restricted and temporarily restricted funds.

Another direction for future research is to investigate the use of a more comprehensive proxy for financial position. While it was the best indicator available given the data, the *FVI* does not include important financial statement line items such as endowment assets and income from the endowment. Investigation of the relationship of a combination of these otherwise excluded financial indicators to *tuition discount rates* would be helpful to provide additional insight into discounting policies. One way to do this is to find a data source supporting the use of the CFI, instead of the *FVI*, as the independent variable. Another alternative is to establish a new indicator whose component pieces were easily attainable through secondary data sources such as IPEDS.

A third direction would be to study institutions longitudinally. Research of this nature could help increase understanding of the institutional changes over time that lead to changes in FVI scores and discounting policies. For example, studies could identify common changes in institutional characteristics that lead to FVI improvements or increases in tuition discount rates. The analysis of longitudinal data also could provide a single equation model by FVI group, as opposed to a different model each year as was done in the current study, to be used by financial officers.

Fourth, because private, not-for-profit institutions have either religious or non-religious institutional control, as defined by IPEDS, comparing these types of institutions in a study similar to this one would offer insight into the differences between these types of institutions. Researchers could break down the results into an additional category: tuition discount rate by FVI group by institutional control. In addition, researchers could group religious institutions by religious affiliation. They could compare results to Gilmartin's (1984) study of distressed institutions to determine whether differences exist over time in financially vulnerable institutions by religious affiliation.

The final direction of future research is to use a case-study approach for institutions that have failed or have restructured their operations in recent years. Studying institutions such as Vanguard University in California may offer insights into which accounts or financial indicators could have predicted an institution's failure months or years in advance. The results might provide ways to identify financial problems early enough to resolve them. Such research also could examine whether discounting policies had a relationship to the institution's financial trouble.

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Appendix A: Variables Used in the Analysis by Year

Variable Description	Data Source	Excel Cell	Variable Name/Code in Data Source				
			2003	2004	2005	2006	2007
Independent Variables - FVI Ratio Components (Trussel, Greenlee, & Brady, 2002):							
Total assets	IPEDS	H	f2.f2a02	f2.f2a02	f2.f2a02	f2.f2a02	f2.f2a02
Total liabilities	IPEDS	I	f2.f2a03	f2.f2a03	f2.f2a03	f2.f2a03	f2.f2a03
Revenue streams:							
Tuition & fees	IPEDS	N	f2.f2d01	f2.f2d01	f2.f2d01	f2.f2d01	f2.f2d01
Federal appropriations	IPEDS	O	f2.f2d02	f2.f2d02	f2.f2d02	f2.f2d02	f2.f2d02
State appropriations	IPEDS	P	f2.f2d03	f2.f2d03	f2.f2d03	f2.f2d03	f2.f2d03
Local appropriations	IPEDS	Q	f2.f2d04	f2.f2d04	f2.f2d04	f2.f2d04	f2.f2d04
Federal grants and contracts	IPEDS	R	f2.f2d05	f2.f2d05	f2.f2d05	f2.f2d05	f2.f2d05
State grants and contracts	IPEDS	S	f2.f2d06	f2.f2d06	f2.f2d06	f2.f2d06	f2.f2d06
Local grants and contracts	IPEDS	T	f2.f2d07	f2.f2d07	f2.f2d07	f2.f2d07	f2.f2d07
Private gifts- grants- and contracts	IPEDS	U	f2.f2d08	f2.f2d08	f2.f2d08	f2.f2d08	f2.f2d08
Contributions from affiliated entities	IPEDS	V	f2.f2d09	f2.f2d09	f2.f2d09	f2.f2d09	f2.f2d09
Investment return	IPEDS	W	f2.f2d10	f2.f2d10	f2.f2d10	f2.f2d10	f2.f2d10
Sales and services of educational activities	IPEDS	X	f2.f2d11	f2.f2d11	f2.f2d11	f2.f2d11	f2.f2d11
Sales and services of auxiliary enterprises	IPEDS	Y	f2.f2d12	f2.f2d12	f2.f2d12	f2.f2d12	f2.f2d12
Hospital revenue	IPEDS	Z	f2.f2d13	f2.f2d13	f2.f2d13	f2.f2d13	f2.f2d13
Independent operations revenue	IPEDS	AA	f2.f2d14	f2.f2d14	f2.f2d14	f2.f2d14	f2.f2d14
Other revenue	IPEDS	AB	f2.f2d15	f2.f2d15	f2.f2d15	f2.f2d15	f2.f2d15
Total rev and investment return	IPEDS	AC	f2.f2d16	f2.f2d16	f2.f2d16	f2.f2d16	f2.f2d16

Variable Description	Data Source	Excel Cell	Variable Name/Code in Data Source				
			2003	2004	2005	2006	2007
Total expenses	IPEDS	J	f2.f2b02	f2.f2b02	f2.f2b02	f2.f2b02	f2.f2b02
Administrative expenses:							
Academic support-total amount	IPEDS	AF	f2.f2e041	f2.f2e041	f2.f2e041	f2.f2e041	f2.f2e041
Student service-total amount	IPEDS	AG	f2.f2e051	f2.f2e051	f2.f2e051	f2.f2e051	f2.f2e051
Institutional support-total amount	IPEDS	AH	f2.f2e061	f2.f2e061	f2.f2e061	f2.f2e061	f2.f2e061

Dependent Variable - Tuition Discount Rate (Duggan & Mathews, 2005):

Institutional grants (funded)	IPEDS	K	f2.f2c05	f2.f2c05	f2.f2c05	f2.f2c05	f2.f2c05
Institutional grants (unfunded)	IPEDS	L	f2.f2c06	f2.f2c06	f2.f2c06	f2.f2c06	f2.f2c06
Allowances (scholarships) applied to tuition and fees	IPEDS	M	f2.f2c08	f2.f2c08	f2.f2c08	f2.f2c08	f2.f2c08
Tuition and fees (net of allowance reported in C-08)	IPEDS	N	f2.f2d01	f2.f2d01	f2.f2d01	f2.f2d01	f2.f2d01

Variable Description	Data Source	Excel Cell	Variable Name/Code in Data Source				
			2003	2004	2005	2006	2007
Institutional Control Variables:							
Selectivity:							
Barron's selectivity rating	Barron's	BL	Barron's 2003	Barron's 2005	Barron's 2005	Barron's 2007	Barron's 2007
Enrollment:							
Total enrollment	IPEDS	F	npec2003.enrtot	hd2004.enrtot	hd2005.enrtot	drvef2006.enrtot	drvef2007.enrtot
Racial Diversity:							
Percent of total enrollment - white, non-Hispanic	IPEDS	G	x	dfr2004. pctenrwh	dfr2005. pctenrwh	drvef2006. pctenrwh	drvef2007. pctenrwh
Total enrollment	IPEDS	AN	ef2003a.efrace24				
Total white, non-Hispanic enrollment	IPEDS	AO	ef2003a.efrace22				
Economic Diversity:							
% Pell recipients	TICAS	AP	% of aid applicants receiving Pell Grants (same in all yrs)				

Note. x - Variable not available. Used calculation.

Appendix B: Ratio Components and Variable Calculations

Independent Variables - FVI Ratio Components (Trussel, Greenlee, & Brady, 2002):

Variable Description	Data Source	Excel Column	Calculated as
Total assets	IPEDS	H	
Total liabilities	IPEDS	I	
Revenue streams:			
Tuition and fees	IPEDS	N	
Federal appropriations	IPEDS	O	
State appropriations	IPEDS	P	
Local appropriations	IPEDS	Q	
Federal grants and contracts	IPEDS	R	
State grants and contracts	IPEDS	S	
Local grants and contracts	IPEDS	T	
Private gifts- grants- and contracts	IPEDS	U	
Contributions from affiliated entities	IPEDS	V	
Investment return	IPEDS	W	
Sales and services of educational activities	IPEDS	X	
Sales and services of auxiliary enterprises	IPEDS	Y	
Hospital revenue	IPEDS	Z	
Independent operations revenue	IPEDS	AA	
Other revenue	IPEDS	AB	
Total revenues and investment return	IPEDS	AC	
Total expenses	IPEDS	J	
Administrative expenses:			
Academic support-total amount	IPEDS	AF	
Student service-total amount	IPEDS	AG	
Institutional support-total amount	IPEDS	AH	
Debt ratio (Debt) =	Calc	AQ	I/H
Revenue concentration index (Concen) =	Calc	AR	$\Sigma((N \text{ to } AB) / AC)^2$
Surplus margin (Margin) =	Calc	AS	(AC - J) / AC
Administrative costs ratio (Admin) =	Calc	AT	(AF + AG + AH) / AC
Size ratio (Size) =	Calc	AU	ln(H)

Variable Description	Data Source	Excel Column	Calculated as
z =	Calc	AV	0.7754 + (0.9272 x Debt) + (0.1496 x Concen) - (2.8419 x Margin) + (0.1206 x Admin) - (0.1665 x Size)
			0.7754 + (0.9272 x AQ) + (0.1496 x AR) - (2.8419 x AS) + (0.1206 x AT) - (0.1665 x AU)
e =	Calc	AW	
FVI =	Calc	AX	$1 / (1 + e^{-z})$
			$1 / (1 + IO^{-AV})$

Dependent Variable - Tuition Discount (TD) Rate (Duggan & Mathews, 2005):

Institutional grants (funded)	IPEDS	K	
Institutional grants (unfunded)	IPEDS	L	
Allowances (scholarships) applied to tuition and fees	IPEDS	M	
Tuition and fees (net of allowance reported in C-08)	IPEDS	N	
Tuition Discount Rate	Calc	AY	(K + L) / (M + N)

Control Variable - Racial Diversity:

Percent of total enrollment - white, non-Hispanic	IPEDS	G	(AO / AN)
Total enrollment	IPEDS	AN	
Total white, non-Hispanic enrollment	IPEDS	AO	

Appendix C: Descriptive Statistics

	2003			2004			2005		
	Mean	Std Dev	Variance	Mean	Std Dev	Variance	Mean	Std Dev	Variance
TD Rate	0.26	0.15	0.02	0.26	0.15	0.02	0.26	0.15	0.02
FVI	0.15	0.08	0.01	0.12	0.07	0.00	0.12	0.08	0.01
Debt	0.34	0.22	0.05	0.34	0.21	0.05	0.33	0.20	0.04
Concen	0.59	5.06	25.60	0.40	0.15	0.02	0.42	0.32	0.10
Margin	0.04	0.61	0.37	0.13	0.14	0.02	0.10	0.16	0.03
Admin	0.41	0.31	0.09	0.38	0.13	0.02	0.39	0.13	0.02
Size	17.93	1.69	2.86	18.03	1.67	2.80	18.09	1.67	2.80
Tuition & Fees	3.02E+07	5.66E+07	3.21E+15	3.26E+07	6.05E+07	3.66E+15	3.47E+07	6.46E+07	4.17E+15
Total Enrollment	2,754.28	3,885.42	1.51E+07	2,833.18	4,015.55	1.61E+07	2,848.01	4,079.84	1.66E+07
Percent White En.	0.69	0.23	5.29	0.69	0.23	5.31	0.68	0.23	5.26
Percent Pell	0.36	0.20	0.04	0.36	0.20	0.04	0.34	0.20	0.04
Selectivity	0.31	0.46	0.21	0.31	0.46	0.21	0.31	0.46	0.21

	2006			2007		
	Mean	Std Dev	Variance	Mean	Std Dev	Variance
TD Rate	0.27	0.15	0.02	0.27	0.15	0.02
FVI	0.12	0.08	0.01	0.11	0.08	0.01
Debt	0.33	0.20	0.04	0.33	0.21	0.04
Concen	0.40	0.15	0.02	0.40	0.15	0.02
Margin	0.13	0.17	0.03	0.17	0.21	0.04
Admin	0.39	0.14	0.02	0.37	0.14	0.02
Size	18.16	1.67	2.79	18.27	1.70	2.89
Tuition & Fees	3.70E+07	6.93E+07	4.80E+15	3.97E+07	7.45E+07	5.55E+15
Total Enrollment	2,892.57	4,147.46	1.72E+07	2,952.82	4,246.76	1.80E+07
Percent White En.	0.67	0.23	5.30	0.67	0.23	5.26
Percent Pell	0.38	0.17	0.03	0.39	0.17	0.03
Selectivity	0.30	0.46	0.21	0.30	0.46	0.21