

ABSTRACT

HARRIS, KIMBERLY NICOLE. The Relationship between Financial Resources and Graduation Rates at Public Colleges and Universities. (Under the direction of Dr. Paul Umbach and Dr. Tamara V. Young).

The purpose of this study is to examine the relationship between public HEI's fiscal resources and student persistence to degree completion. Consequently, building upon the studies of researchers such as Titus (2006a, 2006b), Hearn (2003a, 2003b), and Winston (1999), this study investigates the relationships between institutional organizations through a fiscal lens (revenue sources and credit ratings) and graduation rates. In order to determine the nature of these aforementioned relationships, I will use a framework shaped by resource dependence theory. This study seeks to answer two research questions: (a) What is the relationship between a public institution's credit rating and graduation rates? and (b) What is the relationship between fiscal resources and graduation rates at public HEIs? To answer these questions, I analyze Integrated Postsecondary Education Data System (IPEDS) and Moody's data from 2005 and 2007. Propensity score analysis was conducted to predict the credit rating of Public HEIs. Multiple regression was conducted to analyze the relationship between HEIs' institutional level financial variables and graduation rates. While no significant relationship was found to exist between either of the two highest institutional credit ratings (PHG and UMG) and graduation rates, significance was found to exist between graduation and percent revenue from state operating grants and contracts, percent revenue from investment income and auxiliary enterprise reliance in 2005; as well as percent revenue from tuition and fees net discounts and allowances and auxiliary enterprise reliance in 2007.

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The Relationship between Financial Resources and Graduation Rates at Public Colleges and
Universities

by
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DEDICATION

Firstly, all praises to G-d, the source of my life, health and strength. Father, your favor and tender mercies have sustained me all the days of my life and will continue to sustain me for the balance of my days!! Secondly, this dissertation is dedicated to my mother, Carolyn P. Harris, my friend, my teacher, and one of my biggest supporters. I'm so grateful to G-d for blessing me with you! This dissertation is also dedicated to the loving memory of my father, Richard M. Harris, my friend, my teacher, and my other biggest supporter. Daddy, there is not a day that goes by that I don't miss you and ache for the days that we would talk, sit on the porch exchange each other's dreams, and just be together. Daddy, you taught me how to dream without parameters or boundaries. I love you with all my heart Daddy. In loving memory of my maternal grandmother, Sarah Mary Elizabeth Harris M. Pollock (Whew! Such a big name for such tiny woman but it matches your spirit Grandma), the strength of my family, the love of my life and the best thing to ever come out of Bluefield, West Virginia!!! Also, in loving memory of my paternal grandmother, Valley Gates Mason Harris; a wonderful woman and a fiery spirit. You gave me one of the best graduation presents any person could ever hope for, my father (Grandma Sarah gave me the other one). I also want to extend a special thank you to my sister Demetriss. Thank you for being a shoulder to cry on, an ear to listen, for letting me be vulnerable, scared, and a little bit crazy – never judging, only loving! I love you girl! Lastly, this dissertation is dedicated to ALL my family. Whether related by blood or strong affinity of the heart's spirit; you have been there with me and for me; each in your own way; through the highs and the lows of this journey.

BIOGRAPHY

A North Carolina native, Kimberly Harris was educated in the Durham County Public School system. She attended the University of North Carolina at Chapel Hill (UNC-CH) where she majored in both Economics and African Studies. Upon graduating from UNC-CH, Kimberly worked for a decade in the North Carolina Community College System as both an instructor and administrator. Kimberly holds a Masters in Business Administration from the Lundy – Fetterman School of Business at Campbell University.

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CHAPTER ONE

INTRODUCTION

When one considers the mission of colleges and universities to educate and graduate individuals with the requisite knowledge, skills, and abilities to both contribute and compete in an ever flattening world, it becomes obvious that the magnitude of this effort is equaled only by the enormity of potential encumbrances like the scarcity of resources and student attrition. Government funding of higher education has diminished considerably over the past thirty years (Cheslock, 2006; NCES, n.d; Snyder & Dillow, 2007; St John & Parsons, 2004). At the same time as many public funding sources have dwindled, colleges and universities are being called upon by both federal and state lawmakers to prove that they merit a portion of the funds that remain on the table by reporting various student outcomes such as persistence and degree completion (Seidman, 2005). Additionally, media outlets like U.S. News and World Report, which have become de facto score keepers among the more than 3,000 higher education institutions (HEIs) in the United States, regularly publish school rankings wherein persistence is one of the variables used to determine institutional rank.

Exacerbating these environmental pressures is the growing number of individuals initiating the college matriculation process, but failing to complete a college degree of any kind, including two year associates and four year baccalaureate degrees (Bean, 1980; Caison, 2005; Horn & Carroll, 1998; Tinto, 1993; Young, 2004). This trend has been increasing for over thirty years and the student attrition rate now stands at approximately 50% (Cragg, 2009). Researchers and practitioners attribute this to many factors, generally student level in nature. Student factors such as socioeconomic status, academic preparation, family education

level, goal commitment, and psycho-emotive and psychosocial qualities influence the likelihood of student persistence to degree completion (Blecher, 2006; DeBerard, Spielmans, & Julka, 2004; Scott, Bailey, & Kienzl, 2006; Tinto, 1975; Titus, 2006a, 2006b). However, only focusing on student level attributes when pondering this issue may limit our understanding of degree completion. Student attrition may begin with the individual, but by no means does it end there. The higher education industry is a complex adaptive system that can attenuate or amplify the likelihood of student attrition or degree completion (Lansing, 2003; Lichtenstein, 2000; Meyer, Gaba, & Colwell, 2005). As such, institutional factors must be included to understand if and how they act in concert with student characteristics to influence positive student outcomes, the ultimate of which is persistence to degree completion.

Statement of the Problem

A college degree has become the minimum requirement by which most people in developed nations can secure entrée into a working class existence (Barrow, Didou-Aupetit, & Mallea, 2003; Braxton, 2010; College Board, 2007; Moretti, 2004; Tinto, 1993). As such, it has never been more important for individuals to obtain a degree –a fact that has led to the rapid growth of the higher education industry and the legion of individuals who quickly fill the classrooms of these institutions. In the past thirty years, enrollment in the nation’s colleges and universities has increased from just fewer than 50% to nearly 70% (NCES, n.d.). Yet, while access to college is at an all time high, the rate at which students who enroll in these institutions are failing to attain a degree is also growing. This crisis which is often referred to as student attrition (Bean, 1980; Ishitani, 2006; Pedrini & Pedrini, 1978; Schurr,

Witting and Henriksen, 1993) has far-reaching implications, including the creation of a permanent working underclass precariously perched on the precipices of economic survival and ruin (Braxton, 2010; College Board, 2007; Moretti, 2004; Tinto, 1993).

Furthermore, a college educated citizenry has a positive effect on not only the overall wage earnings, disposable income, and quality of life for those who have college degrees, but also those without degrees in the impacted area (Moretti, 2004). At the individual level, college graduates not only earn more over their working lifetime than non-graduates, but they also tend to marry better educated spouses and have children that are more likely to do better in school and less likely to engage in delinquent behavior than children of non-graduates (Des Jardins et al., 2002). According to decades of research, college is considered an investment in one's own human capital, the result of which is increased productivity (Thomas & Perna, 2002). For the growing numbers of individuals failing to persist in college, returns to their human capital investment and their subsequent contributions to work and industry are lower (Braxton, 2010; College Board, 2007; Moretti, 2004; Tinto, 1993). If the current trends in attrition rates continue unabated, both industry and individuals will be adversely affected. High attrition also casts HEIs into a dim light because it leads to serious questions about the effectiveness of HEIs to do more than merely provide access to the hallowed halls of the academy and go the necessary step further and effectively educate its students, a charge that is central to the mission of all public HEIs (Weisbrod, Ballou, & Asch, 2008).

Like any organization, HEIs are guided by a mission that is realized by setting and achieving goals. Also like any other organization, the goals that are set and the subsequent

capacity to achieve them are limited by an array of factors both inside and outside the organization (Arya & Lin, 2007; Heugens & Lander, 2009; Oliver, 1991; Pfeffer & Salancik, 2003; Rowley, 1997; Schulte, Ostroff, Shmulyian, & Kinicki, 2009; Weisbrod et al., 2008). Known as environmental constraints, these factors involve pressures exerted by constituents or stakeholders (Oliver, 1991; Rowley, 1997) and influence not only the way in which organizations achieve their mission, but also the very mission itself (Arya & Lin, 2007; Heugens & Lander, 2009; Oliver, 1991; Pfeffer & Salancik, 2003; Rowley, 1997; Schulte, Ostroff, Shmulyian, & Kinicki, 2009; Weisbrod et al., 2008). The pressures exerted on organizations are legion and though not all are significant enough to influence organizational decision making and behavior (Arya & Lin, 2007; Heugens & Lander, 2009; Oliver, 1991; Pfeffer and Salancik, 2003; Rowley, 1997; Schulte, Ostroff, Shmulyian, & Kinicki, 2009; Weisbrod et al., 2008), the pressure exerted from constituents that affect resource acquisition cannot be ignored as they directly impact an organization's ability to achieve mission specific goals.

For HEIs, its universe of constituents range from students, who rely upon these institutions to effectively prepare them for the demands of a fast-paced and globalized world on one end, to the federal government at the other end, whose declining funding since the 1980's has left HEIs struggling to find other constituents to fill in the gap (Johnstone, 2004; Lang, 1992; St. John & Parson, 2003; Toutkoushian, 2001). The necessity of fiscal resources cannot be understated. As Weisbrod et al. (2008) so aptly stated, "...non profit organization leaders recognize that revenue is not simply desirable, it is indispensable" (p. 60). For not-for-profit colleges and universities, their ability to accomplish their mission is inextricably

linked to their ability to cultivate the appropriate environment where its students can thrive. Yet, while institutions are being asked to share in more of the responsibility for student persistence, little research exists to inform effective institutional level policy, in general, and institutional fiscal, policy in particular (Titus 2006a, 2006b).

The literature on student persistence is voluminous, spanning over three and one half decades. However, much of this research has focused on factors that affect persistence at the student level of analysis. While this strategy is logical, it is by no means the end of the story. Researchers readily admit that there is still much to understand about what makes some students persist to degree completion while others fall short of obtaining their goals. Student interactions with the systems and subsystems within the college or university create effects that influence the likelihood to persist to graduation (Astin, 1977; Tinto, 1975, 1993). Historically, these institutional level dynamics have been discussed in the aggregate (Astin, 1977; Caison, 2005; Tinto, 1975, 1993). However, more deconstructed analysis of secondary institutions is needed to understand how and why these organizations influence students' actions and decisions, including one of their most important; whether or not they will persist to degree completion. In the past decade, researchers have begun to take a closer and more serious look at the institution and its role in various student outcomes (McLaughlin, Brozovsky & McLaughlin, 1998; Titus, 2006a, 2006b, 2006c; Berger, 2002a, 2002b).

As this body of literature grows, studies are finding significant relationships between institutional fiscal activity and various aspects of student learning outcomes, including persistence (Pike, Smart, Kuh, & Hayek, 2006; Titus, 2006a, 2006b, 2006c; Winston, 1999). As research begins to crystallize the relationship between HEI expenditures and student

outcomes such as level of academic challenge, academic and collaborative learning, student interaction with faculty members, and persistence to graduation (Pike, Smart, et al., 2006; Titus, 2006a), it is necessary to keep in mind that expenditures are made possible through revenue generation. Moreover, state governments are linking appropriations for post secondary institutions to an institution's ability to provide evidence of measurable student outcomes, such as graduation rates (Burke & Minassianns, 2001; Titus, 2006a, 2006b; Zhang; 2009). This demand for institutional accountability on the part of public institutions' largest consistent source of fiscal resources has made student persistence to graduation just as much of a concern of the institution as it has been for the student (Burke & Minassianns, 2001; Titus 2006a, 2006b; Zhang, 2009). Consequently, the need to go beyond the student level predictors of graduation has taken on a heightened sense of urgency. Therefore, the sources of institutional revenue are just as important as the expenditures that result from them. One should expect student level attributes to play a huge role in telling the story of persistence. However, the portion of the story that remains untold at the institutional level could shed light on why we are still grappling with attrition which seems to be worsening with each passing year.

Purpose of Study

The growing call for institutional accountability is not new (Tucker, 1996). However, linking student outcomes to post secondary funding is a more recent proposition (Klein; 2006; Reville, 2006). Specifically, holding colleges and universities accountable for student graduation rates through tying these outcomes to funding is a strategy normally reserved for K-12 institutions. However, scarcity of state and federal funding has made this pay for

performance model a real concern for all postsecondary institutions in general and public colleges and universities in particular (Archibald & Feldman, 2007; Burke & Minassians, 2001; Cragg, 2009; Klein, 2006; Manning, 2008; Reville, 2006). Yet, there is so much that we don't know about post secondary fiscal resources and their impact on student outcomes. Like many other organizations, colleges and universities rely on more than one source for resources. The degree to which any one particular source influences HEIs' ability to successfully educate and graduate students has only begun to be explored (Titus, 2006a, 2006b; Winston, 1999, Zhang, 2009).

The scant research that does exist on institutional impact on persistence to graduation affirms the importance of student engagement in the institution via some facet of the college or university (Astin, 1977; Del Rios & Leegwater, 2008; Tinto, 1975). However, in the face of dwindling levels of public funding and fierce competition for private dollars, how does a higher educational institution underwrite these projects? What little we know about HEI's impact on student retention or the other side of the coin, attrition, indicates that institutional level dynamics do have a role to play (Berger, 2002a, 2002b; Ziskin, Hossler, and Kim, 2009; Kuh, 2002; Jones & Braxton, 2010). The fact that institutional funding sources are now being linked to one particularly important outcome, graduation rates, reinforces the urgency of uncovering exactly how institutions affect student attrition and influence persistence to graduation. However, we are still learning more about the role of HEIs. It is more than plausible to link HEI's ability to cultivate an environment conducive for student success to the fiscal resources at their disposal. Yet, with the paucity of literature on the relationship between institutional fiscal resources and student persistence to graduation, the expectation

that any policy can be crafted to effectively address this relationship is unrealistic. Hence, the purpose of this study is to examine the relationship between public HEI's fiscal resources and student persistence to degree completion. Consequently, building upon the studies of researchers such as Titus (2006a, 2006b), Hearn (2003a, 2003b), and Winston (1999), this study investigates the relationship between research that examines institutional organizations through a fiscal lens, revenue sources and credit ratings, and graduation rates. In order to determine the nature of these aforementioned relationships, I will use a framework shaped by resource dependence theory.

Research Questions and Statistical Methods

This study seeks to answer two research questions: (a) What is the relationship between a public institution's credit rating and graduation rates? and (b) What is the relationship between fiscal resources and graduation rates at public HEIs? To answer these questions, two data sets were analyzed; Integrated Postsecondary Education Data System (IPEDS) and Moody's data from 2005 and 2007. Propensity score analysis was conducted to predict the credit rating of Public HEIs. Multiple regression was conducted to analyze the relationship between HEIs' institutional level financial variables and graduation rates.

Significance of the Study

Practical Significance

This study holds transformational implications for institutions. Firstly, as an increasing portion of federal and state institutional funding becomes tied to degree completion, an institutional plan of action that yields improved student outcomes such as persistence and degree completion will bring forth much needed additional fiscal resources

that can help to ensure the ongoing operation of these organizations. In a similar vein, findings from the study may help institutions to establish an empirical basis for enrollment management policies that links institutional fiscal decision making more directly to persistence and degree completion, both of which are linked. Thirdly, inasmuch as student attrition has been shown to be a costly proposition for institutions that must incur recruitment costs to fill spaces left vacant by students failing to persist to degree completion, effective revenue structure may help colleges to achieve both efficiency and effectiveness (Meeth, 1970). Consequently, many institutional leaders are seeking ways to improve retention rates on their respective campuses while becoming more vocal about the necessity of institutional proactivity. Such an approach to enrollment management could offer administrators and other institutional professionals the means by which to lay out a plan to stem the tide of student attrition.

Research Significance

This study builds upon the emerging literature, which has either focused exclusively on the relationship between HEI expenditures and student outcomes (Pike, Smart, et al., 2006; Titus, 2006a) or has focused only on the impact of donative revenue on student outcomes, such as graduation rates (Winston, 1999). In many ways, it expands the body of knowledge to which researchers such as Titus, Winston, and Hearn have contributed. Unlike Titus (2006a, 2006b 2006c), this research focuses on revenues instead of expenditures. Revenue structure facilitates institutional expenditures and therefore must be considered just as seriously. In addition, whereas Hearn addresses diverse revenue streams (2003a, 2003b), this study analyzes revenue structures. While revenue diversity is quite important, so to is the

source of revenue. Moreover, Hearn's research did not link fiscal structure to student outcomes, whereas this study explores the nature of such this relationship.

Also, while Winston (1999) focuses primarily on donative revenue sources, this study looks at a much broader array of revenue sources. Donative revenue, while very important to the viability of a college or university is by no means the only source of revenue. Therefore, in order to better understand this complex relationship, this study broadens its focus to include other streams. Lastly, but equally important, the prior research has not addressed the influence of institutional credit ratings on student outcomes. Credit ratings are an important fiscal indicator because they impact an institution's ability to generate revenue (Weisbrod et al, 2008).

Additionally, this research is significant to education policy makers because it expands our understanding of the factors that affect graduation rates and assists policy makers in making decisions about expanding or limiting certain types of revenue streams. Much research has been conducted about the predictors of student graduation. Student socio-economic status (SES), initial educational aspirations, academic ability, age, part-time vs. full time status, any jobs worked in addition to attending school, first generation college attendees vs. non-first year, and student engagement affect a student's likelihood of persisting and ultimately graduating from college (Astin, 1977; Bean, 1980; Caison, 2005; Horn & Carroll, 1998; Tinto, 1993; Young, 2004). This research expands our understanding of the role of institutional characteristics in student degree completion, notably institutional revenue variables. Consequently, the findings can inform researchers' development of degree completion models, improving their ability to explain and predict persistence.

Limitations and Delimitations of the Study

As a point of exposition, there are some related areas that fall outside the scope of this study. Given the exclusive focus on institutional level dynamics, this research is not designed to directly consider student level effects on persistence, such as high school performance. While assuming such a strategy is indeed a tradeoff, it is part of a deliberate attempt to expand the body of knowledge of persistence to degree completion by analyzing this situation from a different yet equally important vantage point. Additionally, it is important to keep in mind that as is the case with any analysis utilizing secondary data, this study is limited by the availability of variables in the dataset. This study, which utilizes the Integrated Postsecondary Education Data System (IPEDS), is no exception. The data found in IPEDS is a composite of student data. Consequently, inferences about individual students would be based solely on aggregated statistics drawn from participating institutions. This phenomenon known as an ecological fallacy assumes that individual students will possess all traits and characteristics based on the institution they attend. In other words, the group data may be treated as if it were individual data (Connolly, 2003; Raghunathan, Diehr, & Cheadle, 2003; Steel & Holt, 1996; van Poppel & Lincoln, 1996). In actuality, this may not be the case.

Finally, another limitation of this study is the fact that this study was unable to test for the relationship between endowment revenue and graduation rates among private, four year, colleges and universities. This is due to the fact that while public colleges and universities are required to report the financial activity of their foundations, where endowment revenue is managed, private institutions are not compelled to do the same and therefore there is no uniform account in IPEDS that reflects the endowment income of private colleges and

universities. Therefore, while the relationship between endowment revenue and graduation rates among public universities can be directly analyzed, the same analysis could not be conducted for the private institutions in this study. Due to the fact that the literature has established a relationship between endowment revenue and institutional viability and going concern (Weisbrod et al, 2008; Winston, 1999), the inability to directly assess the degree to which this revenue source impacts graduation rates would undermine this study. As a result, private institutions are not analyzed in this study.

Definition of Key Terms

The issues of student persistence and degree completion not only span several decades but also several disciplines. As such, several terms have been appropriated into the lexicon to describe various aspects of this phenomenon. Consequently, to ensure clarity and apperception, operational definitions drawn from the literature have been utilized to facilitate this discussion.

Attrition is a term that refers to a particular circumstance wherein students do not remain enrolled at an institution for consecutive semesters for some predetermined period of time (Bahr, 2009; Seidman, 2005). Usually, this predetermined period of time will be either six years, which is 150% of what is considered the normal time to degree completion (U.S. Department of Education, Center for Education Statistics, 2009), or actual time to degree completion. For the sake of this study, actual time to degree completion will be the previously referenced time frame of six years.

College / University are two terms that will be used interchangeably in this study to refer to any four-year degree granting postsecondary institution.

Degree Attainment/ Degree Completion occurs when a student completes the requirements for a four year degree at a college/university.

Endowments are donations made by benefactors to an institution. In many cases the donations are monetary in nature but can also include assets such as land, art, or other property. For the purposes of this research, all references made to endowments will refer to either monetary donations or asset donations that have liquidity, meaning they can be converted into cash relatively easily. Monetary endowments are funds that consist of nonexpendable principle and interest income. The interest income is generated from investing the principle and is used for institutional operating expenses, thereby offsetting the need to use revenue generated from tuition and other operational activities to underwrite day to day operations. This type of endowment is also referred to as a true endowment (IPEDS, 2010). For the purposes of this study this research will utilize the same definition for endowments as does the National Center for Educational Statistics' (NCES) panel data set know as the Integrated Postsecondary Education Data System (IPEDS). In addition to a true endowment, IPEDS also classifies *term endowments* and *funds functioning as endowments* as an endowment. Likewise, this study will use the term endowment when referencing any of these three terms.

Funds Functioning as Endowments is a term that IPEDS refers to as “funds established by the governing board [of an institution] to function like an endowment fund but which may be totally expended at any time at the discretion of the governing board” (IPEDS, 2010). Examples of *Funds Functioning as Endowments* include private gifts and bequests.

Going Concern is a term common in both business and accounting. It refers to the assumption that a company will operate for the foreseeable future without becoming insolvent.

Higher Education Institutions (HEIs) used to describe both public and not-for-profit institutions. While this term applies to both 2-year and 4-year post-secondary institutions, for the purposes of this study, it will only be used when referencing 4-year institutions.

Human Capital Theory is a framework often applied to the decision making process individuals use in order to make decisions about their level of investment in higher education (2002 Paulsen, 2001a; Thomas & Perna.). Similarly, human capital theory is also applied to institutional level decision making to explain various strategies such as recruitment, investment, and fund raising. According to Paulsen, “human capital can be defined as the productive capacities [such as] knowledge, understandings, talents, and expenditures on education, health and other activities that augment these productive” (Paulsen, 2001b).

Institutional Commitment is a term that describes student level commitment to the institution, which is determined by the perceived benefits associated with attending a particular institution or type of institution offset by the corresponding costs (Tinto, 1975).

Institutional Departure – see *Institutional Level Withdrawal*.

Institutional Level Withdrawal describes what happens when a student leaves a particular institution (Seidman, 2005; Tinto 1975). This term is sometimes referred to as *Institutional Departure* (Seidman, 2005). For the purposes of this study both these terms will be use interchangeably.

Involuntary Departure – see *Involuntary Withdrawal*

Involuntary Withdrawal occurs when the student departure process is initiated by the institution instead of the student (Seidman, 2005; Tinto, 1975). This term is sometimes referred to as *Involuntary Departure*.

Mortality is a term used to describe what occurs when a student fails to remain enrolled in college until graduation (Seidman, 2005).

Non Profit or Not-for-Profit Institutions (NPOs) a term used to describe any organization that does not distribute surplus funds to owners. It will be used to describe both public and private not for profit colleges and universities. It may also be used interchangeably with HEIs (*HEIs*).

Persistence is a term that is used to describe the act of a student staying within the “system of higher education from beginning year through degree completion” (Seidman, 2005, p. 7).

Resource Dependency Theory postulates that an organization’s ability to achieve an outcome is determined by the environment in which it must operate. Therefore, in order to survive, let alone thrive in an uncertain environment, organizations must be well aware of their strengths, weaknesses, opportunities, and threats. Such awareness will better position an institution to reduce uncertainty while affording them an opportunity to maximize their power by obtaining resources that accomplish one or both of the following: (a) make the institutions less dependent on other organizations, and (b) make other organizations more dependent on the institutions. According to St. John and Parsons (2004), “[r]esource dependency theory argues that institutions substitute for the erosions of one revenue source by increasing revenue from other sources” (p. 142). Traditionally, resource dependency

theory has described institutions to be proactive players seeking opportunities and not merely reactionary respondents.

Retention is a term that refers to an institution's capacity to "retain a student from admission through graduation (Seidman, 2005, p. 7).

Revenue Structure refers to the sources of institutional revenue. In order to safeguard against overdependence on any one source and thereby lessen the likelihood of vulnerability due to limited sources of income, it is suggested that institutions have multiple sources of revenue (St. John & Parsons, 2004; Hearn, 2003).

Revenue Streams simply refers to the various sources of revenue available to an institution (Hearn, 2003).

Stopout, according to Seidman (2005), "refers to a student who temporarily withdraws from a college or university campus" (p. 7).

System Level Departure – see *System Level Withdrawal*

System Level Withdrawal is the process of a student leaving the higher education system altogether (Seidman, 2005). This term is sometimes referred to as *System Level Withdrawal*.

Term Endowments is a term that per IPEDS refers to "funds for which the donor has stipulated that the principal may be expended after a stated period or on the occurrence of a certain event" (IPEDS, 2009).

Voluntary Departure – see *Voluntary Withdrawal*

Voluntary Withdrawal is a situation that occurs when a student initiates institutional departure by deciding not to reenroll (Seidman, 2005; Tinto, 1975). This term is sometimes

referred to as Voluntary Departure.

Withdrawal, according to Seidman, (2005), “refers to the departure of a student from a college or university campus” (p. 7).

Organization of Study

Chapter 1 provided an overview of the study. It described the factors contributing to student degree completion. Also, chapter 1 presented an overview of the challenges facing post secondary institutions as they grapple with dwindling public funding and a call for more accountability from state governments as well the federal government. Chapter 1 presents the dilemma faced by these institutions as they grapple with an increase in both student attrition levels and the call for more fiscal revenue appropriated to HEIs based on graduation rates. Chapter 2 provides a review of both classical and recent scholarship on retention, attrition, goal commitment, institutional commitment, resource dependency theory, human resource theory, and institutional organizational behavior and its impact on student outcomes. It concludes with a review of the most recent studies of institutional organizational behavior, which emphasize the paucity of existing research that examines the relationship between institutional financial structures and student outcomes such as persistence, attrition, institutional commitment, degree completion, and institutional goals such as retention (often referred to as the institutional equivalent of persistence). Chapter 3 presents the research methodology used in the study, which includes a description of the research design and methods. Chapter 4 presents the study’s findings, and chapter 5 summarizes key findings of the study, addresses the study’s limitations, and discusses the theoretical and practical implications. Finally, chapter 5 makes recommendations for future research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Retention is just as much an institutional phenomenon as it is a student level one. Moreover, persistence and retention are merely two sides of one coin. Students' decision and corresponding action to remain enrolled in the school of initial matriculation until degree completion is equivalent to the institutional ability to maintain the enrollment of and successfully graduate students originally enrolled in the institution (Berger & Lyon, 2005; Mortenson, 2005). Berger and Lyon (2005) raise this point in their discussion of retention which they define as "the ability of a particular college or university to successfully graduate the students that initially enroll in that institution" (p. 3).

This chapter provides a review of relevant literature. The review of the literature is divided into two sections. Section one begins by focusing on the organizational theory known as resource dependency. The second section focuses on the theoretical and empirical literature on student persistence. It begins by exploring Tinto's (1975) seminal work wherein he maps out a schema of factors leading to student dropout decisions. It then details the subsequent research spawned by Tinto's (1975) work. The literature on institutional predictors of persistence is also summarized. In the final section, the paucity of literature on institutional fiscal policy is discussed, including current studies exploring the relationship between institutional fiscal resources and graduation rates.

Organizational Behavior

Resource Dependence Theory

Resource dependence theory postulates that an organization's ability to achieve a particular outcome is bounded by the environment within which they operate (Arya & Lin, 2007; Oliver, 1991; Rowley, 1997). Naturally, these environments are contextualized by many factors, including inter-organizational relationships that exist between all entities (Pfeffer & Salancik, 2003). Therefore, in order to thrive, let alone survive in an uncertain environment, organizations must be well aware of not only their strengths and weaknesses, but also their opportunities and threats created by the balance of power present in each relationship (Casciaro & Piskorski, 2005; Pfeffer & Salancik, 2003). Such awareness will better position an organization to reduce uncertainty and, in doing so, afford them an opportunity to maximize their power to cultivate relationships with other entities that will result in the acquisition of needed resources. Ultimately, most organizations will seek to minimize their dependence on any one entity while simultaneously creating and intensifying other organizations' dependence on them (Arya & Lin, 2007; Oliver, 1991; Rowley, 1997). This process is referred to as constraint absorption (Casciaro & Piskorski, 2005). For HEIs absorbing constraints can be achieved through multiple sources of revenue, thereby reducing encumbrances and restrictions that could limit what these institutions are able to do with their resources. Therefore revenue structure is an important consideration for institutions crafting strategy to improve student outcomes such as graduation rates.

Pfeffer and Salancik (2003) argued that people are inclined to attribute organizational outcomes to individuals instead of the environment in which the organization operates.

However, as they posit, many of the things that impact organizational outcomes are not controlled by organizational participants. Often times, the answers are found in the ecological constituents that along with the organization itself create the conditions of the environment. Organizations are coalitions and as such, each organization operates as a complex adaptive system, consisting of individual actors that come together and splinter from one or more groups within the organization. For each actor, their objective is to satisfy their own agendas and meet their own needs. However, to do this, they must work in a way that does not impede other coalition members from doing the same. Therefore, the actors interact and exchange information and resources.

There are competing conflicts and demands that must be managed (Pfeffer & Salancik, 2003). Successful management of these conflicts and demands is both an art and a science. According to Pfeffer and Salancik, the focal organization is just as much a coalition actor as any other group of actors with which it interacts. Therefore, organizational managers must successfully navigate the waters yielding as little as possible while conceding what it must in order to get what it needs and ultimately support its mission. These dynamic interactions create what Pfeffer and Salancik refer to as a quasi-market place. With this market place environment, coalition actors are influenced by each other. They contribute and compensate, give and take, and modify and adapt, as needed in order to ensure their survival. In HEIs, coalition actors range from local, state, and federal government at one end, to students and society in general at the other end. Each of these constituents has its own set of demands and pressures with which HEIs must deal. When analyzing the effect of organizational decision making on students, one must not only factor in the process by which

individuals arrive at these decisions, but also the context in which these decisions are being made. This includes the financial context. These institutions are not acting alone. Their success is in part based on how effective they are at coalescing with others in order to secure the resources needed for them to achieve their mission. One strategy utilized in this effort is multiple sources of revenue.

In a comprehensive literature review of multiple revenue streams and non-profit organizations (NPOs), Froelich (1999) showed that while not free of challenges and constraints, multiple sources of revenue lessened resource dependence and promoted organizational autonomy. Revenue streams from private contributions, grants, and government funding are not new to NPOs, including colleges and universities. Yet, according to Froelich, these conventional streams can often result in process and structural constraints, revenue volatility, and goal displacement. In contrast, some streams of revenue, commercial activity in particular, is perceived as a corruptible influence that could cause the current distinguishing lines of the non-profit and for-profit sectors to one day become indistinguishable. However, this concern alone does not marginalize the importance of commercial activity as a viable revenue source for NPOs. Unlike sources from private contributions, revenue generated from commercial activities often promotes autonomy while also reducing the likelihood of goal displacement as well as process and structural changes. While each stream is fraught with its own drawbacks and advantages, most NPOs seek some optimal combination of each in order to maintain going concern.

Organizational going concern depends largely on an organization's ability to acquire resources, which are by nature finite and scarce (Froelich, 1999). As such, organizations

often find themselves obliged to adhere to the demands and conform to the requirements of other entities that either directly or indirectly have access to resources they are unable to obtain independently. Such an open-systems perspective means that organizations interact with and depend on the environment in order to survive. Consequently, effective organizations seek to manage their dependence by a combination of tactics that include ensuring adherence to the requirements of resource providers, seeking to acquire “countervailing power”, seeking to forge relationships with other potential resource providers, and seeking to circumvent resource providers altogether in an effort to produce the resource or an acceptable substitute. These principles are true in the case of nonprofit organizations as they are with any other organization. However, as Froelich pointed out, in the case of non-profits and similarly structured organizations, dependence management often leads to concern that non-profits may be assuming the role of the less noble for-profit entity. For nonprofit organizations, philanthropic gestures and strategically aligned networks are as elemental to these institutions as the missions which define them.

Heimovics, Herman, and Jurkiewicz (1993) used resource dependence theory to shape their exploration of the ways in which successful chief executive officers (CEOs) of NPOs are able to find resources and strengthen the missions of the organizations they lead. They concluded that because of their resource dependence, effective CEOs were more likely to use a political frame whereby they utilize bargaining, negotiating, and alliance and consensus building, among other skills, in an effort to secure scarce resources from potential providers. Overall, successful CEOs were found to utilize the most appropriate framework for a given situation in an effort to secure resources and cultivate strategic relationships.

Because all NPOs interact with their environment, by their very nature, they are open systems. Successful NPOs go about these interactions seeking to coalesce with others in their environment (1993).

Additionally, successful NPOs are ever mindful of what is called for in their environment in order to maneuver accordingly, thereby increasing the probability of acquiring non material resources, such as forging relationships that will enable them to carry out their mission (Arya & Lin, 2007; Heimovics, et al., 1993). Additionally, organizations that rely heavily on resource providers as their primary source of revenue are more likely to allow these contributors to dictate the way in which the proceeds are spent (Barman, 2008). Heavy reliance on external resources is referred to as donor choice and is more prevalent among organizations that are either small, have limited loci of resources, located in highly diverse areas, or some combinations of these and other factors. In investigating the factors that shape NPO capital structure, Yan, Denison, and Butler (2009) looked at various sources of revenue among not-for-profit art organizations. In determining financing decision via equity or debt, the researchers determined that art organizations with multiple sources of revenue were more likely to issue debt than their counterparts with less diverse revenue streams. Multiple streams of revenue create a coinsurance effect resulting in greater firm debt capacity due to the fact that these NPOs are often combining business with uncorrelated earning streams (Yan et al., 2009).

HEIs also operate in an open system. As such, they depend on resources from various entities to insure their going concern. Prior to the 1980s, a great deal of HEIs' fiscal resources came from federal government. However, changes in policy around education

funding resulted in drastic cuts in appropriations. This environmental change resulted in state governments and students having the responsibility of underwriting post secondary education. However, Reacting to these environmental changes, some institutions responded by soliciting alumni and community members for donations. Other institutions responded by seeking research grants or pursuing contracts. Regardless of the institutional response, each decision held consequences, not only for the institutions but the students attending them. Since the 1980's state appropriations have been the largest consistent source of funding for public HEIs. Now, with increasing calls for performance driven funding, the landscape is threatening to change once more.

Retention and Persistence

Classic Arguments

Applying Durkheim's (1951) theory of suicide to dropout, Tinto (1975) formulated a longitudinal theoretical model wherein dropout decisions are the result of a student's level of both goal and institutional commitment by way of academic and social integration.

Academic integration. Academic integration refers to the degree to which a student understands and conforms to the scholastic norms of the institution in which they are enrolled. In Tinto's conceptual schema, academic integration is a function of academic growth which is measured by the institutional academic system, a compilation of both the students' grades and their degree of intellectual development that has taken place while in college (Tinto, 1975). Grades are a more extrinsic metric while intellectual development is a more intrinsic measure. The institutional academic system influences student academic integration which, in turn, acts upon a student's level of goal commitment and affected a student's decision to drop out. While grades and intellectual development are both student level factors, they are influenced by several institutional level interventions such as libraries, tutors, academic labs, and academic support programs. These institutional programs are underwritten by financial resources. Therefore the quality of these programs is a function of the availability of financial resources.

Goal commitment. Goal commitment refers to a student's individual educational expectations and the "intensity with which the expectation is held" (Tinto, 1975, p. 93). A student's level of goal commitment is initially shaped by the multidimensional process of interactions between one's family background, individual attributes, and pre-college

schooling. This composite of attributes, sometimes referred to as habitus (Perna, 2006), is mediated by the institutional academic system. Then, acting as an input variable, goal commitment directly impacts one's experience in the higher education academic system by impacting both grade performance and intellectual development, which, in turn, act upon academic integration. Academic integration then serves to modify goal commitment.

According to the longitudinal model presented by Tinto (1975), goal commitment ultimately acts as one of two process variables, directly impacting an individual's decision to dropout (Tinto, 1975). Since goal commitment is acted upon by academic integration, the financial resources that have an impact on the quality of institutional programs, which influence the institutional academic system (grades and intellectual development at college), also influence goal commitment.

Social integration. Social integration refers the interaction between the student and other people on the campus (Tinto, 1975). These interactions are influenced by both the characteristics of the student and those with whom they interact. Tinto's conceptual schema posits social integration to be a function of the institutional social system, which is made up of both peer-group and faculty interactions. The institutional social system influences student social integration which, in turn, acts upon a student's level of institutional commitment and influences a student's decision to drop out. Interactions that facilitate social integration take place not only in classrooms, but also within the other institutional environments that students encounter. In addition to the classroom itself, venues such as campus movie theatres, dormitories, dining halls, student unions, and student gymnasiums are all settings where social integration takes place at an HEI. Establishing and maintaining these facilities requires

fiscal resources not always available to institutions with limited sources of revenue. Consequently, institutions with comparatively few fiscal resources are not able to take advantage of as many opportunities to cultivate an atmosphere where social integration can take place compared to institutions with multiple sources of revenue.

Institutional commitment. According to Tinto (1975), institutional commitment, like goal commitment, directly affects an individual's decision to dropout of college or university. Tinto asserts that institutional commitment informs the degree to which one interacts with both their peer-groups as well as with faculty. Institutional commitment is determined by the perceived benefits associated with attending a particular institution or type of institution offset by the corresponding costs (Tinto, 1975). Acting as an input variable in the model, institutional commitment is initially influenced by a student's habitus. Upon entering college, the student's level of institutional commitment acts on their social system, which, in turn, influences institutional commitment by way of social integration.

Building on Tinto's work, Peng and Fetters (1978) drew upon data from a national longitudinal study of 1972 high school students to determine the difference between those who attrited and those who persisted to degree completion. Their research findings showed that students that persisted were more likely to come from higher socio economic status (SES). Peng and Fetter also found that these students exhibited higher ability and achievement. Also using Tinto's (1975) findings as a springboard, Pedrini and Pedrini (1978) conducted a study involving students at the University of Nebraska. The researchers found that in addition to GPAs, institutional programs such as comprehensive counseling positively impacted student persistence. Similarly, Pascarella and Terenzini's (1979) longitudinal study

consisting of students at a New York State University indicated both institutional and goal commitment positively impacted persistence, especially males.

With Tinto's (1975) model as a widely used guide-evident by the fact that it has been cited over 600 times since its original publication-there is a plethora of research that demonstrates that student level factors lie at the epicenter of the persistence and retention discussion. However, what is equally incontestable is that the institutional environment that the students encounter is relevant to student persistence and retention. Researchers; such as Astin (1977) and Bean (1980), have also contemplated some institutional level factors. According to Astin (1977) drop-out occurrences could be reduced by increasing the levels of student engagement on college campuses. Astin posited that one way to accomplish such a goal would be to increase the availability of various types of institutional programs on college and university campuses. Applying a model developed to predict turnover in work organizations, Bean (1980), sought to explain student attrition. Of the twenty one variables analyzed, institutional commitment, defined in the study as "the degree of loyalty toward membership in an organization", was the most highly correlated factor with student attrition (p. 160).

Contemporary arguments. Scholars that shaped mainstream ideology continue to assert some of its most classic tenants. For example, Astin (2006) considered the danger in the over reliance on retention rates as an indicator of school quality or as a predictor of the individual likelihood of persistence to degree completion in four to six years. Specifically, his study of 262 baccalaureate universities and colleges showed degree completion rates vary widely, from as low as 18% to 96%. Predictors of degree completion, such as freshman

predictors, environmental contingencies, and college characteristics showed that student GPA, composite SAT scores, years of foreign language study, years of physical science taken in high school, and hours of week spent studying and doing homework, were all positive indicators of degree completion. Demographic factors such as the level of education obtained by a student's family were also good predictors of degree completion. Astin also found that students' positive self concept were positive predictors while behaviors such as smoking and students working were found to be negative predictors. Other factors such as living on campus and financial aid were found to be positive predictors, while certain majors such as the health professions, fine arts, and engineering were all found to be negative predictors. Astin's latest research supports the classic argument that student level demographic factors are central to the retention argument. However, what we know from other disciplines (Arya & Lin, 2007; Oliver, 1991; Pfeffer & Salancik, 2003; Rowley, 1997;) as well emerging findings from research on higher education (Berger, 2000; Bound & Turner, 2007; Jones & Braxton, 2010; Kuh, 2002; Titus, 2006a, 2006b, 2006c, 2010) is that it is important to broaden our analytical scope in order to consider a wider array of institutional level factors that predict persistence and retention.

With researchers only recently having begun to focus on institutional level predictors of persistence and degree completion, the conversation remains mostly conceptual and disjointed. However, some researchers are beginning to increasingly point to the importance of institutional characteristics on degree completion. Bean and Bogdan-Eaton (2002), for example, explained the process by which student retention occurs by analyzing the psychological impact of institutional programs on students. Student psychological outcomes

such as improved coping skills, a more inward oriented locus of control, and confidence in their academic and social adroitness were all positively related to service learning, learning communities/freshman interest groups, freshman orientation seminars, and mentoring. Consequently, it is presumed that students in these programs will also be more likely to be academically and socially integrated into the institution, and thus more likely to persist to graduation.

Jones and Braxton (2010), Kuh (2002), and Berger (2000) have begun to explore the relationship between an institution's organizational culture and student persistence. Specifically, they have focused on creating frameworks that can explain how formal and informal norms and practices create an environment that either facilitates or impedes student outcomes. In a study designed to determine exactly what steps institutions are taking to improve retention and degree completion among college and university students, Jones and Braxton (2010) surveyed 54 colleges and universities in eight different states. The scholars found many colleges and universities are not conducting campus-based research of student retention. This finding is not surprising when one considers the fact that many colleges and universities have long operated under the notion that it is incumbent upon the students to conform to the demands of the institution in order to achieve postsecondary academic success (Astin , 2006). This sentiment, however, is counterproductive and only serves to undermine any efforts to improve student persistence rates. To remedy this problem, Jones and Braxton (2010) strongly urged college and university administrators to provide funding to conduct institutional research.

In writing about organizational culture and its relationship to student persistence, Kuh (2002) discussed various principles of organizational culture. According to Kuh, colleges and universities that clearly formulate and articulate their educational philosophy as well as consistently act on those principles while also encouraging and appreciating community are more likely to be successful at conveying to students what the institution deems to be important while also helping them experience academic and social success. Kuh also asserted that strong communities are fostered through attributes such as encouraging and promoting diversity, facilitating good internal communications, shared leadership, consideration, concern, cultivating good governance, and care for the young (2002, p. 28). A five state study of 274 schools conducted by Ziskin, et al (2009) found that institutional roles and behaviors do relate to student persistence. Specifically, having first year students live on campus and the level of funding allocated to instructional expenses both predicted student persistence.

Berger (2000) critiqued the siloed approach that researchers have utilized in analyzing the various factors predicting student outcomes. He pointed out that analyses conducted at the institutional level often relied upon organizational predictors collected from primary data sources, while utilizing secondary data sources, such as aggregated student scores, to ascertain the effect of institutional predictors. Similarly, investigations conducted at the student level often fail to integrate institutional level predictors that research has shown to have an impact on student outcomes. The utilization of organizational theory would be more than suitable to bridge the analytical disconnect and thereby contribute to the research on this topic by explaining the ways in which institutional decisions impact students. In

doing this student effects can be appropriately considered when policies are being crafted.

In his article, Berger (2000) used organizational theory to create an analytical framework that explores the ways in which various dimensions of college organizational behavior combines to create the environments that impact student outcomes. Referencing the five elemental units of organizational behavior: (1) bureaucratic, (2) collegial, (3) political, (4) symbolic, and (5) systematic, Berger put forth the notion that like other organizations, colleges and universities possess each of these five building blocks, albeit at different levels. According to Berger, variation in the building blocks results in each institution's unique organizational environment, which, in turn, impacts student outcomes. Berger then used an instrument that he developed, The Survey of Organizational Dimensions (SOD), to measure the degree of each of the five organizational elements found at the institutions. In his study, analysis of aggregated scores revealed three emerging environmental patterns: competitive, casual, or cohesive.

Competitive environments are characterized by low levels of collegiality, medium levels of bureaucratic, symbolic, and systemic behavior, and high levels of political behavior (Berger, 2000). Institutions fitting this profile were described as highly competitive for the institution's resources. However, they were also shown to lack both participatory and collaborative traits. In casual environments, institutions operate with low levels of bureaucracy and medium levels of collegiality, symbolic, systemic, and political behavior. As a result, these institutions operate more informally with less rigor and an equal distribution of attributes such as collegiality, resource allocation and sharing, use of symbols such as shared vales, and open systems. Institutions operating in a cohesive environment are

typically ones with low levels of resource competition and low level of open systems. Yet, in terms of shared values, social and cultural cues, collaboration and collegiality, and formalized goal setting and hierarchical structure, such institutions operate at high levels. Based on these categories, Berger developed a theoretical model that explains the relationship between higher educational organizational behavior and student outcomes. While such a contribution is laudable because it begins to build the body of knowledge on the direct impact of higher education organizations on student outcomes, it is limited, even Berger concedes, in that it only explores humanistic values and community service involvement while failing to consider outcomes such as persistence, completion, or academic performance.

Titus (2006a, 2006b, 2006c) built upon this body of knowledge by addressing the aforementioned shortcomings in Berger's (2000) work. In a series of studies conducted using two national data sets, Titus explored the nature of the relationship between institutional level revenue and expenditures and their subsequent influence on student degree completion. In all three studies, the percentage of an institution's revenue derived from tuition and total expenditure per full time equivalent (FTE) were positively associated with student degree completion. Titus also concluded that expenditures on administrative functions were negatively correlated to student persistence (Titus, 2006a). Yet, in a subsequent study (Titus, 2006c), percentage of funds expended on administration was found to have no effect on persistence. Titus (2006b) also looked at the role that state appropriations to colleges and universities play in student persistence. The study showed that the percentage of state grant money appropriated for higher education operating expenses also positively impacted student

persistence levels.

In one of Titus' most recent studies, he continues this line of inquiry. Attempting to look at a larger unit of analysis than the institution, Titus (2010) explored the roles that states play in degree completion by examining how the fiscal aspects of state higher education impact undergraduate degree production. Titus' rationale for state-level analysis was based on the fact that over one-third, and in some cases, nearly half of all students in higher education attend more than one institution in a state. Consequently, Titus argued for the appropriateness of state level analysis of higher education in lieu of an institutional analysis, which by his own admission consists of only a "[small] body of student retention research" (p. 9). While his findings confirm conclusions drawn by previous research (e.g., Bound & Turner, 2007; Volkwein & Tandberg, 2008), it does not expand our understanding of the fiscal impact on degree completion on degree attainment beyond what we already know about the relationship between financial aid and tuition and degree completion.

Sources of revenue. Like firms in other industries, colleges and universities depend upon the resources at their disposal to accomplish their goals. Therefore, it is incumbent upon these institutions to acquire as many resources as they can to achieve this end. Historically, the status quo of institutions of higher learning have centered on the pursuits of "excellence, prestige, and influence" (Hearn, 2003, p. 5). Consequently, such lofty and boundless goals led institutions to seek to raise and subsequently spend all the money they could. Such a strategy is somewhat understandable when one considers the demands that colleges and universities face to expand their capacity, stimulate economic development, and maintain market position in the face of a burgeoning for-profit model. Yet, in the face of increased

competition of the foreign, domestic, private, and public persuasions, raising funds to achieve these ends is definitely more challenging than at any other time in the history of American post-secondary education.

Colleges and universities generating multiple revenue streams is a direct response to the dwindling availability of traditional funding sources coupled with increased competition from both for-profit and more traditional not-for-profit institutions (Hearn, 2003). One of the main goals of diversifying revenue streams is the generation of new net returns and not just merely producing new sources of revenue (Hearn, 2003, p. iii). Consequently, in an effort to maintain and grow market share, institutions are implementing what has been described as business like strategies.

According to Weisbrod, Ballou, and Asch, (2008), institutions must determine not only the mission they will pursue, but also how they will finance its pursuit. The mission of higher education in the American academy is a three-tiered model consisting of instruction, research, and service (Weisbrod, Ballou, and Asch, 2008). Each facet is a noble and laudable charge. Yet, as Weisbrod, et al. (2008) pointed out, while each facet of this mission is socially valuable, they are also organizationally unprofitable. In their words:

In the assessment of higher education there are two essential truths: services that can be sold profitably do not need public subsidies. Services that cannot be sold profitably, either because the beneficiaries are poor or the benefits are so dispersed that beneficiaries cannot be excluded from the benefits – knowledge stemming from basic research and public service activities of colleges and universities – will not be provided by for-profit schools and

cannot be provided by public or nonprofit universities without subsidization.

(p. 3-4)

Therefore, the necessity of resources to underwrite college and university missions speaks to the importance of institutional revenue streams. As the authors point out, “expenditure decisions by any organization are linked closely with its revenue source” (p. 10). In addition to revenue sources such as tuition, government contributions, and endowments, institutions are also looking toward areas such as patents from faculty inventions and partnerships with other entities as other sources of revenue. When considering the importance of revenue, one must consider the various factors that impact institutions’ ability to generate it. Like organizations operating in any other industry, credit rating significantly impacts their ability to generate revenue. This point is not lost on institutional executive leadership as they seek to find ways to both maintain going concern and establish a competitive edge.

In an address given in 2000 at the University of Washington, James J. Duderstadt, President Emeritus of the University of Michigan, Ann Arbor, discussed the importance of high credit ratings as a tool to secure resources through vehicles such as debt issuances and arbitrage (Duderstadt, 2000). Faced with a volatile economy, growing social needs that compete with education, and a “limited will and capacity to support higher education”, public colleges and universities must now operate as quasi privates (p. 5). As such, they too must consider the ways in which revenue streams are affecting student outcomes such as graduation rates. These institutions are grappling with issues of resource availability and its subsequent implications for the level of excellence at which they operate.

According to Winston (1999), the sources of expenses and revenues directly influence both institutional decision making as well as the “long-run viability of a college or university” (p. 13). Focusing primarily on donative revenue sources, Winston addresses the fact that institutions that are able to draw upon more sources of revenue are not only able to deeply discount the cost of the education consumed by their students, but also can provide these students with

...more and better maintained buildings and grounds, more computers, a more distinguished and influential faculty with lighter teaching loads that leave more time for public engagement and research, a richer menu of student services, from psychological to career counseling, better food, and fewer double or triple dorm rooms, smaller classes, more varied courses and programs, more outside speakers and debates, and extracurricular activities that are better funded. All that at a price that’s low relative to the cost of supplying these items (p. 21).

Winston discusses this vicious cycle that characterizes the higher education industry wherein institutions that are able to secure multiple sources of revenue are able to build a more competitive cutting edge institution than institutions with fewer sources of revenue.

Moreover, these institutions are able to aggressively recruit students and faculty; deeply discounting student tuition while simultaneously compensating their faculty at higher rates than less well off colleges and universities. Over time this results in cultivating a permanent underclass of institutions that are less fiscally well off, forced to charge more for an arguably lower caliber education, and unable to provide the necessary programs and student support

that their students need to persist to graduation.

Winston (1999) also asserted that the notion of excellence as it pertains to HEIs refers to the caliber of educational services that institutions are able to provide as well as the equity with which these institutions are able to provide these services. Juxtaposed alongside this, institutional prestige refers to the selectivity/exclusivity with which institutions recruit and admit students. Winston referred to both quality and position as almost an academic caste system wherein certain caliber of institutions (elites, research intensive, land grant, etc.) recruit both students and faculty that will enable them to maintain their station. These institutions rely upon donative revenue to accomplish this, often times from the alumni and other friends of the institution that can help them maintain their stead. Thus, we can see that the source of an institution's fiscal resources and the quality of their educational support system are related to one another.

Winston (1999) discussed both the similarities and dissimilarities of higher education and the mercantile notion of a business (1999). Like a business, HEIs seek to maximize revenue. However, unlike a traditional business, it is not necessarily preoccupied or even charged with maximizing profit. Spending revenue that is generated in strategic marketing and fundraising can ensure that these institutions not only have going concern but uphold a reputation that commands a certain caliber of student. By creating an elite caché of clientele with the right social and, more importantly, cultural capital, institutions can thereby create a donative base via these elite alumni who give and thereby enable the institutions to continue to maximize their revenue and thereby strategically work to maintain the brand.

In a global discussion of multiple revenue streams in higher education Liu, (2007) presented both Russia and China as two case studies. As part of her conceptual framework, Liu used Johnstone's (2004) five primary vehicles of supplementation of governmental with non- governmental revenues: tuition and fees, grants and loans, private sectors, entrepreneurial activities, and philanthropy (Johnstone, Arora, & Experton, 1998). Liu examined the roles that the Chinese and Russian governments can play in facilitating revenue generation from non-government sources. Liu also explored the efforts that higher education administrators in these respective countries can play in utilizing more diverse sources of revenue generating opportunities. Using a framework that consists of both cost sharing theory as well as Johnstone's five vehicle of supplementation of governmental funding with nongovernmental revenues, Liu (2007) discussed the decentralization of Russian and Chinese higher education amid the backdrop of fiscal paucity.

Using Johnstone's (2004) five point model of supplementation of governmental with nongovernmental revenues for higher education organizations: (a) raising and in some cases introducing tuition and fees in sectors of higher education traditionally supported wholly or in part by public revenues, (b) introducing means tested grants and loans, (c) encouraging private higher education supported mainly through tuition and fees, (d) encouraging entrepreneurial activities on the part of faculty or the university, and (e) encouraging philanthropy, Liu (2007) identified opportunities for generating revenue. According to Liu, the dissatisfaction with the rigidities and inefficiencies of the public sector management of higher education has stirred an outcry for a model that shifts the burden of support away from government support of higher education to the perceived direct beneficiaries of higher

education, individuals. So to account for these changes, Liu added a cost sharing model to the conceptual framework that considers the cost of higher education to be shared by the government, students, family or the extended family of students, donors, and the institution through entrepreneurship and other forms of enterprise.

In a critique of higher education finance and its stakeholders, Ward (2007) explained that missions varied across different types of institutions in the United States. According to Ward, governments' market-based policies, institutional entrepreneurial policies, and student selection contributed to the differences in missions. Specifically, the missions of HEIs will reflect the convergence of these factors: customer demand, institutional ability to meet such demand, and governmental policy which can facilitate or impede such a process. At a time when public funds for higher education are shrinking, demand for higher education is growing and a public outcry for more institutional self reliance is getting louder, market based revenues are a growing portion of institutional net revenue. Furthermore, this trend may hold undesirable implications for traditional academic values.

This "expansion of access" (Ward, 2007, p.11) has put a strain on already limited resources and made exploration of revenue opportunities in the market place a necessity. As Ward put it: "Increasingly, governments are questioning their obligation and their willingness to pay the full costs of expanded access and, at the same time, they are actively encouraging higher education to seek alternative revenues" (p.12). The types of models employed by HEIs when seeking revenues are primarily a function of the type of educational institution and its subsequent ability to command a certain level of revenue in the form of tuition. This ability is determined by market forces that influence consumer demand. Relative to supply

and demand, tuition is a sensitive yet immediate source of revenue generation because education is valued and while consumers are willing to pay considerably to consume it, there is a point at which increased tuition results in further educational consumption being prohibitive.

Historically, tuition and fees at public institutions have been quite low and in some extreme cases-such as that of California public HEIs, non existent. However, over time, for some institutions, tuition has become a significant source of revenue (Ward, 2007). According to Ward, the U.S higher education system has relied upon tuition and fee manipulation to respond to the marketplace. For many graduate professional programs as well as established institutions, tuition rates are set comparable to perceived future return on investment in the form of higher salaries compared to what they would have earned had they not attended such institutions. Also, for many institutions, foreign and out-of-state students have become the academic equivalent of ‘cash cows’ due to the markedly higher tuition and fees that these students pay compared to their in-state and domestic counter parts. As Ward noted, “International students for some institutions are clearly a source of revenue and some institutions in the United States, in fact, use high levels of out of state undergraduate tuition fees to subsidize low in-state undergraduate fees” (p.12).

In addition to tuition and fee manipulation, the tug of war that exists between the perception of higher education as a public right versus a private benefit continues to play out. Ward (2007) wrote about the fact that the shift in financing higher education from the government to the individual has brought about a change in sentiment that the benefits of higher education is more of a private good than a public one. He opined “As an increasing

proportion of the financial burden of higher education is now borne by students and their families, it is increasingly assumed that higher education is a private benefit resulting in higher lifetime earnings” (p.13). This shift in perception is due in large part to the policy changes that took place primarily in the 1980’s. These policies reallocated government resources away from higher education funding with the primary justification being that the true benefactors, the individual, should bear the fiscal burden of their own higher education. While institutions of higher learning operate within a model that aligns with policy, they grapple with how to buttress their image as institutions that provides a service from which all members of society benefit instead of being merely sources of training and workforce development.

Until the 1980’s private giving was a revenue source relied upon primarily by the private institutions of higher learning. However with the reduction in the amount of support from the public sector, private giving has become a necessity for state colleges and universities as well (Ward, 2007). Yet, as important as private giving is, substantial contributions are often limited to those elite institutions that are well recognized, possessing an established tradition as leading research institutions for whom private giving is a significant source of revenue. These same institutions benefit from other assets such as intellectual property and real estate. Furthermore, the success experienced by some institutions with endowments has created some false expectations as to what can be realized in smaller institutions with fewer resources available to not only effectively fund raise but also successfully manage the funds they might generate. Successful management is more than ensuring positive returns on assets, but also making sure that proceeds generated are

used in a sensible manner as not to incite stakeholder criticism and ill-will (Ward, 2007). Moreover, it is just as important to implement sound strategy when identifying potential sources of revenue. Institutional partnerships with private outside entities usually only result in a “project-specific investment” (p.15), whereas gifts are “invested in an endowment for future needs” (p.15). All of the aforementioned issues are important because they influence an institution’s ability to cultivate a reputation as an academically competitive institution.

Cheslock (2006) purported that within a model of resource maximization set against a backdrop of fiscal constraints, the amount of educational excellence, prestige, and influence achieved at a college or university is limited by the amount of revenue these institutions can generate. While policy changes, growing industry demand for institutional technology in areas such as science, technology, engineering, and math, as well as a growing demand for education on the part of adult consumers, promises a steady flow of tuition revenue from these sources, the corresponding expenses threaten to cannibalize this inflow. Cheslock pointed out that this rosy picture is juxtaposed against steep costs that rise at alarming rates and outpace the revenue brought in from tuition.

Moreover, different HEIs face different situations depending on the amount of fixed revenue they possess (Cheslock, 2006). In particular, institutions with low levels of fixed revenue have a more difficult time acquiring these resources compared to their more well off counterparts. This difficulty is largely due to the fact that potential donors generally give to institutions with more fiscal resources and better research infrastructure, often not wanting to take a chance on needier institutions. It is through fixed revenues that institutions along all strata are able to provide the services and other resources needed for their students to be

successful. Therefore, “[f]or need based aid as well as other activities, [one] must consider the available level of financial resources when comparing [one institution’s] performance against others” (p. 30).

In his comparison of public and private institutional revenue over a time period of 1980-81 to 2000-01, Cheslock (2006) found public institutions generate a lot less revenue from tuition and fees compared to private institutions. Further, although, private institutions received slightly more than their public counterparts, both institutions received less than 20 percent of their tuition from federal government. Revenue from state government made up nearly 40 % of public revenue, while barely comprising 2 % for private institutions. Public institutions received almost 5 % of their revenue from private gifts, grants, and contracts, while private institutions received nearly double that amount for the same line item. Less than 1% of the public revenue came from endowment income, yet private institutions received more than five times the amount of the public institutions.

Particularly noteworthy is the fact that net tuition and fee revenue has increased at a decreasing rate for both public and private institutions (Cheslock, 2006). Moreover, public colleges and universities rely more heavily on this revenue stream and therefore may be more adversely impacted by such a negative trend. Along a similar vein, in the past, colleges and universities reported tuition discounts as an expense to be netted against gross revenue. While this approach proves logical for selective institutions for which enrollment demand exceeds capacity and service a clientele for which discounted tuition is not an issue, it is not a logical approach for non-selective institutions operating under capacity and for whom even discounted tuition revenue can serve to cover fixed costs such as overhead and a portion of

faculty salaries.

The ideal scenario for non-selective institutions would be discounts set so that even discounted tuition revenues exceed marginal costs (Cheslock, 2006). Having revenues merely equal marginal costs would be a problem because while the additional cost incurred with every additional unit of service provided would be covered, the fixed costs, such as overhead and contractual salary obligations would go unmet in the long run. However, many factors affect this type of price setting measure, such as student awareness of such a pricing method. Yet, with declining government support coupled with efforts to meet the needs of low-income students, as well as increased competition for high achieving students across all socio economic strata, institutions are increasing financial aid for more of its student body, especially among private colleges and universities where some reports estimate nearly 80% of the enrollees receiving aid that averages up to 39% of their tuition costs (Cheslock, 2006). Consequently, gross tuition dollars have dwindled for these institutions over time.

While increases in tuition do result in corresponding increases in net tuition revenue, there are many reasons why this revenue source alone is not enough to sustain the operations of most colleges and universities (Cheslock, 2006). First, these increases are quite small and are often dwarfed by inflation rates. Second, while the rate of government funding for colleges and universities has diminished over time, the level of government involvement in college and university issues that matter to policy-making stakeholders has not followed suit. The public debate over college access and affordability is quite contentious and lawmakers have applied continued pressures on HEIs not to increase tuitions by too much too fast. However, as Cheslock pointed out, these debates and subsequent pressures are based on the

list price without knowing or appreciating the full costs associated with providing higher education services. Third, while there will always be some level of inelasticity among a certain group of higher education consumers, one must realize that choices to consume higher education are not made in a silo and are weighed against other goods and services that can also be consumed. Price increases can only go so far before potential education consumers elect to substitute higher education for some other service or good that they consider to be equally as beneficial. Therefore, other revenue streams must be seriously, considered, cultivated, and utilized if HEIs are to have going concern (Bryan & Whipple, 1995). As Cheslock notes, these various revenue sources vary in their ability to generate revenue, however they all merit consideration.

Private gifts are one source of revenue. However, some gifts can come with restrictions in terms of use that result in them being impractical and, in some cases, cost prohibitive when the gift requires the recipient institution to incur costs to engage in activities stipulated by the donor. Another consideration is the fact that most entities usually give monies and assets to institutions with large endowments. Ironically, this reality results in the neediest institutions being unattractive prospects for potential givers. Income generated from endowments can prove to be an institution's lifeblood. Overall, endowment size is the best indicator of an institution's fiscal robustness. Less than one percent of U.S. colleges and universities, public or private can claim an endowment of \$1 billion dollars or more. As is the case with private gifts, the most elite selective institutions enjoy the largest endowments.

Cheslock (2006) summed up the importance of endowments in the following quote "To understand the importance of a large endowment, consider the case of a school with an

enrollment of ten thousand students. If that school had a \$2 billion dollar endowment, and drew from those assets yearly at a 4 % payout rate, it could subsidize students' education by eight thousand dollars per student. Clearly these funds allow a school to gain a strong competitive advantage over other institutions and engage in a variety of socially important activities that do not generate substantial revenue" (p. 38). Moreover, Cheslock also pointed out that endowments can also facilitate the process of securing research grant money through improving its research infrastructure.

Like private gifts, grants can be an unrestricted source of revenue to cover both the direct cost of the funded research as well as the costs associated with general research not affiliated with the grant (Cheslock, 2006). However, at the other end of the spectrum, grants that fail to cover these indirect costs can reduce the resources available for other activities and thereby should be considered carefully. The latest revenue area being explored by higher education organizations is entrepreneurial activity. While this source of revenue holds promise, as of now, little evidence can be provided about the extent to which these relatively new ventures can generate positive cash flows that not only sufficiently cover their own costs, but also contribute to the existing institutional operations. Patents that result from institutional research and development are labor intensive products and the revenue generated from them may not go a long way in improving the fiscal position of the institutions that own them. Overall, key questions must be entertained when considering the potential usefulness of certain revenue streams. These questions are: "Which activities produce positive net revenue, and how large are these profits? Which activities produce negative net revenue, and how large are these deficits? How much fixed revenue is

generated?” (p. 39). This study extends these questions by also seeking to determine which activities generated financial resources that institutions can utilize to improve student learning outcomes.

Summary

Although scholars have made important strides towards understanding the relationship between institutional finance and student learning outcomes, our knowledge of the impact of fiscal structure on graduation rates is limited. This study presents the resource dependence model for explaining this relationship. For public HEIs, this framework assumes that revenue from: tuition and fees net discounts and allowances, federal operating grants and contracts, state operating grants and contracts, local/private operating grants and contracts, gifts, including contributions from affiliated organizations, additions to permanent endowments, and investment income as well as: annual operating margin, auxiliary enterprise reliance, reliance on operating margin excluding gifts, reliance on other revenue, and reliance on state appropriations all affect graduation rates. In addition, this framework assumes that institutional credit ratings have an impact on graduation rates as well. The next chapter, Chapter 3, describes the study design whereby I identify all of the variables used in this framework.

CHAPTER THREE

METHODOLOGY

Overview

To answer the research questions I analyzed data derived from Moody's Corporation (Moody's) and the Integrated Post Secondary Education Data System (IPEDS). Moody's is an investment, research, and analytics firm. It is organized as a publicly traded entity with a parent company, Moody's Corporation, and two subsidiaries, Moody's Investors Service and Moody's Analytics (Moody's, 2010). As of June 2009, Moody's maintained 32 rating systems; each designed to rank the credit risk of entities such as publicly traded businesses, states and international governments, and colleges and universities (Moody's Investor Services, 2009). Each of the credit rating systems are further classified into one of three scales based on the maturity length of the debt obligation; long term, medium term, and short term. IPEDS is a repository of post secondary data on information such as institutional characteristics, prices, enrollment, financial aid, degrees and certificates conferred, student outcomes, human resources, and fiscal resources. Built around a system of interconnected surveys, the IPEDS system was created by the National Center for Education Statistics (NCES), a federal entity that is part of the Department of Education (Broyles, 1995). IPEDS is the primary post secondary data collection program in the United States (Broyles, 1995).

The primary data sources for this study of post secondary institutional revenue sources and credit ratings were data that was retrieved, cleaned, and analyzed from the IPEDS website and the Moody's report known as Public College and University Medians; which is produced by Moody's Investors Service. For the purposes of this study, data was

retrieved from the following IPEDS survey categories: Student Financial Aid, Admission and Test Scores, Institutional Characteristics, and Finance. Information about credit ratings at post secondary institutions was retrieved from the Moody's report. An explanation of the research methods, including: population and sample, data collection, measurement, and quantitative analyses procedures follow.

Population and Sample

This study consists of the universe of public four year colleges and universities. It is based on institution-level variables. As such, institutions comprise the sample, not students. The universe of subjects from which the samples are drawn includes more than 7,100 institutions. The subjects of interest to this study are public, four year, degree granting colleges and universities. I chose to focus on public colleges and universities because disaggregated information about private endowments was not available in the IPEDS data base. Public colleges and universities adhere to financial record keeping stipulated by the Governmental Accounting Standards Board (GASB). Private colleges and universities utilize a different accounting method that is mandated by the Financial Accounting Standards Board (FASB). While institutions reporting under GASB standards have been mandated to report endowment revenue since 2004, there is no similar requirement for institutions adhering to FASB standards (Craig Bowen, IPEDS Post Secondary Institutional Studies Program, personal communication, May 19, 2010). Thus, a direct assessment of the degree to which private endowment revenue impacts graduation rates at these institutions was not possible. Therefore, I chose not to include private post secondary institutions in my analysis. Consequently, the final sample of colleges and universities satisfying the criteria of

endowment revenue being reported to IPEDS totaled 673 public institutions.

Moody's Investment Services is not affiliated with IPEDS and did not capture as many public, four-year degree granting institutions as did the IPEDS data set. Specifically, the Moody's report includes credit rating information for only 426 public, four-year, degree granting institutions. Therefore, I used this subset of data on these institutions to answer the first research question: "Is there a relationship between an institution's credit rating and graduation rates?" Using IPEDS data, I conducted analysis to answer the second research question: "What is the relationship between institutional revenue structure and graduation rates?" I did not rely upon Moody's to answer any part of the second research question, therefore I was able to utilize all 673 institutions.

Data Collection

Moody's Investment Services

Reiterating a point stressed by Weisbrod et al, an institution's credit rating impacts its ability to generate revenue (2008). Therefore, when considering revenue structure, it is appropriate to contemplate credit ratings as well. Consequently, in addition to IPEDS, I turned to the fiscal reports issued annually by Moody's Investment Services known as the Higher Education Outlook. The goals of Moody's credit ratings process are twofold: (1) to ascertain potential and current debt holder's risk of not receiving timely payment of principle and interest of an investment and (2) to determine how that particular level of risk compares to that of all other debt securities (Moody's, 2010). Institutional ratings generally consist of a four step process that begins with data collection. Interviews are conducted, operations are observed, and ultimately samples of financial records are scrutinized. To

ensure as much objectivity as possible, rating committees are formulated to ensure peer checking takes place. The actual rating process then ensues, followed by a reporting of the findings.

Institutional credit rating data was drawn from Moody's 2008 Fiscal Year Colleges and University Medians. Moody's produces a separate publication for both private and public institutions. Both publications include appendices consisting of institutional credit ratings as well as comparative fiscal median data spanning five years (2004-2008). This comparative fiscal data is grouped by credit rating. Moody's Fiscal Year 2008 Private Colleges and University Medians also groups median fiscal data according to institutional size, which is based on FTE (full time equivalency) enrollment numbers and revenue.

IPEDS

In making the appropriate statistical inferences, Hahn and Meeker (1993) stress the importance of collecting data that is apposite to the corresponding decisions that will be made while also able to be gathered "under the ever present constraints on [resources]" (p. 1). While subject to limitations like any other dataset, the National Center for Education Statistics' (NCES), Integrated Postsecondary Education Data System (IPEDS) data set adheres to this tenant as well as any data set could be expected. NCES is authorized by congressional mandate to "...collect, collate, analyze, and report complete statistics on the condition of American education, conduct and publish reports, and review and report on education activity internationally" (IPEDS, 2009). IPEDS is the means by which NCES carries out this directive. Institutions that either participate in or are applicants to participate in any federally funded student financial aid program per the authorization of Title IV (20

U.S.C. 1094(a)(17)) of the Higher Education Act, are required to take part in the survey.

IPEDS was authorized by NCES to serve as its primary core data collection center. The expansive system is built around interrelated surveys that collect institution-level data in areas of enrollment, program completions, faculty, staff, and finances. These surveys include data on numerous variables subsumed under ten categories known in IPEDS as survey components. The survey components are: institutional characteristics (IC), admission test scores, student charges, fall enrollment (EF), twelve month enrollment (E12), completions (C), graduation rates (GRS), student financial aid (SFA), finance, and human resources (IPEDS, 2010).

Each of the ten components is further divided into three broader categories based upon the type of information contained in them: general information, student surveys, and resource surveys. The general information category only includes the institutional characteristics component. The Student surveys category is the largest category, consisting of information on seven of the ten components. These components are admissions test scores, student charges, fall enrollment, twelve month enrollment, completions, graduation rates, and student financial aid. Finally, the resource surveys category comprises information from both the finance and human resource components (IPEDS, 2010). Variables from the student financial aid, admission and test scores, institutional characteristics, finance, and graduation rates components were analyzed in this study.

Financial aid to full-time, first-time degree/certificate seeking undergraduate students. Student financial aid encompasses all monies provided to students, their parents, or guardians to pay for educational expenses. At the time this study was conducted, the IPEDS

Financial Aid variable contained three levels: Financial aid to full-time, first-time degree/certificate-seeking undergraduate students, Student counts, fall cohort, and student counts, full year cohort. Of these three categories, only Financial Aid to full time, first-time degree/certificate seeking undergraduate students contained disaggregated information about the type of financial aid students were receiving. The Financial Aid to full time, first-time degree/certificate seeking undergraduate students consisted of five financial aid levels: any type of financial aid received, federal financial aid, state and local financial aid, institutional aid, and loans.

Admissions and test scores - considerations. The considerations category is one of three categories found in the admissions and test scores variable. Each of the ten levels within the considerations category assesses a particular aspect of an institution's admissions and selection policy. Guided by the literature on, determinants of student success in post secondary institutions (Kahn & Nauta, 2001; Ryan, 2005; Zwick & Sklar, 2005), I selected seven of the ten levels. Each of these levels was selected in order to gauge the rigor of an institution's selection process. These levels included secondary school GPA, secondary school rank, secondary school record, completion of college-preparatory program, recommendations, formal demonstration of competencies, and admission test scores.

SAT and ACT test scores. Besides being shown to be a predictor of college grades and degree completion among some groups of students (Zwick & Sklar, 2005), standardized test scores are also an institutional characteristic used by some researchers to explain the variation in curriculum among post secondary institutions (Brint, Riddle, Turk-Bicakci, and Levy, 2004). Unless governed by an open admissions policy, each institution provides to

IPEDS information regarding student outcomes on SAT and ACT exams, including scores at the 25th and 75th percentile. This information is displayed in IPEDS as an institutional average of SAT and ACT scores in each category at the 25th percentile and 75th percentile mark.

Institutional Characteristics

Carnegie directory information. Like standardized test scores, the Carnegie classifications of HEIs are also an institutional characteristic used to explain many institutional attributes including differences in curricular offerings (Brint et al, 2004). Carnegie classification of HEIs is a system developed by the Carnegie Commission in 1970 (Carnegie Foundation, 2010). These multiple classifications are organized around three main themes: what types of instructional programs are taught, what is the typical profile of the students who enroll in these institutions, and the “size and setting” of the institution (Carnegie Foundation, 2010). In IPEDS, there are seven Carnegie levels: Carnegie Classification 2005, Carnegie Classification 2005: Undergraduate Instructional Program, Carnegie Classification 2005: Undergraduate Profile, Carnegie Classification 2005: Enrollment Profile, Carnegie Classification 2005: Size and Setting, Carnegie Classification 2000, and Classification for 2-year postsecondary institutions.

Finance

Public institutions

GASB 34/35. IPEDS collects and reports institutional financial information found on the General Purpose Financial Statements. Information on assets, liabilities, revenues expenses, as well as scholarships and grants are included. Depending on the type of

institutional control, which for the purposes of this study only analyzes publics and private not-for-profits, an institution is required to report its financial information on one of two types of forms. Public Institutions use the Governmental Accounting Standards Board (GASB) forms. Private institutions use the Financial Accounting Standards Board (FASB) forms. For this study only revenue and expense accounts for public institutions were analyzed.

Graduation Rates

IPEDS requires institutions to report graduation rates based on the number of students who have successfully completed the requirements in 6 years or 150% of normal time.

Measurement

As stated earlier, this study seeks to answer two research questions: (a) Is there a relationship between an institution’s credit rating and graduation rates? and (b) What is the relationship between revenue structure and graduation rates? To answer the first question, the data from IPEDS was used in conjunction the data in the Moody’s fiscal reports, which captured only a subset of the 673 public four-year degree granting institutions in the IPEDS universe. Table 3.1 shows the key independent and dependent variables for each research question.

Table 3.1
Research Questions and Variables

Research Question	Independent Variable	Dependent Variable
RQ1 What is the relationship between an institution’s credit rating and graduation rates?	Credit Rating	Graduation rates
RQ2 What is the relationship between institutional revenue structure and graduation rates?	Institutional Revenue Structure	Graduation rates

Dependent Variable

Graduation rates. The dependent variable is graduation rates. This measure was based on information provided to IPEDS by each of the colleges and universities. While actual percentages are not provided in IPEDS, both the number of students comprising a cohort, as well as the total number of degree completers within a particular cohort are provided. As a result, calculating the graduation rate is possible. Two years were analyzed in this study; 2005 and 2007. Therefore, graduation data for both these years was selected. These years were chosen to correspond with two different business cycles, the more robust economic climate of 2005 and the recession which was officially declared in December of 2007 (The National Bureau of Economic Research, 2010).

After the graduation rate data for both years was retrieved from IPEDS, graduation rates were calculated by dividing the number of completers within six years (150% of normal time) by the total number in the adjusted cohort. Adjusted cohort data was based on revisions made by authorized individuals at each institution. Known as key holders, these individuals update data on each cohort at the end of six years to accurately reflect the profile of the group members. Finally, the graduation rate data was then imported into SPSS version 18.0 and STATA version 11.0.

Independent Variable

Credit rating. The variable *credit rating* measures an institution's fiscal stability as a means of ascertaining credit worthiness (Moody's, 2002). By conducting analysis of metrics referred to as financial ratios, such as those discussed in the following section, and other fiscal indicators, Moody's assigns a score to these institutions that is often relied upon

by potential investors and lenders. Ratings range from Aaa to C. Table 3.2 Illustrates the Moody's credit ratings (Aaa-B3), their corresponding credit categories, and their frequency distributions. Of the 426 institutions captured in the Moody data set, 402 of these institutions were dispersed among the three highest credit categories. These categories were Prime, High Grade, and Upper Medium Grade. These three credit categories also contained 7 of the 16 ratings (Aaa-A3). As a result of the disproportionate dispersal of credit ratings among the three highest credit categories, I collapsed the two highest credit categories into one composite referred to as Prime High Grade. The Prime High Grade composite category consisted of 247 institutions. The Upper Medium Grade was now the second highest credit category, consisting of 155 institutions.

Table 3.2
Credit Ratings and Definitions

Rating	Definition					
	Prime	High grade	Upper medium grade	Lower medium grade	Non Investment grade speculative	Highly Speculative
Aaa	17					
Aa1		35				
Aa2		68				
Aa3		127				
A1			58			
A2			72			
A3			25			
Baa1				11		
Baa2				12		
Baa3				0		
Ba1					0	
Ba2					0	
Ba3					1	
B1						0
B2						0
B3						0

As we can see in Table 3.2, 94.33% of the values for credit rating fell within the two highest credit categories, Prime High Grade and Upper Medium Grade credit categories. Conversely, the two lowest credit categories, Non Investment Grade Speculative and Highly Speculative had only one value; Ba3. Only 5.44% of the values for credit rating fell within

the Lower Medium Grade credit category. As a result, Instead of focusing on a singular credit rating within the Prime High Grade credit, I instead collapsed the values within this category to create a variable I refer to as Prime High Grade. This variable is coded dichotomously “1” = Yes and “0” = No. Table 3.3 summarizes the collapsed variables and their corresponding dichotomous codes.

Table 3.3
Rating Frequencies for Collapsed Variables

Collapsed Variable	Definition	N	
		Yes	No
Prime High Grade	Aaa	1	0
	Aa1	1	0
	Aa2	1	0
	Aa1	1	0
Upper Medium Grade	A1	1	0
	A2	1	0
	A3	1	0

Revenue structure. Few studies have analyzed the relationship between institutional fiscal resources and student outcomes. Of the few, the scope of analysis has been quite narrow; with independent variables including only tuition, state appropriations, or both (Bound & Turner, 2004; Kelly & Jones, 2005; Zhang, 2009). This study widens the scope of analysis to include more than just the two aforementioned variables. However, with little literature to guide the selection of independent variables, this study relied primarily on empirical data gathered by Moody’s (2008) and to a lesser extent, the studies of researchers conducting analysis of a particular component of institutional resources (Bound & Turner, 2004; Kelly & Jones, 2005; Titus, 2006b; Toutkoushian, 2001; Weisbrod et al, 2008; Winston, 1999; and Zhang, 2009).

For this study, the variable *revenue structure* measures the proportion of total revenue and operating revenue comprised of sources that range from tuition and fees to local government appropriations. Specifically, for public institutions *revenue structure* measures: (a) the proportion of total revenue made up of tuition and fees after deducting discounts and allowances, federal operating grants and contracts, state operating grants and contracts, local operating grants and contracts, and additions to permanent endowments and investment income as well as (b) the proportion of operating revenue made up of an operating surplus (deficit), auxiliary services, the sum of operating surplus (deficit) less gifts and pledges, revenue sources other than operating and auxiliary revenues, gifts (including contributions from affiliated organizations), and state appropriations. These ratios were selected because they were utilized by Moody's in its fiscal analysis of institutions for forecasting and credit rating purposes (Moody's 2008). Also, ratios such as percent of total revenue from tuition, percent of total revenue from federal, state, and local grants, and percent of revenue from endowments in his analysis of the influence of financial aspects on college completion, were used in analysis conducted by Titus (2006b). Table 3.4 shows each of the financial indicators for public institutions and their corresponding equations.

Table 3.4
Public Institutions' Financial Indicators and Equations

	Equations
% revenue from tuition and fees net discounts and allowances	Tuition and fees, after deducting discounts and allowances / Total Revenue
% revenue from federal operating grants and contracts	Federal operating grants and contracts / Total Revenue
% revenue from state operating grants and contracts	State operating grants and contracts/Total Revenue
% revenue from local/private operating grants and contracts	Local operating grants and contracts/Total Revenue
% revenue from gifts, including contributions from affiliated organizations	Gifts, including contributions from affiliated organizations / Total Operating Revenue
% revenue from additions to permanent endowments	Additions to Permanent Endowments / Total Revenue
% revenue from investment income	Investment income/Total Revenue
annual operating margin	Operating surplus (deficit) / Total Operating Revenue
auxiliary enterprise reliance	Auxiliary revenues/Total Operating Revenues
reliance on operating margin excluding gifts	The sum of operating surplus (deficit) less gifts and pledges / the sum of total adjusted operating revenues less gifts and pledges.
reliance on other revenue	Other revenues and additions / total operating revenues
reliance on state appropriations	State appropriations revenue / total operating revenue

Control Variables

Use of proxies and controlling for confounders. An exclusively institutional level analysis such as this carries with it the inherent risk of the study's findings being confounded by untested student level variables which are not part of the IPEDS dataset. This phenomenon is referred to as endogeneity bias, a situation occurring when variables that are related to the outcome variable are not factored into the model, thereby creating an impact on the outcome variable that cannot be measured. To safeguard against this potential endogeneity bias, I included IPEDS variables to proxy for performance in high school and

socioeconomic status. I also included IPEDS variables to control for institutional selectivity. These variables were selected because they have been shown to impact degree completion (Garcia & Bayer, 2005; McNamara Horvat & Lising, 1999; Tate, 2004; Titus, 2006b). Table 3.5 lists each of these variables.

Table 3.5
IPEDS Proxies

IPEDS Variable	Approximated Variable
Carnegie Classification	Institutional Selectivity
Completion of College Preparatory Program	High School Academic Performance
Secondary School GPA	
Secondary School Rank	
Secondary School Record Recommendations	
Formal Demonstration of Competencies	
SAT scores	
ACT scores	
Open Enrollment	
Secondary School Rank	
Percentage of Students Receiving Any Financial Aid	Socio – Economic Status (SES)
Percentage of Students Receiving Federal Financial Aid	
Percentage of Students Receiving State/Local Financial Aid	
Percentage of Students Receiving Institutional Aid	

By adding these covariates to the model, I am able to effectively investigate the relationship between the dependent variables and independent variables of interest while statistically eliminating the effect of the co variables (Tabachnik and Fidell, 2007). Failure to control for the aforementioned covariates would have resulted in them being treated as unobserved variables relegated to the error term. Such an occurrence would result in the error

term being inflated and research findings being less accurate. Appendix A illustrates the frequency distribution for each covariate in both years. The implications of missing variables on research analysis as well as the strategies employed for handling such missingness are discussed in the next section.

Analysis

Missing Value Analysis

Missing data generally falls into one of three categories: missing at random (MAR), missing completely at random (MCAR), and not missing at random (NMAR) (Azur, Frangakis, & Stuart, 2008; Satten & Carroll, 2000; von Hippel, 2004). Data that is MAR means that pattern of missing values is related to observed data only. MCAR data are related to neither the observed nor the unobserved data. In both instances, the assumption is made that there is no difference between observed and unobserved data. However, in the case of NMAR, there is a difference between the observed and unobserved data, a situation that holds several negative implications for the researcher (Azur, Frangakis, & Stuart, 2008; Rubin 1973, 1976; Satten & Carroll, 2000; von Hippel, 2004; SPSS, 2008). In some situations, the nature of the missing data is such that the researcher may be able generate estimates of missing values based on the value of other items within the case and any other pertinent information from other cases. This process is known as imputation and is only possible if items are available within a case for a researcher to use in calculating an estimate. In the case of this analysis, imputation was not possible.

Data that is NMAR poses two incommensurable challenges to analysis. The first challenge is one of generalization. If the missingness is associated with the outcome of

interest, ignoring the missing data will bias the results and ultimately undermine the findings being generalized to the larger population. Secondly, missing data compromises the efficiency of the data analysis due to the reduction in sample size that occurs when cases are dropped from most statistical software packages (Vermeulen, Post, Span, van der Bij, Koeter, and TenVergert, 2005). Utilizing SPSS 18, I conducted missing value analysis (MVA) to determine the nature of missingness among the items in the data set with no values. The following section describes the output that was generated from MVA. MVA performs several functions, among which is providing a descriptive analysis of the pattern of missingness among the data. I performed missing value analysis for the sets of variables found in Table 4.4 twice; one for each year (2005 and 2007).

Descriptive Analysis of Missingness Patterns

Variables Used in 2005 Analysis

Univariate statistics. The descriptive analysis of missingness patterns were calculated by conducting a Univariate Statistics Analysis (UVSA) within MVA. The UVSA provided the first look; variable by variable; at the extent of missing data. Missingness among variables ranged as high as 37.9% (SAT Math and Critical Reading Test Scores at both the 25th and 75th percentiles) to 0% (CARNALL_BA and CARNALL_PhD). Table 3.6 provides a list of the variables with the most missing values. A complete variable summary of missingness can be found in Appendix B.

Table 3.6
Univariate Statistics
 Extent of Missing Data for 2005 Variables

	Missing		No. of Extremes ^b	
	Count	Percent	Low	High
<i>High School Performance</i>				
PSAT05	232	34.5	0	0
PACT05	227	33.7	0	0
CR25TH05	255	37.9	0	3
CR75TH05	255	37.9	0	3
M25TH05	255	37.9	2	9
M75TH05	255	37.9	1	5
AC25TH05	246	36.6	2	2
AC75TH05	246	36.6	2	1
SGPA05	150	22.3		
SRANK05	150	22.3		
SSRCD05	150	22.3		
CPREP05	150	22.3		
RECOM05	150	22.3		
FDCOMP05	150	22.3		
ADMNT05	150	22.3		
FACSA05	150	22.3		
<i>Categorical Covariants</i>				
<i>Credit Ratings</i>				
Aaa	248	36.8		
Aa1	248	36.8		
Aa2	248	36.8		
Aa3	248	36.8		
A1	248	36.8		
A2	248	36.8		
A3	248	36.8		
Baa1	248	36.8		
Baa2	248	36.8		
Ba3	248	36.8		

b. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

From Table 3.6 we see that most of the missing variables are found among the High School Performance and Credit Rating covariants. Also we see that among the Credit Rating variables as well as the categorical High School Performance variables, the number of missing values is uniform (N=150 for the categorical High School Performance variables and N=248 for the Credit Ratings variables). In the case of Institutional Credit Ratings, such uniform missingness is expected since information about institutional credit ratings was only available for 426 of the colleges and universities.

Descriptive Analysis of Missingness Patterns

Variables Used in 2007 Analysis

Univariate statistics. The descriptive analysis of missingness patterns were calculated by conducting a Univariate Statistics Analysis (UVSA) within MVA. The UVSA provided the first look; variable by variable; at the extent of missing data. Missingness among variables ranged as high as 37.9% (SAT Math and Critical Reading Test Scores at both the 25th and 75th percentiles) to 0% (CARNALL_BA and CARNALL_PhD). Table 3.7 provides a list of the variables with the most missing values. A complete variable summary of missingness can be found in Appendix B.

Table 3.7
Univariate Statistics
 Extent of Missing Data for 2007 Variables

	Missing		No. of Extremes ^b	
	Count	Percent	Low	High
<i>High School Performance</i>				
CR25TH07	240	35.7	3	3
CR75TH07	240	35.7	0	2
M25TH07	233	34.6	4	5
M75TH07	233	34.6	1	2
W25TH07	503	74.7	3	7
W75TH07	503	74.7	0	3
AC25TH07	229	34.0	1	9
AC75TH07	229	34.0	9	6
SGPA07	142	21.1		
SRANK07	142	21.1		
SSRCD07	142	21.1		
CPREP07	142	21.1		
RECOM07	142	21.1		
FDCOMP07	142	21.1		
ADMNT07	142	21.1		
FACSA07	142	21.1		
<i>Categorical Covariants</i>				
<i>Credit Ratings</i>				
Aaa	248	36.8		
Aa1	248	36.8		
Aa2	248	36.8		
Aa3	248	36.8		
A1	248	36.8		
A2	248	36.8		
A3	248	36.8		
Baa1	248	36.8		
Baa2	248	36.8		
Ba3	248	36.8		

b. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

From Table 3.7 we see that most of the missing variables are found among the High School Performance and Credit Rating covariants. Also we see that among the Credit Rating variables as well as the categorical High School Performance variables, the number of missing values is uniform (N=142 for the categorical High School Performance variables and N=248 for the Credit Ratings variables). As before, in the case of Institutional Credit Ratings, such uniform missingness is expected since information about institutional credit ratings was only available for 426 of the colleges and universities.

Response to Missing Data

Missing data can present a problem with the statistical analysis if the missing data is correlated to the outcome of interest. While it is sometimes appropriate to restrict subjects with no response items, simply restricting the analysis to subjects with complete data is problematic in that it can result in biased estimates, especially if the subjects that were excluded are different than those that remain (Raghunathan, 2004). In this data set there was one type of missing data: unit non-response. Unit non-response occurs when institutions provided no answers to any of the questions about the variables of interest in this study. This is also referred to as case-wise missingness. In instances where unit non response exists, it is not possible for values to be generated for the missing items based on the value of other items within that particular case as well as any other relevant data from other cases due to the fact that no values exist for that case. Therefore, institutions fitting this profile were eliminated by utilizing a method known as case – wise deletion.

As previously stated, for both years, High School Performance and Institutional Credit Ratings comprised most of the missing variables in the data set. Missingness among

the institutional credit ratings category was attributable to the limited scope of the Moody's data set. Consequently nothing could be done to attenuate the impact of the missingness among this category. However, steps were taken to reduce the impact of missing data within the High School Performance category. After conducting factor analysis among the variables within the High School Performance category, composite variables were created and some variables were removed from the analysis. As a result, the number of institutions included in the analysis increased, and the remaining institutions were removed to case-wise missingness.

Recoding Variables

To minimize mean squared prediction error, a fraction of the total number of observations is typically utilized when conducting regression analysis (Breiman & Freedman, 1983). According to contemporary research, for each model, no more than 20 variables should be entered into the regression equation (Kutner, 2006; Neter, Wasserman, and Kutner, 1996). Typically, the smaller the ratio of variables to observations, the more robust the model (Kutner, 2006; Neter, et al., 1996).

Financial Aid

For both years 2005 and 2007, I began with 22 High School Performance variables, 257 Carnegie variables, and 29 financial variables. In the case of financial aid variables, I began with 10 variables for 2005 and 5 variables for 2007. Table A.1 in Appendix A shows the variables for 2007. However, in light of the fact that data for 2005 was divided among the 2004-2005 and 2005-2006 school years, there were two values for each variable in the 2005 financial aid model. This is illustrated in Table A.2 Therefore, to

remedy this issue, I created five composite variables. I generated these composites by averaging the 2004-2005 and 2005-2006 values. This resulted in composite variables which are illustrated in Table A.3 of Appendix A.

High School Performance

High School Performance was comprised of 19 variables that measure the rigor of an institution's admissions policies such as a student's secondary school GPA, rank, and record. The first seven variables (Secondary school GPA, Secondary school rank, Secondary school record, Completion of college preparatory program, Recommendations, Formal Demonstration of competencies, and Admission Test Scores) all measure institutional policy regarding the types of secondary school records student are required to provide. Institutional researchers at each college or university provided this information to IPEDS. Institutions that required students to provide records about this information received a value of 1. Institutions that did not require this information but only recommended students submit these records received a value of 2. Institutions that neither required nor recommended this information from students received a value of 3. Finally, institutional researchers who reported not knowing the college or university policy around secondary school records were assigned a value of 4.

Composite variables were created for both years 2005 and 2007. To create these composite variables, I employed a two- step diagnostic method. In this first step, I sought to determine if any redundancy existed among any of the variables within each model. More commonly referred to as multi-co linearity, variable redundancy is a common occurrence when there are many variables involved. Therefore by conducting a co linearity diagnostic, I

could readily determine which variables (if any) were highly correlated. I next conducted an additional step to create the High School Performance composites.

Carnegie Classifications

As with the High School Performance variables, for the Carnegie variables, I first sought to determine if any multi co linearity existed among any of the variables within each model. A co linearity diagnostic was conducted from which it was determined what variables (if any) were highly correlated. Based on the findings of extremely high co- linearity, as well as the literature on the use of Carnegie Classifications in research (NCES, 2006 & Pascarella, Cruce, and Umbach, 2006), I created the composites for variables in the Carnegie model.

Credit Ratings

Institutional credit ratings were available for only 426 of the institutions. As Table 3.8 illustrates, As previously stated, over 90% of the institutional credit ratings fell in the two highest categories; 247 in the Prime High Grade and 155 in the Upper Medium Grade. This is illustrated in Table 3.8.

Table 3.8
 Frequency Distribution
 Moody's Credit Ratings

	Variables						
	Aaa	Aa1	Aa2	Aa3	A1	A2	A3
M	.04	.08	.16	.30	.13	.17	.06
N	17	33	68	127	57	72	25

As Table 3.8 indicates, the distribution of the credit ratings is disproportionately skewed in the two highest credit categories. In fact the means range from .04 (Aaa) to .30 (Aa3). When summed, the means of the seven credit rating in Table 3.8 total to 94%. The lowest 9 credit ratings (Baa1-B3) comprised the remaining 6% of the institutions in the Moody's data set. Consequently, as previously stated, instead of focusing on a singular credit rating within the Prime High Grade credit, I collapsed the variables within these two categories in order to create composite variables, Prime_High and Upper_Medium. Each is dichotomously coded "1" = Yes and "0" = No. Table 3.9 shows the recoded variables below.

Table 3.9
 Frequency Distribution
Recoded Credit Categories

Variables		
	Prime High Grade	Upper Medium Grade
M	.58	.37
N	246	156

Colinearity Diagnostics for 2005

High School Performance Model

Bivariate colinearity. From my diagnostic analysis of the variables in the 2005 High School Performance model, I determined that extremely high co linearity existed among two subsets of the thirteen variables. The first subset consisted of seven variables: Secondary School GPA, Secondary School Rank, Secondary School Record, Completion of College Preparatory Program, Recommendations, Formal Demonstration of Competencies, and Admission Test Scores. The co linearity coefficients of these variables are shown in Table 3.10.

Table 3.10
Pearson Correlation Matrix among 2005 High School Performance Variables

	SGPA	SRANK	SSRCD	CPREP	RECOM	FDCOMP	ADMNT
SGPA		.85**	.90**	.90**	.91**	.92**	.92**
SRANK	.85**		.91**	.87**	.89**	.89**	.91**
SSRCD	.90**	.91**		.87**	.92**	.92**	.93**
CPREP	.90**	.87**	.87**		.89**	.90**	.92**
RECOM	.91**	.89**	.92**	.89**		.95**	.93**
FDCOMP	.92**	.89**	.92**	.90**	.95**		.93**
ADMNT	.92**	.91**	.93**	.92**	.93**	.93**	

**p < 0.05

***p < .01

As Table 3.10 illustrates, the co linearity among these variables was quite high. In fact, the lowest co linearity coefficient was .85.

The second subset consisted of admission test scores for both the SAT and ACT standardized tests. Running correlation diagnostics revealed highly correlated coefficients as illustrated in Table 3.11.

Table 3.11
Pearson Correlation Matrix 2005_Admission Test Scores_Composite

	CR25TH05	CR75TH05	M25TH05	M75TH05	AC25TH05	AC75TH05
CR25TH05		.90**	.95**	.86**	.88**	.82**
CR75TH05	.90**		.88**	.93**	.83**	.89**
M25TH05	.95**	.88**		.91**	.89**	.83**
M75TH05	.86**	.93**	.91**		.82**	.90**
AC25TH05	.88**	.83**	.89**	.82**		.90**
AC75TH05	.82**	.89**	.83**	.90**	.90**	

**p < 0.05

***p < .01

As Table 3.11 illustrates, the co linearity among these variables was quite high; as the lowest co linearity coefficient was .82.

Factor Analysis for 2005

After determining strong co linearity to exist among the aforementioned variables in the High School Performance model, next, I conducted factor analysis. Factor analysis is an appropriate tool to determine if any particular structure exists among variables, thereby enabling the researcher to reduce the number of variables analyzed in a methodologically sound fashion. Table 3.12 illustrates the structure of the thirteen variables which comprised the High School Performance model.

Table 3.12
 Factor Loadings for Exploratory Factor Analysis With Varimax Rotation of 2005 High School Performance Scales.

Scale	Stand. Test Scores	Portfol. an. _Record	Portfo l. _Qua l.	College Readiness
Secondary school GPA (2005)	.026	-.595	.321	.185
Secondary school rank (2005)	-.117	.738	.081	.197
Secondary school record (2005)	-.104	.662	.313	.005
Completion of college-preparatory program (2005)	-.087	-.441	.074	.483
Recommendations (2005)	-.133	.057	.782	-.017
Formal demonstration of competencies (2005)	.020	.016	.761	.002
Admission test scores (2005)	-.076	.125	-.051	.866
SAT Critical Reading 25th percentile score (2005)	.943	-.047	-.109	-.072
SAT Critical Reading 75th percentile score (2005)	.951	-.061	-.039	-.010
SAT Math 25th percentile score (2005)	.955	-.018	-.074	-.082
SAT Math 75th percentile score (2005)	.954	-.030	.026	-.027
ACT Composite 25th percentile score (2005)	.925	-.100	-.079	-.066
ACT Composite 25th percentile score (2005)	.933	-.087	.011	-.042

From this analysis, 7 composite variables were created. Table 3.13 shows a list of these seven composite variables for the High School Performance model.

Table 3.13
2005_Composite High School Performance Variables.

Variables	
Variable Label	Variable Name
<i>Standardized Test Scores</i>	
2005 High School Performance_SAT 25 TH Percentile	SEL_SAT252005
2005 High School Performance_SAT _75 th Percentile	SEL_SAT752005
ACT Composite25th PercentileScore (2005)	AC25TH05
ACT Composite75th PercentileScore (2005)	AC75TH05
<i>Portfolio Quantitative Record</i>	
2005 High School Performance_GPA , Rank, and Record	SEL_GPA_RNK_RCD2005
<i>Portfolio Qualitative</i>	
2005 High School Performance_Student Demonstration of Competencies	SEL_REC_COMP2005
<i>College Readiness</i>	
2005 High School Performance_College Prep. And Admission Test Scores	SEL_CPREP_ATSCR2005

Colinearity Diagnostics for 2007

High School Performance Model

Bivariate colinearity. From my diagnostic analysis of the variables in the 2007 High School Performance model, I determined that extremely high co linearity existed among two subsets of the thirteen variables. The first subset consisted of seven variables: Secondary School GPA, Secondary School Rank, Secondary School Record, Completion of College Preparatory Program, Recommendations, Formal Demonstration of Competencies, and Admission Test Scores. The co linearity coefficients of these variables are shown in Table 3.14.

Table 3.14
Pearson Correlation Matrix among 2007 High School Performance Variables

	SGPA	SRANK	SSRCD	CPREP	RECOM	FDCOMP	ADMNT
SGPA		.85**	.89**	.88**	.91**	.92**	.92**
SRANK	.85**		.90**	.86**	.89**	.89**	.91**
SSRCD	.89**	.90**		.87**	.92**	.92**	.92**
CPREP	.88**	.86**	.87**		.89**	.90**	.92**
RECOM	.91**	.89**	.92**	.89**		.95**	.93**
FDCOMP	.92**	.89**	.92**	.90**	.95**		.93**
ADMNT	.92**	.91**	.92**	.92**	.93**	.93**	

**p < 0.05

***p < .01

As Table 3.14 illustrates, the co linearity among these variables was quite high. The lowest co linearity coefficient was .85.

The second subset consisted of admission test scores for both the SAT and ACT standardized tests. Running correlation diagnostics revealed highly correlated coefficients as illustrated in Table 3.15.

Table 3.15
Pearson Correlation Matrix 2007 Admission Test Scores Composite

	CR25TH07	CR75TH07	M25TH07	M75TH07	AC25TH07	AC75TH07
CR25TH07		.88**	.93**	.83**	.91**	.83**
CR75TH07	.88**		.85**	.89**	.87**	.91**
M25TH07	.93**	.85**		.91**	.90**	.83**
M75TH07	.83**	.89**	.89**		.87**	.89**
AC25TH07	.91**	.87**	.90**	.87**		.87**
AC75TH07	.83**	.91**	.83**	.89**	.92**	

p < 0.05, *p<.01

As Table 3.15 illustrates, the co linearity among these variables was quite high; as the lowest co linearity coefficient was .83.

Factor Analysis for 2007

After determining strong co linearity to exist among the aforementioned variables in the High School Performance model, next, I conducted factor analysis. Factor analysis is an appropriate tool to determine if any particular structure exists among variables, thereby

enabling the researcher to reduce the number of variables analyzed in a methodologically sound fashion. Table 3.16 illustrates the structure of the thirteen variables which comprised the High School Performance model.

Table 3.16
Factor Loadings for Exploratory Factor Analysis With Varimax Rotation of 2007 High School Performance Scales.

Scale	Stand. Test Scores	Portfol._Quan ._Record	Portfol._Qual	College Readiness
Secondary school GPA (2007)	-.011	-.547	.333	.256
Secondary school rank (2007)	-.093	.739	-.024	.096
Secondary school record (2007)	-.136	.690	.268	.094
Completion of college-preparatory program (2007)	-.156	-.402	-.129	.555
Recommendations (2007)	-.193	.083	.730	.006
Formal demonstration of competencies (2007)	.068	-.022	.800	-.041
Admission test scores (2007)	-.015	.221	.053	.843
SAT Critical Reading 25th percentile score (2007)	.943	-.019	-.107	-.040
SAT Critical Reading 75th percentile score (2007)	.943	-.056	-.064	-.023
SAT Math 25th percentile score (2007)	.950	-.026	-.024	-.076
SAT Math 75th percentile score (2007)	.948	-.036	.036	-.056
ACT Composite 25th percentile score (2007)	.950	-.083	-.076	-.057
ACT Composite 75th percentile score (2007)	.932	-.106	-.030	-.026

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

From this analysis, 7 composite variables were created. Table 3.17 shows a list of these seven composite variables for the High School Performance model.

Table 3.17
2007_Composite High School Performance Variables.

Variables	
Variable Label	Variable Name
<i>Standardized Test Scores</i>	
2007 High School Performance_SAT 25 TH Percentile	SEL_SAT252007
2007 High School Performance_SAT _75 th Percentile	SEL_SAT752007
ACT Composite25th PercentileScore (2007)	AC25TH07
ACT Composite75th PercentileScore (2007)	AC75TH07
<i>Portfolio Quantitative Record</i>	
2007 High School Performance_GPA , Rank, and Record	SEL_GPA_RNK_RCD2007
<i>Portfolio Qualitative</i>	
2007 High School Performance_Recommendation_Student Demonstration of Competencies	SEL_REC_COMP2007
<i>College Readiness</i>	
2007 High School Performance_College Prep. And Admission Test Scores	SEL_CPREP_ATSCR2007

Table 3.18 shows the frequency distributions for these composite variables.

Table 3.18
Descriptive Analysis for 2005 and 2007 High School Performance Composite Variables

	2005					2007				
	N	M	SD	MIN	MAX	N	M	SD	MIN	MAX
High School Performance										
<i>Standardized Test Scores</i>										
High School Performance_SAT25TH Percentile	418	471.81	55.27	320	630	440	464.03	58.39	220	625
High School Performance_SAT75TH Percentile	418	579.67	53.86	440	775	440	573.66	56.40	436.50	725
ACT Composite25th Percentile Score	427	19.11	2.81	3	28	444	19.25	2.62	9	28
ACT Composite75th Percentile Score	427	24.10	2.85	8	33	444	24.10	2.66	18	32
<i>Portfolio_Quantitative Record</i>										
High School Performance_GPA, Rank, and Record	523	3.54	.38	2	4	531	3.54	.36	2	4
<i>Portfolio_Qualitative</i>										
High School Performance_Recomm._Student Demonstration of Competencies	523	2.34	.52	1	4	531	2.33	.51	1	4
<i>College Readiness</i>										
High School Performance_College Prep. And Admission Test Scores	523	3.67	.41	2	4	531	3.68	.42	2	4

Statistical Models

The purpose of the statistical models used in this study is twofold: to determine the relationship between graduation rates and institutional revenue structure and to ascertain the relationship between institution credit ratings on graduation rates. To answer the research questions, I utilized two statistical methods, multiple regression and propensity score analysis. Table 3.19 shows each of the research questions, the independent and dependent

variables, as well as the corresponding statistical methods.

Table 3.19
Research Questions, Variables, and Corresponding Statistical Methods

	Research Question	Independent Variable	Dependent Variable	Statistical Method
RQ1	Is there a relationship between an institution's credit rating and graduation rates?	Credit Rating	Graduation rates	PROPENSITY SCORE MATCHING
RQ2	What is the relationship between institutional revenue structure and graduation rates?	Institutional Revenue Sources	Graduation rates	MULTIPLE REGRESSION

Appropriateness of Propensity Score Analysis

Propensity score analysis (PSA) is appropriate for studies such as this which utilize observational data because it allows researcher to determine what would have happened to the subject in a set of conditions contrary to the conditions under which they were actually observed (Baser, 2006; Brookhart, Schneeweiss, Rothman, Glynn, Avorn, & Stürmer, 2006; Cook, Shadish, & Wong, 2008; Guo, 2005). This type of research which is often referred to as counterfactual analysis falls under a larger umbrella of methods known as quasi experimental design (Baser, 2006; Guo, 2005; Shaddish, Cook, & Campbell, 2002). These counterfactual conditions can include various types of treatments, interventions, or attributes received or possessed by one but not received or possessed by another group of subjects that are otherwise similar to one another (Guo, 2005; Kaltenbach, 2008). To determine the impact of an intervention, treatment, or attribute, PSA was utilized in an effort to go beyond merely establishing correlation between credit ratings and graduation rates. There were a few

reasons for this tactic. Firstly, establishing correlation in itself is not sufficient. While correlation does indicate relationship, it fails to get at the root cause which is ultimately causation. Propensity score analysis enables us to infer causation, (Shadish, Cook, & Campbell 2002). While I am not asserting institutional credit ratings to be the cause of graduation, it is likely that the underlying factors which influence credit ratings do have a causal relationship with graduation. PSA will help determine if this is the case.

Propensity scores tell us the probability that the untreated comparison subjects, also known as the control, would have the same attribute as the experimental group, (Shadish, Cook, and Campbell 2002) thereby allowing us to ‘backdoor’ into causality. There are several benefits to using propensity scores. Propensity scores reduce all the information in the predictors to just one number. Consequently, this can make it much easier to do matching or stratifying when there are multiple matching variables available (Cook and Shadish, 2008). In addition, propensity scores can successfully address issues of unobserved variables as well as issues of endogeneity, both of which could confound findings. Moreover, propensity score matching, like other quasi experimental design methods are suitable for the social sciences in general, and education especially wherein experimentation is not only impractical but often times unethical. The literature provides us with examples of propensity score analysis’ usefulness in social science research.

Frisco, Muller, and Frank (2007) used propensity score analysis to analyze learning outcomes of adolescents. Using data from the National Longitudinal Study of Adolescent Health and Academic Achievement Study, Frisco, Muller, and Frank (2007) conducted a study to determine whether the effects on parents’ union dissolution on their children’s high

school achievement. Frisco et al showed that in the short term, academic performance does decline after the dissolution of their parents' marriage. In another study, Furstenberg and Neumark (2007) used data from the Philadelphia Educational Longitudinal Study (PELS), to study the effectiveness of Educational Effectiveness (EE) Programs on the educational related outcomes which consisted of "dropping out, high school graduation, educational aspirations and expectations, and college attendance" (p. 139). After conducting propensity score matching, the researchers found that EE programs increased positive education outcomes and decreased some negative education outcomes such as dropping out. Callahan, Wilkinson, & Muller (2008) utilized PSA to estimate the effects of English as a Second Language (ESL) testing on the academic achievement of students of Mexican origin. The study found second generation students of Mexican origin enrolled in schools with a high immigrant student population. Finally, in an effort to control for non-random assignment problems, otherwise known as selection bias, Titus (2007) utilized propensity score analysis in a study conducted to estimate the effects of earning particular types of master's degrees on the wages of degree recipients. Titus' research found that receiving a master's degree in business management has positive relationship with higher wage earnings.

To conduct propensity score analysis, we began by first running a logistic regression. The dependent variable outcomes were dichotomous; $Y=1$ if the subjects received the treatment; $Y=0$ if the subjects did not receive the treatment (Guo, 2005; Kaltenbach, 2008). Using a method known as mahalanobis matching, each treatment subject was then matched to a non treatment subject based on the propensity score. Finally, we ran multiple regression which included the propensity score. In this step, an effort to determine if the difference in

graduation rates was attributable to a difference in treatment, or a difference in the condition (attributes) of the subject. The equation for the model I have constructed is as follows:

$$\text{logit (propensity score)} = b_0 + b_1(\text{estimated Pr})X_1(\text{E+| covariates}) + b_2(\text{estimated Pr})X_2(\text{E+| covariates}) + b_3(\text{estimated Pr})X_3(\text{E+| covariates}) + b_4(\text{estimated Pr})X_4(\text{E+| covariates}) + b_5(\text{estimated Pr})X_5(\text{E+| covariates}) \quad (3.1)$$

$$d(i,j) = (u-v)^T C^{-1} (u-v) \quad (3.2)$$

$$Y'(\text{Graduation Rate}) = A + B_1 X_1 (\% \text{ receiving financial aid}) + B_2 X_2 (\text{High School Performance}) + B_3 X_3 (\text{carnegie classification}) + B_4 X_4 (\text{finance ratios}) + B_5 X_5 (\text{institutional credit ratings}) \quad (3.3)$$

Appropriateness of Multiple Regression

Multiple regression is conducted to ascertain the predictive relationship between one dependent variable and two or more independent variables (Tabachnick and Fidell, 2007). I chose to utilize this method in analyzing research question 2. The equation for the model I have constructed is as follows:

$$Y'(\text{Graduation Rate}) = A + B_1 X_1 (\% \text{ receiving financial aid}) + B_2 X_2 (\text{High School Performance}) + B_3 X_3 (\text{Carnegie Classification}) + B_4 X_4 (\text{finance ratios}) \quad (3.4)$$

Where Y' represents predicted graduation rates, A is the constant; or the value of predicted graduation rates when the sources of revenue are 0 and all of the values of the control variables also equal 0. B_1 , B_2 , and B_3 represents coefficients of the control variables; which means for every one unit change in percentage of students receiving financial aid, High School Performance, Carnegie Classifications, graduation rates change by some corresponding amount. X_1 represents the Financial Aid covariates, X_2 represents the High School Performance covariates, and X_3 represent the Carnegie Classification covariates. B_4 represents the coefficient for the independent variables, financial ratios. As in the case of the

control variables, for every 1 unit change in the B_4 coefficient, graduation rates change by some corresponding amount. X_4 represents the independent variables, financial ratios.

Summary

Starting with data gathered from 673 public postsecondary institutions throughout the United States, I conducted a series of diagnostic analysis which resulted in the evaluation of 418 and 440 institutions for the respective years 2005 and 2007. Using this subset of institutions, I developed and tested a model to determine the relationship between graduation rates and institutional revenue structure and to ascertain the impact of institution credit ratings on graduation rates. Using multiple regression and propensity score analysis, I examined to what extent certain financial indicators predict the likelihood of degree completion from public colleges and universities. Furthermore, by utilizing propensity score analysis, I was able to utilize a counterfactual method to understand possible factors of causation. The next chapter presents the quantitative results attained from these procedures.

CHAPTER FOUR

RESULTS

Overview

This chapter presents the quantitative findings for this study. The section begins by summarizing both the descriptive and comparative analyses for the variables specified for both research questions. This section also details the statistical model, explaining to what extent each of the independent variables specified predict graduation rates.

Statistical Analyses

Descriptive Statistics

Tables 4.1 presents the descriptive statistics for the dependent variables, control variables, and independent variables for years 2005 and 2007. Table 4.1 provides descriptive statistics which includes frequency analysis of each of the variables analyzed for both years 2005 and 2007. Out of a universe of 673 public, not-for-profit, four year, degree granting colleges and universities, only 592 institutions had graduation rate data in 2005, compared to 612 in 2007. When disaggregated by financial aid type, we see that in both years (2005 and 2007) nearly 80% of students enrolled in public institutions received some type of financial aid. Approximately 46 % of students received student loan aid in both years (M = 46.16 for 2005 ; M = 46.15 for 2007); while state aid was received by nearly 37% of students in public not-for-profit four year institutions (M = 37.16 for 2005 ; M = 36.51 for 2007). About one-third of the students at these institutions received federal aid (M = 34.10 for 2005 ; 33.08 for 2007). Institutional aid made up the smallest proportion of aid for students (M = 30.61 for 2005 ; M = 32.45).

Table 4.1
Descriptive Analysis for 2005 and 2007

	2005					2007				
	N	M	SD	MIN	MAX	N	M	SD	MIN	MAX
<i>Dependent Variable</i>										
<i>Graduation Rates</i>										
Grand Total of Completers	592	44.04	.17	.00	92.6	612	44.60	.17	4.00	93.2
<i>Covariants</i>										
<i>Source of Financial Aid</i>										
Percent Receiving Any Financial Aid	620	77.27	15.03	.00	100	622	77.43	15.55	.00	100
Percent Receiving Federal Grant Aid	620	34.10	17.22	.00	100	622	33.08	17.03	.00	98
Percent Receiving State/Local Aid	620	37.16	22.02	.00	92.5	622	36.51	22.42	.00	95
Percent Receiving Institutional Grant Aid	620	30.61	19.42	.00	99	622	32.45	20.69	.00	100
Percent Receiving Student Loan Aid	620	46.16	20.40	.00	89	622	46.15	21.24	.00	93
<i>High School Performance</i>										
<i>Standardized Test Scores</i>										
<i>SAT Composite</i>										
High School Performance_SAT25TH Percentile	418	471.81	55.27	320	630	440	464.03	58.39	220	625
High School Performance_SAT75TH Percentile	418	579.67	53.86	440	775	440	573.66	56.40	436.50	725
<i>ACT Composite</i>										
ACT Composite25th Percentile Score	427	19.11	2.81	3	28	444	19.25	2.62	9	28
ACT Composite75th Percentile Score	427	24.10	2.85	8	33	444	24.10	2.66	18	32
<i>Portfolio_Quantitative</i>										
<i>Record_Composite</i>										
High School Performance_GPA, Rank, and Record	523	3.54	.38	2	4	531	3.54	.36	2	4
<i>Portfolio_Qualitative_Composite</i>										
High School Performance_Recomm._Student Demonstration of Competencies	523	2.34	.52	1	4	531	2.33	.51	1	4
<i>College Readiness</i>										
High School Performance_College Prep. And Admission Test Scores	523	3.67	.41	2	4	531	3.68	.42	2	4

Table 4.1 Continued

<i>^aCarnegie</i>										
<i>Classification_Composite</i>										
Carnegie_BA	548	18.57	.39			548	18.57	.39		
Carnegie_PhD	455	32.39	.47			455	32.39	.47		
<i>^aCredit Ratings</i>										
Prime High Grade	246	.21	.22			246	.21	.22		
Upper Medium Grade	156	.14	.20			156	.14	.20		
Independent Variables										
Percent revenue from tuition and fees net discounts and allowances	628	23.13	.12	.00	.99	628	23.15	.12	.00	.99
Percent revenue from federal operating grants and contracts	628	11.20	-.09	.00	.88	628	10.98	.11	.00	3.15
Percent revenue from state operating grants and contracts	628	3.39	.04	.00	.31	628	3.27	.04	.00	.25
Percent revenue from local/private operating grants and contracts	628	2.25	.04	.00	.62	628	2.20	.04	.00	.63
Percent revenue from gifts, including contributions from affiliated organizations	628	3.08	.06	.00	.82	628	3.27	.06	.00	.77
Percent revenue from additions to permanent endowments	628	.27	.01	.00	.12	628	.25	.01	.00	.08
Percent revenue from investment income	628	1.48	.02	.00	.18	628	2.40	.03	-.01	.26
Auxiliary enterprise reliance	628	17.01	.12	.00	1.00	628	17.42	.13	.00	1.00
Reliance on other revenue	628	3.83	.38	.00	7.53	628	2.00	.10	-.02	1.56
Reliance on state appropriations	628	74.16	.97	.00	12.68	628	75.10	.92	.00	12.71
Reliance on operating margin excluding gifts	628	-1.09	3.63	-65.78	.68	628	-1.10	3.48	-57.76	.58
Annual Operating Margin	628	-1.65	15.08	-373.30	.68	606	-88.87	3772.84	-79970.31	39874.98

^a Because these dichotomous variables were coded such that no = 0 and yes = 1, the mean is equivalent to the percent of institutions in which the variable is present. Also, the maximum for each of these dichotomous variables is 1 and the minimum is 0.

The frequencies in 2007 were only slightly higher than in 2005 (N=523 in 2005 and N=531 in 2007). There was only a slight difference in the means and standard deviations for both years. We see that in both years, public institutional policy regarding mandatory admission test score submission was most strict (M=1.09 in 2005 and 2007). Conversely, institutional mandates for students to formally demonstrate competencies was the least rigorous policy (M=2.74 in 2005 and 2.76 in 2007). SAT and ACT test scores are reported at both the 25th and 75th percentile. For the SAT, scores were as low as 220 (Writing 25th percentile in 2007) and as high as 770 (Reading 75th percentile in 2005). For the ACT, score ranged from as low as 3 (Composite 25th percent, English 25th percent, and Math 25th percent in 2005) and as high as 35 (English 75th percentile in 2005).

With the exception of Carnegie classification, the variables are continuous. In the case of the Carnegie classifications, the variables are dichotomous such that absence of an attribute (MA or PhD degrees are not the highest degrees offered at the institution) = 0, and presence of an attribute (MA or PhD degrees are the highest degrees offered at the institution) = 1. Hence, the means of these dichotomous variables represent the percent of institutions with this attribute out of the total number of institutions. As shown in Table 4.4, 18.57% of the schools in the universe of public, four year not-for-profit, degree granting institutions, the bachelors is the highest degree conferred, while the PhD is the highest degree awarded in 32.39% of these schools.

Institutional credit rating frequencies are also shown in Table 4.1. We can see that most public, not for profit, four year, degree granting institutions have a credit rating that

falls within the prime high grade category (N = 246 ; M = 21). The second most frequent credit rating was Upper Medium Grade (N = 156 ; M = .14). Also in both years we see that public institutions relied quite heavily on state appropriations (M=74.16 in 2005 and M=75.10 in 2007). We also see that slightly less than a quarter of total revenue was comprised of tuition in that year (M=23.13 in 2005 and M=23.15 in 2007). The average annual operating margin was negative in both years (M= -1.09 in 2005 and M= -1.10 in 2007).

We also see that the percentage of revenue from additions to permanent endowments was quite low (M=.27 in 2005 and .25 in 2007). The proportion of operating expenses drawn from institutional food services, housing, and other auxiliary sources was also static from 2005 (17.01) to 2007 (17.42). However, the most striking comparison is the sharp increase in the annual operating margin deficit from 2005 to 2007. Defined as the proportion of total operating revenue made up by an operating surplus (deficit), the negative margin in 2007 (M=-88.87) was nearly eighty eight times greater than that of 2005 (M=-1.09). This tells us that operating expenses grew greatly over these two years. This negative trend, as well as the decline in state appropriations and percentage of revenue from endowments is likely attributable to the recessionary economy that characterized 2007 compared to the more robust economy of 2005. Lastly, the frequencies ranged from as high as 622 institutions that supplied data about a particular variable, to as low as 156.

Relational

To ascertain multicollinearity, both the tolerance and the variance inflation factors (VIFs) were analyzed for each of the variables for both years. The tolerance metric analyzes

how linear the relationship between a variable being added to a model is with the variables currently in the model (Williams, 2009). Tolerance is equal to $1-R^2$ (Williams, 2009). It can also be written as $1/VIF$. A variable with a low tolerance indicates that it measures the same factors as those measured by variables already in the model and therefore should not be added; i.e. high collinearity (Williams, 2009). Similarly, VIFs explain the impact of collinearity among the variables within a model (Williams, 2009). Measured as $1/Tolerance$, a high VIF is an indicator of not only possible high multicollinearity but also possible beta coefficient instability. Table 4.2 illustrates the VIFs and tolerances for each of the covariates and independent variables in the 2005 analysis.

Table 4.2

Variance Inflation Factors (VIFs) and Tolerances for 2005 Covariates and Independent Variable

	VIF	1/VIF
Annoppmar_05	133.78	0.007475
Roppeg_05	125.19	0.007988
AC75TH05	17.85	0.056011
SEL_SAT252005	17.13	0.058376
AC25TH05	16.52	0.060524
SEL_SAT752005	15.57	0.064243
Rel_statapp_mgn	9.58	0.104336
Pctrev_gif_cao	4.14	0.241815
PFGRA500_Composite	3.81	0.262734
PFAID500_Composite	3.15	0.317656
Upp_Med_Gde	3.08	0.324880
Pme_Hgh_Gde	3.04	0.329233
PSLAID500_Composite	2.92	0.342216
PLOAN500_Composite	2.31	0.432640
Pctrev_fedop_grco	2.25	0.445095
Pctrev_tufee_da	2.22	0.450072
Pct_auxentrel	1.97	0.506685
Pctrev_invinc	1.87	0.534315
PIAID500_Composite	1.86	0.536661
CARNALL_PhD	1.84	0.542614
Pctrev_lcop_grco	1.72	0.580001
SEL_GPA_RNK_RCD2005	1.59	0.629256
Pctrev_stop_grco	1.56	0.640419
Pctrev_addpermendow	1.50	0.665268
CARNALL_BA	1.33	0.753639
SEL_REC_COMP2005	1.32	0.757606
Rel_otherev_mgn	1.24	0.808304
SEL_CPREP_ATSCR2005	1.17	0.852509

From Table 4.2 we see that six variables in the analysis had VIFs greater than 10. These variables were Annoppmar_05, Roppeg_05, AC75TH05, SEL_SAT252005, AC25TH05, and SEL_SAT752005. A seventh variable, Rel_statapp_mgn, had a VIF very close to 10, 9.58. In addition, each of these seven variables also had very low tolerances compared to the other variables in the analysis. As a result of the VIFs and low tolerances found among these seven variables, correlation coefficients were also calculated as another diagnostic measure. Table 4.3 shows the findings from the analysis.

Table 4.3

2005 Correlation Coefficients for Variables with high VIFs

	Annoppar_05	Roppeg_05	AC75TH05	SEL_SAT 752005	AC25TH05	SEL_SAT 25_2005	Rel_st atapp_mgn
Annoppar_05		0.9836	-0.0327	0.0036	-0.0420	-0.0162	-0.3320
Roppeg_05	0.9836		-0.0503	-0.0175	-0.0595	-0.0359	-0.3146
AC75TH05	-0.0327	-0.0503		0.9238	0.9110	0.8524	-0.3029
SEL_SAT752005	0.0036	-0.0175	0.9238		0.8431	0.9041	-0.3035
AC25TH05	-0.0420	-0.0595	0.9110	0.8431		0.9014	-0.3038
SEL_SAT25_2005	-0.0162	-0.0359	0.8524	0.9041	0.9014		-0.2985
Rel_st atapp_mgn	-0.3320	-0.3146	-0.3029	-0.3035	-0.3038	-0.2985	

Table 4.3 shows that each of standardized test score variables, AC75TH05, AC25TH05, SEL_SAT252005, and SEL_SAT752005, were highly correlated with one another. The variables Annopmar_05 and Roppeg_05 were also highly correlated with one another. However, none of these seven variables were highly correlated with any of the other variables in the analysis. The variable Rel_statapp_mgn did not appear to be highly correlated with any other variable in the analysis.

Of these seven variables, four of them were institutional control variables; AC75TH05, SEL_SAT252005, AC25TH05, and SEL_SAT752005; and were included as controls in the model based on the literature. Therefore despite their high VIFs and low tolerances, it was determined necessary to include them based on the findings of earlier studies (Blecher, 2006; DeBerard, Spielmans, & Julka, 2004; Tinto, 1975; Titus, 2006a, 2006b). However, three of the variables, Annopmar_05, Roppeg_05, and Rel_statapp_mgn were independent variables. Therefore, in order to determine if any of the three independent variables with high VIFs was significantly related with graduation rates, upon analyzing the findings from the correlation coefficient matrix, three additional multiple regressions were run wherein only one of the independent variables with a high VIF was included with the other control and independent variables. The results of each of these three regression analysis showed no significant relationship between graduation rates and the three independent variables. As a result, each of these three variables was allowed to remain in the analysis. Appendix E illustrates the results of these regressions.

Table 4.4 illustrates the VIFs and tolerances for each of the covariates and independent variables in the 2007 analysis.

Table 4.4

Variance Inflation Factors (VIFs) and Tolerances for 2007 Covariates and Independent Variable

	VIF	1/VIF
AC25TH07	17.30	0.057813
AC75TH07	13.87	0.072113
Rel_statapp_mgn	12.70	0.078763
SEL_SAT752007	12.58	0.079492
Annoppmar_07	11.30	0.088483
SEL_SAT252007	11.29	0.088611
PFGRA607_Composite	2.93	0.341809
Pme_Hgh_Gde	2.77	0.361175
PFAID607_Composite	2.77	0.361191
Upp_Med_Gde	2.73	0.365773
PSLAID607_Composite	2.68	0.372870
Pctrev_fedop_grco	2.23	0.448234
Pctrev_tufee_da	2.23	0.448109
Pct_auxentrel	1.94	0.516687
PIAID607_Composite	1.84	0.543253
Pctrev_invinc	1.83	0.547556
CARNALL_PhD	1.83	0.546267
PLOAN607_Composite	1.78	0.561914
Pctrev_lcop_grco	1.77	0.566198
SEL_GPA_RNK_RCD2007	1.60	0.624914
Pctrev_addpermendow	1.55	0.646820
Pctrev_stop_grco	1.50	0.666526
Pctrev_gif_cao	1.40	0.716265
SEL_REC_COMP2007	1.36	0.733479
CARNALL_BA	1.28	0.783097
Rel_otherev_mgn	1.20	0.834813
SEL_CPREP_ATSCR2007	1.14	0.877626
Roppeg_07	1.13	0.884787

From Table 4.4 we see that six variables in the analysis had VIFs greater than 10. These variables were AC25TH07, AC75TH07, Rel_statapp_mgn, SEL_SAT752007, Annoppmar_07, and SEL_SAT752007. In addition, each of these variables also had very low tolerances compared to the other variables in the analysis. As a result of the VIFs and low tolerances found among these six variables, correlation coefficients were also calculated as another diagnostic measure. Table 4.5 shows the findings from the analysis.

Table 4.5

2007 Correlation Coefficients for Variables with high VIFs

	Annoppar_07	AC25TH07	AC75TH07	SEL_SAT752005	Rel_statapp_mgn	SEL_SAT252007
Annoppar_07		0.0149	0.0228	0.0224	-0.4174	0.0189
AC25TH07	0.0149		0.9179	0.9005	-0.2730	0.9284
AC75TH07	0.0228	0.9179		0.9226	-0.2886	0.8427
SEL_SAT752005	0.0224	0.9005	0.9226		-0.2380	0.9087
Rel_statapp_mgn	-0.4174	-0.2730	-0.2886	-0.2380		-0.2093
SEL_SAT252007	0.0189	0.9284	0.8427	0.9087	-0.2093	

Table 4.5 shows that each of standardized test score variables, AC75TH07, AC25TH07, SEL_SAT252007, and SEL_SAT752007, were highly correlated with one another. Neither the variable Annopmar_07 and Rel_statapp_mgn was also correlated with one another. These two variables, Annopmar_05 and Rel_statapp_mgn, were not correlated with any of the other variables, AC25TH07, AC75TH07, SEL_SAT752005, and SEL_SAT752007. None of these six variables was highly correlated with any of the other variables in the analysis.

Of these six variables, four of them were institutional control variables; AC75TH07, SEL_SAT252007, AC25TH07, and SEL_SAT752007; and were included as controls in the model based on the literature. Therefore despite their high VIFs and low tolerances, it was determined necessary to include them based on the findings of earlier studies (Blecher, 2006; DeBerard, Spielmans, & Julka, 2004; Tinto, 1975; Titus, 2006a, 2006b). However, two of the variables, Annopmar_07 and Rel_statapp_mgn were independent variables. Therefore, in order to determine if either of the two independent variables with high VIFs was significantly related with graduation rates, upon analyzing the findings from the correlation coefficient matrix, two additional multiple regressions were run wherein only one of the two independent variables with a high VIF was included with the other control and independent variables. The results of both of these regression analyses showed no significant relationship between graduation rates and either of the independent variables with high VIFs. As a result, both of these variables were allowed to remain in the analysis. Appendix E illustrates the results of these regressions.

Findings

Research Question 1

Before propensity score analysis, least squares regression was run for each credit rating to determine if a significant relationship could be found between either of the credit ratings and graduation rates. After running separate least square regression analysis for both credit ratings, no significance was found between either of them and graduation rates for both 2005 and 2007. After conducting this analysis, propensity score analysis was then conducted to see if significance could be detected after matching was conducted.

Tables 4.6-4.9 present findings for propensity score analysis (PSM) analysis to answer the second research question concerning institutional credit ratings and graduation rates. While the analysis consisted of only one additional model in both years, separate analysis was run wherein each of the two highest credit rating categories (Prime High Grade and Upper Medium Grade) were analyzed as treatments.

2005

Prime High Grade

Sources of financial aid. When *Prime High Grade* (PHG) composite variable was introduced into the analysis in Model 5, it was found to have no effect on the *Financial Aid* variables that was different from that of Models 2-4.

High school performance. According to Table 4.6, we see that in Model 5, ACTcomposite_25th percentile and High School Performance_college prep and admission test scores were both shown to have a significant relationship with graduation rates. Specifically, a one unit increase in the ACT composite _25th percentile score ratio was shown to result in an increase in graduation rates by .03% in Model 5. A one unit increase in the rigor of High School Performance as it pertains to emphasis placed on evidence of

college preparation and admission test scores, resulted in a .08% increase in graduation rates.

Carnegie classification. In Model 5, we see that no significant relationships exist between graduation rates and either of the two variables (BA and PhD).

Financial ratios. Only auxiliary enterprise reliance was shown to have a significant relationship with graduation rates in Model 5. Table 4.6 reveals a one point increase in this ratio results in a .31% increase in graduation rates.

Credit ratings. Table 4.6 shows that a prime high grade credit rating was not significantly related to graduation rates.

R Square. Table 4.6 shows that when PHG credit category was added to the model, an additional 5% of variance was accounted for, bringing the total amount of variance explained by all 5 models to .78. Table 4.6 in its entirety is presented below.

Table 4.6
 2005 Sources of Financial Aid, High School Performance, Carnegie Classification, Financial Ratios
 Predicting Graduation Rates, and Prime High Grade (PHG) Credit Rating

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios+ Credit Rating(PHG)
Intercept: 2005 Graduation Rates – Grand Total Financial Aid	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.66(.14)***	-.61(.17)***
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***	.00(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)**
High School Performance					
ACT Composite 25th percentile score (2005)		.02(.01)**	.02(.01)**	.02(.01)**	.03(.01)***

Table 4.6 Continued.

ACT Composite 75th percentile score (2005)	0(.01)	0(.01)	-.01(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile	0 (.00)***	0 (.00)***	0 (.00)***	0(.00)
2005 High School Performance_SAT 75 th Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record	-.01(.02)	-.01(.02)	-.03(.02)	-.04(.02)
2005 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)**	.07(.02)***	.08(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies	.02(.01)	.02(.01)	.02(.01)	-.01(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA		-.03(.02)	-.07 (.02)**	-.04(.03)
Dummy Variable _ Carnegie _ PhD		.02(.01)	.03 (.01)**	.03(.02)
Financial Ratios				
2005 Percent revenue from tuition and fees net discounts and allowances			--.04(.08)	-.05(.09)
2005 Percent revenue from federal operating grants and contracts			.08(.09)	.03(.12)
2005 Percent revenue from state operating grants and contracts			.42(.19)**	.39(.23)

2005

Upper Medium Grade

Sources of financial aid. As was the case with the *Prime High Grade* (PHG) composite variable, the *Upper Medium Grade* (UMG) variable had no effect on the *Financial Aid* variables that was different from that of the previous four models. Assigning UMG as a treatment has the same impact on the relationship between each of the *Financial Aid* variables and overall graduation rates as did the PHG variable.

High school performance. According to Table 4.7, we see that in Model 5, ACTcomposite_25th percentile and High School Performance_college prep and admission test scores were both shown to have a significant relationship with graduation rates. Specifically, a one unit increase in the ACT composite _25th percentile score ratio was shown to result in an increase in graduation rates by .03% in Model 5. A one unit increase in the rigor of High School Performance as it pertains to emphasis placed on evidence of college preparation and admission test scores, resulted in a .08% increase in graduation rates.

Carnegie classification. In Model 5, we see that no significant relationships exist between graduation rates and either of the two variables (BA and PhD).

Financial ratios. As was the case with Table 4.6, Table 4.7 illustrates Auxiliary enterprise reliance is the only financial ratio to have a significant relationship with graduation rates. The table reveals a one point increase in this ratio results in a .32% increase in graduation rates.

Credit ratings. Table 4.7 shows that *Upper Medium Grade* credit ratings were not shown to be significantly related to graduation rates.

R square. Table 4.7 shows that when UMG credit category was added to the model,

an additional 5% of variance was accounted for, bringing the total amount of variance explained by all 5 models to .78. Table 4.7 in its entirety is presented below.

Table 4.7.

2005 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates, and Upper Medium Grade (UMG) Credit Ratings

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating(UMG)
<i>Intercept: 2005 Graduation Rates – Grand Total</i>	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.66(.14)***	-.59(.17)***
<i>Financial Aid</i>					
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***	.00(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)*	0(.00)*	0(.00)	0(.00)*
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)**

Table 4.7 Continued

High School Performance

ACT Composite 25th percentile score (2005)	.02(.01)**	.02(.01)**	.02(.01)**	.03(.01)**
ACT Composite 75th percentile score (2005)	0(.01)	0(.01)	-.01(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile	0 (.00)***	0 (.00)***	0 (.00)***	0(.00)
2005 High School Performance_SAT 75 th Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record	-.01(.02)	-.01(.02)	-.03(.02)	-.04(.02)
2005 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)**	.07(.02)***	.08(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies	.02(.01)	.02(.01)	.02(.01)	-.01(.01)

Carnegie Classification

Dummy Variable _ Carnegie _ BA		-.03(.02)	-.07 (.02)**	-.04(.03)
Dummy Variable _ Carnegie _ PhD		.02(.01)	.03 (.01)**	.03(.02)

Table 4.7 Continued.

<i>Financial Ratios</i>					
2005 Percent revenue from tuition and fees net discounts and allowances				--.04(.08)	-.05(.09)
2005 Percent revenue from federal operating grants and contracts				.08(.09)	.04(.12)
2005 Percent revenue from state operating grants and contracts				.42(.19)**	.45(.23)
2005 Percent revenue from local/private operating grants and contracts				-.07(.27)	.09(.32)
2005 Percent revenue from gifts, including contributions from affiliated organizations				.29(.26)	1.03(.83)
2005 Percent revenue from additions to permanent endowments				.07(.76)	.69(.98)
2005 Percent revenue from investment income				.58(.26)**	.40(.29)
2005 Auxiliary enterprise reliance				.32(.06)**	.32(.08)***
2005 Reliance on other revenue				0(.02)	-.12(.08)
2005 Reliance on state appropriations				-.01(.02)	.03(.07)
2005 Annual Operating Margin				-.02(.07)	-.38(.40)
2005 Reliance on operating margin excluding gifts				.02(.07)	.43(.38)
<i>Credit Rating</i>					
Upper Medium Grade					-.04(.03)
R Squares	Model 1	Model 2	Model 3	Model 4	Model 5
	.39	.68	.69	.73	.78

**p < 0.05

***p < .01

2007

Prime High Grade

Sources of financial aid. As was the case with the *Prime High Grade* (PHG) composite variable in 2005, the PHG variable had no effect on the *Financial Aid* variables that was different from that of the previous four models. Assigning PHG as a treatment in 2007 had the same impact on the relationship between each of the *Financial Aid* variables and overall graduation rates as did the PHG variable.

High school performance. According to Table 4.8, Model 5 reveals a significant relationship was found to exist between graduation rates and the following High School Performance variables: ACT composite_25th percentile, High School Performance_SAT_25th percentile, and High School Performance_college prep_and admission test scores. A one unit increase in these scores resulted in a .02% increase in graduation rates. In addition, Model 5 in Table 4.8 revealed that a 1 unit increase in an institution's rigor in requiring proof of completion of college preparatory coursework as well as admission test scores resulted in a .07% increase in graduation rates.

Carnegie classification. Table 4.8 also shows us that in Model 5, going from a masters degree granting status to PhD degree granting status is not significant. However, going in the opposite direction results is significant and results in a decrease in graduation rates of .11%.

Financial ratios. Model 5 shows graduation rates to be significantly related to percent revenue from tuition and fees net discounts and allowances and auxiliary enterprise reliance. According to Model 5, a 1 unit increase in the percent revenue from tuition and fees net discounts and allowances resulted in a .20% decline in graduation rates. Finally, we find

1 unit increase in the auxiliary enterprise reliance ratio resulted in a .18% increase in graduation rates.

Credit ratings. Table 4.8 shows that *Prime High Grade* credit ratings were not shown to be significantly related to graduation rates.

R square. Table 4.8 also shows that when PHG credit category was added to the model, an additional 4% of variance was accounted for, bringing the total amount of variance explained by all 5 models to .74. Table 4.8 in its entirety is presented below.

Table 4.8

2007 Sources of Financial Aid, High School Performance, Carnegie Classification, Financial Ratios Predicting Graduation Rates, and Prime High Grade (PHG) Credit Rating

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating(PHG)
<i>Intercept: 2007 Graduation Rates – Grand Total</i>	.73(.04)***	-.72(.12)***	-.64(.12)***	--.45(.13)***	-.53(.16)***
<i>Financial Aid</i>					
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**	0(.00)***
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***	0(.00)***
<i>High School Performance</i>					
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)	.02(.01)**
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)	0(.01)
2007 High School Performance_SAT 25 th Percentile		0 (.00)***	0(.00)***	0 (.00)***	0(.00)**

Table 4.8 Continued.

2007 High School Performance_SAT 75 th _ Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record	0(.02)	0(.02)	-.02(.02)	-.03(.02)
2007 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)***	.06(.02)***	.07(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies	.04(.01)**	.04(.01)***	.03(.01)**	.02(.02)
<i>Carnegie Classification</i>				
Dummy Variable _ Carnegie _ BA		-.04(.02)**	-.07(.02)**	-.11(.03)***
Dummy Variable _ Carnegie _ PhD		.03(.01)**	.03(.01)**	.02(.02)
<i>Financial Ratios</i>				
2007 Percent revenue from tuition and fees net discounts and allowances			-.21(.07)**	-.20(.09)**
2007 Percent revenue from federal operating grants and contracts			-.01(.04)	.04(.13)
2007 Percent revenue from state operating grants and contracts			.18(.16)	.25(.19)
2007 Percent revenue from local/private operating grants and contracts			-.20(.28)	-.17(.32)
2007 Percent revenue from gifts, including contributions from affiliated organizations			.12(.12)	.04(.19)
2007 Percent revenue from additions to permanent endowments			6.7(.76)	-1.70(1.35)
2007 Percent revenue from investment income			-1.90(1.13)	.41(.22)
2007 Auxiliary enterprise reliance			.19(.06)***	.18(.07)**
2007 Reliance on other revenue			-.02(.04)	0(.05)
2007 Reliance on state appropriations			-.03(.02)	-.05(.06)

Table 4.8 Continued.

2007Annual Operating Margin				0(.01)		-.01(.05)
2007Reliance on operating margin excluding gifts				0(.00)		0(.00)
<i>Credit Rating</i>						
Prime High Grade						.03(.03)
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4		Model 5
	.37	.64	.66	.70		.74
**p < 0.05						
***p < .01						

2007

Upper Medium Grade

Sources of financial aid. As was the case with the *Prime High Grade* (PHG) composite variable, the *Upper Medium Grade* (UMG) variable had no effect on the *Financial Aid* variables that was different from that of the previous four models. Assigning UMG as a treatment has the same impact on the relationship between each of the *Financial Aid* variables and overall graduation rates as did the PHG variable.

High school performance. According to Table 4.9, we see that UMG resulted in a significant relationship between graduation rates and the following High School Performance variables: ACT composite_25th percentile, High School Performance_SAT_25th percentile, and High School Performance_college prep_and admission test scores. A one unit increase in these scores resulted in a .02% increase in graduation rates. In addition, Model 5 in Table 4.9 revealed that a 1 unit increase in an institution's rigor in requiring proof of completion of college preparatory coursework as well as admission test scores resulted in a .07% increase in graduation rates.

Carnegie classification. Table 4.9 also shows us that just as was found when PHG was used as the treatment in Model 5, when using UMG as the treatment, going from a masters degree granting status to PhD degree granting status is not significant. However, going in the opposite direction results is significant and results in a decrease in graduation rates of .11%.

Financial ratios. Model 5 shows graduation rates to be significantly related to percent revenue from tuition and fees net discounts and allowances and auxiliary enterprise reliance. According to Model 5, a 1 unit increase in the percent revenue from tuition and fees

net discounts and allowances resulted in a .20% decline in graduation rates. Finally, we find 1 unit increase in the auxiliary enterprise reliance ratio resulted in a .20% increase in graduation rates.

Credit ratings. Table 4.9 shows that *Upper Medium Grade* credit ratings were not shown to be significantly related to graduation rates.

R square. Table 4.9 shows that when UMG credit category was added to the model, an additional 4% of variance was accounted for, bringing the total amount of variance explained by all 5 models to .74. Table 4.9 in its entirety is presented below.

Table 4.9.

2007 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates, and Upper Medium Grade (UMG) Credit Ratings

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating(UMG)
<i>Intercept: 2007 Graduation Rates – Grand Total</i>	.73(.04)***	-.72(.12)***	-.64(.12)***	--.45(.13)***	-.50(.16)***
<i>Financial Aid</i>					
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**	0(.00)***
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***	0(.00)***
<i>High School Performance</i>					
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)	.02(.01)**
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)	0(.01)

Table 4.9 Continued.

2007 High School Performance_SAT 25 th Percentile	0 (.00)***	0(.00)***	0 (.00)***	0(.00)**
2007 High School Performance_SAT 75 th _ Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record	0(.02)	0(.02)	-.02(.02)	-.03(.02)
Table 4.9 Continued				
2007 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)***	.06(.02)***	.07(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies	.04(.01)**	.04(.01)***	.03(.01)**	.02(.02)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA		-.04(.02)**	-.07 (.02)**	-.11(.03)***
Dummy Variable _ Carnegie _ PhD		.03(.01)**	.03(.01)**	.02(.02)
Financial Ratios				
2007 Percent revenue from tuition and fees net discounts and allowances			-.21(.07)**	-.20(.09)**
2007 Percent revenue from federal operating grants and contracts			-.01(.04)	.04(.13)
2007 Percent revenue from state operating grants and contracts			.18(.16)	.29(.18)
2007 Percent revenue from local/private operating grants and contracts			-.20(.28)	-.17(.32)
2007 Percent revenue from gifts, including contributions from affiliated organizations			.12(.12)	.03(.19)
2007 Percent revenue from additions to permanent endowments			6.7(.76)	-1.73(1.35)

Table 4.9 Continued.

2007 Percent revenue from investment income				-1.90(1.13)	.40(.22)
2007 Auxiliary enterprise reliance				.19(.06)***	.20(.07)**
2007 Reliance on other revenue				-.02(.04)	-.001(.05)
2007 Reliance on state appropriations				-.03(.02)	-.05(.06)
2007 Annual Operating Margin				0(.01)	-.01(.05)
2007 Reliance on operating margin excluding gifts				0(.00)	0(.00)
Credit Rating					
Upper Middle Grade					-.05(.03)
R Squares	Model 1	Model 2	Model 3	Model 4	Model 5
	.37	.64	.66	.70	.74
**p < 0.05					
***p < .01					

Research Question 2

2005

Tables 4.10 and 4.11 present findings for the multiple regression analysis to answer the second research question concerning institutional revenue structure and graduation rates. In both years, the analysis consisted of four models, the first three control variables and the fourth being the independent variable. The coefficient indicates how a one-unit change in the independent or control variables affects the probability of change in graduation rates at public, not for profit, four-year, degree granting institutions. Given a significant statistical test of α at both .05 and .01, a positive sign of a parameter estimate indicates that an increase in the independent variables with the other variables held constant increases the likelihood of an increase in graduation rates. Conversely, a negative sign on the estimate indicates that graduation rates decrease with the presence or level of the predictive variables.

Sources of financial aid. Table 4.10 presents the findings for the year 2005. We see that for each of the covariates within Model 1, there exists a significant relationship. Yet, while the relationship between graduation rates and each of these Financial Aid variables is significant, the beta co-efficients reveal little change in graduation rates as a result of a unit change in these variables. For example in Model 1 we see that for every 1 percentage point increase in students receiving financial aid in general and federal financial aid in particular, overall graduation rates decreased by .01%. However, percentage point increases in the number of students receiving state/local aid, institutional aid, or loans, result in no change in graduation rates. When we assess this relationship across models, we find fewer significant relationships existing among these Financial Aid variables and graduation rates. We also find

no correlation to exist between a one unit change in these variables and graduation rates in Models 2-4.

High school performance. The composite variables that comprise High School Performance in Models 2-4 measure the rigor of an institution's admissions policies. Of the seven composite variables, we see that three of these were significantly related to graduation rates in Models 2-4. These variables were ACT composite 25th percentile score, High School Performance_SAT composite 25th percentile, and High School Performance_college prep and admission test scores. In each of the three models, we see that a 1 point increase in the ACT composite scores of students who fell in the 25th percentile resulted in a .02% increase in graduation rates. Also, a one point increase in the level of rigor an institution places on requiring proof of completion of college preparatory coursework as well as admission test scores (High School Performance_college prep. and admission test scores), corresponds with nearly one-tenth of a 1% increase in graduation rates across all three models (.06 in Model 2, .05 in Model 3, and .07 in Model 4).

Carnegie classification. For Model 3, neither MA nor PhD granting institutions were found to have a significant relationship with graduation rates. However, In Model 4, we see that both MA and PhD granting institutions show a significant relationship with graduation rates. In Model 4, findings indicate that going from a masters degree granting status to PhD degree granting status results in a .03% increase in graduation rates. However, the same does not hold true when the direction is reversed. In Model 4 we see that a going a from a master's degree granting status to bachelor's degree granting status results in a .07% decline in graduation rates.

Financial ratios. Financial ratios assess the overall fiscal health of an organization. The changes in these ratios indicate to what degree either total revenue or operating revenue is dependent on certain revenue sources. Among the twelve ratios analyzed, significance was found to exist among only three of them. These ratios were the following: 2005 Percent revenue from state operating grants and contracts, 2005 Percent revenue from investment income, and 2005 Auxiliary enterprise reliance. For every one unit increase in Percent revenue from state operating grants and contracts ratio, overall graduation rates increased by .42%. Additionally, for every one unit increase in the Percent revenue from investment income ratio, overall graduation rates increased by .58%. Lastly, for every one unit increase in the Auxiliary enterprise reliance ratio, graduation rates increased by .32%.

R square. The R square values tell us that alone, type of financial aid accounted for 39% of the variance in graduation rates in 2005. When High School Performance was added to the model, an additional 29% of variance was accounted for. Only 1% additional variance was explained by adding Carnegie Classification. Finally, by adding the financial ratios, an additional 4% of variance was explained. The output in its entirety from Table 4.10 appears below.

Table 4.10.
 2005 Sources of Financial Aid, High School Performance, Carnegie Classification, and
 Financial Ratios Predicting Graduation Rates

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
Intercept: 2005 Graduation Rates – Grand Total	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.66(.14)***
Financial Aid				
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)	0(.00)	0(.00)
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
High School Performance				
ACT Composite 25th percentile score (2005)		.02(.01)**	.02(.01)**	.02(.01)**
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile		0 (.00)***	0 (.00)***	0 (.00)***
2005 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record		-.01(.02)	-.01(.02)	-.03(.02)
2005 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)**	.07(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies		.02(.01)	.02(.01)	.02(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA			-.03(.02)	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.02(.01)	.03 (.01)**

Table 4.10 Continued

<i>Financial Ratios</i>				
2005 Percent revenue from tuition and fees net discounts and allowances				--.04(.08)
2005 Percent revenue from federal operating grants and contracts				.08(.09)
2005 Percent revenue from state operating grants and contracts				.42(.19)**
2005 Percent revenue from local/private operating grants and contracts				-.07(.27)
2005 Percent revenue from gifts, including contributions from affiliated organizations				.29(.26)
2005 Percent revenue from additions to permanent endowments				.07(.76)
2005 Percent revenue from investment income				.58(.26)**
2005 Auxiliary enterprise reliance				.32(.06)**
2005 Reliance on other revenue				0(.02)
2005 Reliance on state appropriations				-.01(.02)
2005 Annual Operating Margin				-.02(.07)
2005 Reliance on operating margin excluding gifts				.02(.07)
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4
	.39	.68	.69	.73

**p < 0.05

***p < .01

2007

Sources of financial aid. Table 4.11 presents the findings for the year 2007. As in 2005, a significant relationship exists for each of the covariates within Model 1. Once again, we find the beta co-efficients to reveal little change in graduation rates as a result of a unit change in these variables. In fact, the only change in graduation rates as a result of financial aid is found in Model 1. Here we see that a 1 percentage point increase in the number of students receiving federal grant aid results in a .01% decline in overall graduation rates. A percentage point increases in the number of students receiving state/local aid, institutional aid, or loans, result in no change in graduation rates. As in 2005, when we assess this relationship across models, we find fewer significant relationships existing among these Financial Aid variables and graduation rates. We also find no correlation to exist between a one unit change in these variables and graduation rates in Models 2-4.

High school performance. Of the seven composite variables, a significant relationship was found to exist among the following three variables and graduation rates; High School Performance_SAT 25th, High School Performance_college prep. and admission test scores, and High School Performance_recomm_student demonstration of competencies. Each of these variables was found to be significant in all three models (Models 2-4). In both Models 2 and 4, a one point increase in the level of rigor an institution places on requiring proof of completion of college preparatory coursework as well as admission test scores (High School Performance_college prep. and admission test scores) corresponds with a .06% increase in graduation rates. This proportional change is only slightly lower in Model 3 wherein we find a one point increase in this indicator results in

a.05% increase in graduation rates. In both Models 2 and 3 we see that a point increase in the level of rigor that an institution places on student providing recommendations as well as demonstrated proof of competencies, results in a .04% increase in graduation rates. The increase in graduation rates attributable to a 1 unit increase in this value was only slightly lower at .03%.

Carnegie classification. As in 2005, in 2007 PhD granting institutions were found to have a significant relationship with graduation rates in both Models 3 and 4. However, unlike 2005, so too did bachelors granting institutions in 2007. In Model 3, we see that in comparing institutions, going from master's degree granting status to doctoral degree granting status results in a .03% increase in graduation rates. Going in the opposite direction (from masters to bachelors) resulted in a decline in graduation rates by .04%. In Model 4, the degree of impact attributable to going from a masters degree granting institution to a PhD degree granting institution remains same (.03%). However, going from a masters degree granting institution to a bachelors degree granting institution results in an even larger decline in graduation rates compare to that found in Model 3 (.07% decline).

Financial ratios. Among the twelve ratios analyzed, significance was found to exist among only two of them, percent revenue from tuition and fees net discounts and allowances and auxiliary enterprise reliance. For every one unit increase in Percent revenue from tuition and fees net discounts and allowances ratio, graduation rates decreased by .21%. In addition, for every one unit increase in auxiliary enterprise reliance ratio, graduation rates increased by .19%.

R square. The R square values tell us that alone, type of financial aid accounted for 37% of the variance in graduation rates in 2005. When High School Performance was added to the model, an additional 27% of variance was accounted for. Only 2% additional variance was explained by adding Carnegie Classification. Finally, by adding the financial ratios, an additional 4% of variance was explained. The output in its entirety from Table 4.11 appears below.

Table 4.11.

2007 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
<i>Intercept: 2007 Graduation Rates – Grand Total</i>	.73(.04)***	-.72(.12)***	-.64(.12)***	--.45(.13)***
<i>Financial Aid</i>				
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***
<i>High School Performance</i>				
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)
2007 High School Performance_SAT 25 th Percentile		0 (.00)***	0(.00)***	0 (.00)***
2007 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record		0(.02)	0(.02)	-.02(.02)
2007 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)***	.06(.02)***
2007 High School Performance_Recomm_Student Demonstration of Compentencies		.04(.01)**	.04(.01)***	.03(.01)**

Table 4.11 Continued

<i>Carnegie Classification</i>				
Dummy Variable _ Carnegie _ BA				
Dummy Variable _ Carnegie _ PhD				
<i>Financial Ratios</i>				
2007 Percent revenue from tuition and fees net discounts and allowances				
2007 Percent revenue from federal operating grants and contracts				
2007 Percent revenue from state operating grants and contracts				
2007 Percent revenue from local/private operating grants and contracts				
2007 Percent revenue from gifts, including contributions from affiliated organizations				
2007 Percent revenue from additions to permanent endowments				
2007 Percent revenue from investment income				
2007 Auxiliary enterprise reliance				
2007 Reliance on other revenue				
2007 Reliance on state appropriations				
2007 Annual Operating Margin				
2007 Reliance on operating margin excluding gifts				
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4
	.37	.64	.66	.70

**p < 0.05

***p < .01

Summary

The central theoretical argument for this study is two fold. The first argument is that the credit ratings of public post secondary institutions influence graduation rates (research question 1). The second argument is that the sources of institutional fiscal resources impacts student outcomes in general and graduation rates in particular (research question 2). The results from this study indicate no support for research question 1 and some support for research question 2. In particular, the study also found no significant relationship to exist between graduation rates and neither a prime high grade nor an upper medium grade credit rating for 2005. Likewise, the study found no significant relationship to exist between graduation rates and either of these two variables in 2007. In addition, the findings indicated that for 2005, significance existed only for the auxiliary enterprise reliance financial ratio and graduation rates. The findings also indicated that for 2007, a significant relationship was found to exist between graduation rates and the following financial ratios: percent revenue from tuition and fees net discounts and allowances and auxiliary enterprise reliance. The next chapter will review the key findings, specify the limitations of the study, describe theoretical and practical implications, and propose directions for future research on institutional fiscal resources and graduation rates.

CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

Overview

A number of principal findings derived from answering the research questions were presented in the previous chapter. This final chapter reviews the key findings and discusses the limitations of this study. Some of the broader theoretical and empirical implications of the research findings are also presented. The chapter concludes with recommendations and directions for future research.

Summary of Findings

This study has introduced a conceptual framework known as Resource Dependence Theory to evaluate the relationship between sources of revenue and credit ratings on graduation rates. Resource Dependence Theory characterizes the organization as a complex adaptive system operating in an environment contextualized by the constraints created by a network of interdependencies and social relationships with entities that are often referred to as constituents (Pfeffer & Salancik, 2003). This network of relationships is fostered by an organization's need to reduce uncertainty and acquire resources, which includes fiscal capital, from these constituents (Pfeffer & Salancik, 2003). In addition, this network also results in other benefits such as access to information, channels of communication, support and legitimization, all of which provide access to fiscal capital and reinforce both going concern as well as organizational stability (Pfeffer & Salancik, 2003). However, these linkages can also result in an organization being overly dependant on these external providers of resources (Pfeffer & Salancik, 2003). In return for resources, organizations are compelled

to at the least consider the demands of their constituents and in the most extreme cases, adhere to their directives.

The degree to which an organization considers or adheres to the demands of their constituents depends in great part, on not only how much of the organizations' resources are provided by any one particular constituent, but also the degree to which an organization is constrained by its environment to become less dependent on any particular constituent. While such a relationship can result in positive outcomes for organizations whose interests run parallel with their constituents, it can hold dire consequences for those organizations with limited resource alternatives that find themselves overly reliant on constituents with interests that may be contrary to their own. Consequently, the level of autonomy enjoyed by an entity is dependent on the forces that shape the environment in which these organizations operate (Chiang, 2004). Therefore, according to resource dependency theory, the source of an organization's resources are just as important as the resources themselves, as these resources are often accompanied by constraints that may impede the organization from realizing its mission. In the case of post secondary institutions, whose mission it is to both educate and graduate students, a misalignment between the provider of an institution's resources and an institution's mission could result in students who matriculate into its hallowed halls, but fail to persist to degree completion. An HEIs ability to make substantive decisions about how and what type of academic services will provided to its students is influenced by funding sources (Chiang, 2004).

Within this framework, this study addressed two questions concerning the nature of the relationship between graduation rates and two institutional attributes: credit ratings and

financial resources. The first major focus of this research was: ‘is there a predictive relationship between a public institution’s credit rating and graduation rates?’ (research question 1). To answer this question, propensity score analysis was utilized; thereby providing a means of determining if the difference in graduation rates between institutions was attributable to the difference in their credit ratings. The attribute of interest, in this case, high credit scores was defined as either the prime high grade or upper middle grade credit rating.

In both years 2005 and 2007, the findings showed that neither prime high grade (PHG) nor upper middle grade (UMG) was a significant predictor of graduation rates. The second major focus of this research was ‘what is the relationship between fiscal resources and graduation rates at public HEIs?’ (research question 2). The results show that of the twelve financial ratios, in 2005, percent revenue from state operating grants and contracts, percent of revenue from investment income, and auxiliary enterprises reliance were all significant predictors of graduation rates. In comparison, in 2007, percent revenue from tuition and fees and auxiliary enterprise reliance were significant predictors of graduation rates. Despite what the literature has shown (Winston, 1999), the results of this study found no significant relationship between endowment revenue (percent revenue from additions to permanent endowments) and graduation rates. Several possible reasons could explain these findings; each of which will be discussed in the following section.

Reasons for Findings

Auxiliary enterprise reliance. Revenues earned from a diverse array of activities ranging from renting residents halls, selling food services, health services, college unions,

college stores, intercollegiate sports to hotel and restaurant services are known as auxiliary enterprise revenue (IPEDS, 2009; Winston & Yen, 1995). This revenue source was consistently found to have a significant positive relationship with graduation rates in both years 2005 and 2007. In addition, in the analysis of credit ratings, auxiliary enterprise reliance was a significant predictor of graduation rates for both PHG and UMG for 2005 as well as 2007.

One possible reason attributing to this significant positive relationship with graduation rates is fact that unlike some sources of post secondary funding such as tuition and state appropriations, the prices charged for auxiliary services are directly tied to the cost of providing the service (Des Jardins, Ahlburg, & McCall, 2001; IPEDS, 2009; Winston & Yen, 1995). In a similar vein, this positive directional relationship between auxiliary enterprise revenue and graduation rates could also be attributable to the fact that many of the charges that comprise auxiliary revenue, are built into the sticker cost of the institution. Fees for lodging, meals, health services, athletic events, and other activities are an unavoidable cost that students pay, whether they participate in the any of the activities or not. As such, of all the other sources of revenue that an institution has at their disposal, auxiliary revenue is one of the most reliable. Consequently, these two realities lead to a third possible explanation; in spite of the fact that most institutional pricing models for auxiliary services were not designed to generate profit, many of them often do (Jenny, 1968). Historically, many colleges and universities have diverted these profits from auxiliary enterprises to support educational programs on campus (Jenny, 1968). The importance of auxiliary revenue to an institution cannot be over emphasized. On some campuses this particular fiscal

source comprises a sizable portion of revenue (Townsend, 1993).

Finally, a possible but less likely explanation for this significance can be found in the revenue generated from intercollegiate athletics. Collegiate athletics has become one of the most profitable businesses within the higher education industry (Clark, Apostolopoulou, Branvold, & Synowka; Cullen, Latessa, & Byrne, 1990; Ferris, Finster, & McDonald, 2004; Stern, 1979). Auxiliary revenue generated from intercollegiate athletics range from ticket sales, media coverage, to the sale of licensed team paraphernalia (Clark, Apostolopoulou, Branvold, & Synowka; Cullen, Latessa, & Byrne, 1990; Ferris, Finster, & McDonald, 2004; Stern, 1979). Often times, the revenue generated from a particular sport is shared among the entire athletic department; funding programs for both students and student athletes (Clark, Apostolopoulou, Branvold, & Synowka; Cullen, Latessa, & Byrne, 1990; Ferris, Finster, & McDonald, 2004; Stern, 1979). These programs provide additional opportunities for students to engage.

Percent revenue from state operating grants and contracts. While it was not a significant predictor of graduation rates in 2007, we see percent of revenue from state operating grants and contracts being a predictor of graduation rates in 2005. This can be explained by the fact that that in 2005, the value of contracts awarded by state agencies to public institutions was on the incline (Delta Cost Project and American Institute for Research, 2009). However, by 2006, economic growth and activity had declined significantly and by 2007, the National Bureau of Economic Research (NBER) officially categorized the economy as recessionary (NBER, 2010). In light of the scarcity characterized by such as economic climate, the lack of significance between state operating grants and contracts and

graduation rates in 2007 is not surprising.

Percent revenue from investment income. In 2005, we see a strong relationship between investment income and graduation rates. Once again, the economic environment is the best explanation for this trend. With the more robust economic climate of 2005, a increase in the amount of revenue generated from invested assets would be expected to grow. Therefore, an increase in investment income can be explained by the economic activity during this time (NBER, 2010).

Percent of revenue from tuition and fees net discounts and allowances. While the relationship between net tuition and graduation rates is inversely related in both 2005 and 2007, we find a significant relationship exists between these two variables in 2007. Directionally, a negative beta coefficient tells us that graduation rates decline by 1% for every 1 unit increase in the percent of revenue from tuition and fees net discounts and allowances ratio. Given such a relationship, one of two things is likely. Either enrollment is increasing beyond the institutions' capacity and student outcomes are being adversely impacted, or tuition and fees are increasing, which could also adversely impact student outcomes. Students can respond to an increase in tuition and fees several ways. They can simply pay more out of pocket, secure a loan to finance the increased cost, get a job, or drop out (Des Jardins, et al, 2001). The last two options are not uncommon for many students in pursuit of a post secondary degree.

The recession brought about by the contracting economy, resulted in many institutions increasing their tuition and fees. The same anemic economy that resulted in heightened resource scarcity for institutions also translated into a more restricted credit

market for students and their parents seeking loans to underwrite their education.

Consequently, many students during this time were forced to work while they were enrolled in school or drop out of school in order to save enough money to pay for their post secondary education at some deferred time.

Limitations

When working with data sets as large as IPEDS, it is not uncommon for some subjects to fail to respond to some of the survey items. Therefore, by the very nature of the data source, the researcher is faced with an inherent limitation of a reduction in power and efficiency due to the reduction in sample size that occurs when cases are dropped by statistical software (Raghunathan, 2004; Schafer & Graham, 2002). Whether the missingness is among only some but not all items within a case; item non response, or all the items within a case; complete missingness or unit non response, addressing missingness within a data set always presents the researcher with unavoidable challenges. In this analysis all of the missingness was unit non response. This limitation was addressed by creating composite variables to attenuate the impact of the missingness.

In addition, this analysis is limited by the fact that only public, four-year, degree granting institutions were analyzed. No private, four year, not-for-profit, degree granting, nor private, four year, for-profit, degree granting institutions were analyzed. Moreover, no community colleges were included in this study as well. Consequently, these results cannot be generalized to the entire universe of post –secondary institutions within the United States. In addition, no institutions outside the United States were analyzed in this study. Therefore, these findings cannot be generalized to post-secondary institutions outside of the United

States.

Also, this study was limited by temporal constraints. Although this study compares two points in time, comparing years 2005 and 2007, it does not examine subsequent or prior years. Therefore, this study alone would not be sufficient to analyzing and making decisions about subsequent and prior years. In a similar vein this study does not address any lag time that may exist between the occurrence of any internal institutional financial phenomena, such as a tuition increase or any external phenomena; such as changes in local, state, or federal economic conditions and any subsequent impact on students. Such a limitation is peculiar to a dataset such as IPEDS and could possibly be addressed by utilizing additional data from other sources.

Another limitation of this model is the fact that information on institutional credit ratings was limited to only a subset of the public institutions. For more rich and complete analysis of credit ratings and their subsequent impact on graduation rates, a complete list of institutional credit ratings would be needed. Lastly, in working with a large national data set such as IPEDS, occasionally, complete cases of information can be missing. In these instances, imputing data was not an option, leaving me with no other option than to drop a case. Such an approach is problematic as it attenuates the power of the model. However, it was unavoidable.

Finally, it goes without saying that the validity of any instrument is only as good as the integrity of those that develop it. In March 18, 2010, the Securities and Exchange Commission issued a Wells notice to Moody's Investors Services (Salmon, 2010). With the issuance of this document, official notice was served that the SEC may bring a civil action

against the firm or a person in the firm. According to the SEC Moody's misled regulators giving risky and unstable investments top ratings, only to have these investments ultimately collapse. Moody's attributed some of these erroneous ratings to computer errors. This matter is significant to this analysis in that data from Moody's served as the only source of institutional credit rating information (Huffington Post, 2010).

While this reality should be acknowledge and considered, it is important to point out some distinctions in the analysis and credit rating of public, four-year, degree granting post secondary institutions. First of all, post secondary institutions are not for profit organizations. Characteristically, the magnitude of HEIs influence over an international publically traded firm such as Moody's is less likely to comparable to that of bond traders, portfolio managers, and some of the for-profit businesses that may have much more leverage in a relationship with this credit rating firm. Moreover, unlike many of the businesses that Moody's analyzes, HEIs are not publically traded. This is significant in that it takes away one of the motivators to solicit inaccurate ratings; fear of lower stock values. In addition, many of the financial instruments that were rated consisted of high risk bonds such as mortgage backed securities; quite unstable and different from colleges and universities.

Theoretical Implications

This study's findings have important implications for the study of institutional fiscal activity and its subsequent impact on student outcomes. One of the theoretical implications brought out in this study is the importance of HEIs in positioning themselves to be effective policy actors (Pfeffer & Salancik, 2003). By doing this, HEIs can better positioned to negotiate an environment that enables them to participate in mutually beneficial networks without being exploited or having the needs of faculty, staff, or students marginalized. The results presented in this study indicate that the source or type of institutional revenue does impact graduation rates (Chiang, 2004; Hearn, 2003). Moreover, when one considers this fact as well as the reality of an accountability environment, characterized by a growing call for a performance based model wherein post secondary institutions' government appropriations are allocated based on student outcome such as graduation rates (Burke & Minassiann, 2001; Klein; 2006; Reville, 2006; Titus 2006a, 2006b; Tucker, 1996; Zhang, 2009), another theoretical implication becomes apparent; the need for institutions to develop a compelling organizational brand that communicates to current and potential constituents the institutions' value proposition (Stimpert, 2010). Such strategic tactics are necessary to not only remain viable in a highly competitive environment with limited resources, but also craft legitimacy with constituents within the network in which the focal organization must operate (Pfeffer and Salancik, 2003).

Currently, there exists a gap in the literature as it pertains to institutional fiscal activity and its impact on student outcomes. The literature that does exist on post secondary fiscal activity and student outcomes focuses primarily on expenditures (Titus 2006a, 2006b,

2006c). Yet, the story of how sources of revenue can impact student outcomes has yet to be fully explained. Drawing on the literature of resource dependence theory to inform us about the relationships between post secondary institutions and their constituents promises to create a paradigm shift that will change the conversation about issues of persistence and degree completion and ultimately inform future research; thus encouraging us to consider issues of higher learning not directly linked to pedagogy or psycho emotive phenomena, but ultimately just as relevant and impactful in the lives of students.

Empirical and Practical Contributions

Rarely is it the case to find solutions to questions for which we are not seeking an answer. In seeking to answer questions of student persistence to graduation and degree completion, institutional administrators have approached this issue from the premise that a great deal of what influences student success is based on instruction, student support, and programs that supplement the collegiate learning experience. In other words, expenditure items; the ‘what’ that is being spent has driven the approach to facilitating student success. However, this approach may be more reactionary than is needed to ensure that appropriate steps are taken by institutions to assist students in being successful. Depending on its source, revenue comes with stipulations that dictate its use and thus limit the autonomy of the institution to allocate funds as it sees fit.

Therefore, this research is practically significant because it because it highlights because it extends the body of knowledge to include institutional revenue. In doing so, this research makes the cases that some of these revenue sources are significant predictors of graduation and as such should be given consideration in the institutional conversation about

plans of action to improve graduation rates. As a result of such a focus, this research holds the promise of a paradigm shift for post secondary professionals as well. One such shift would be to view the finance department as an integral part of institutional curriculum planning and decision making, and more than mere a division charged with finding ways to underwrite programs once they are already conceptualized or in place. In addition, this research also holds implications for post secondary professionals in that it can provide the basis for which they begin to view the steps to improve student persistence to graduation as limited not only to the loci of student control, but also encompassing strategic institutional tactics as well.

Directions for Future Research

While far from completely explored, the resource dependence theory framework presented within the context of this study offers a broad theoretical base from which to understand the ways in which institutional finance impacts student outcomes. A broader and deeper expansion of this will require that we better understand how the economic landscape, institutional business models, and policy environment all converge to influence resource acquisition. Future investigators need to gather detailed information on the financial activities of post secondary institutions and the strengths, weaknesses, opportunities, and threats that influence every fact of their operational reality.

Including private, four-year degree granting colleges and universities will also contribute to the ability of the model to predict graduation rates. It is also vital that we learn more about institutional credit ratings and the roles they have to play. In order to accomplish this, it is imperative to analyze the credit ratings of all institutions and not just a

representative sample of publics. Another crucial step in understanding the relationship between fiscal resources, credit and graduation rates, must examine the relationship between actual constituents and the influence of these groups over fiscal policy outcomes, as well as the overall effectiveness of these constituents at achieving their policy goals through these post secondary institutions. In order to accomplish this, it is imperative that research be done to ascertain the mission of these groups, identify the individual stakeholders that comprise these entities, and the history of their relationship with the colleges and universities with which they have aligned themselves. In addition, the literature also stands to gain considerably from studying the post secondary institutions in the context of the organizations with which they seek to align themselves and vice versa. Relationship cultivation is a time consuming process. The impetuses that motivate such relationships are borne out of a quest to fulfill some unmet need. In studying the anatomy of these relationships we stand to learn about an institution's attitude toward their students and the priorities that are placed on student centered outcomes.

Future research could also include mediating variables such as classes, programs, or enrollment size, in an effort to better to determine the factors influencing graduation rates. Finally, this was a quantitative study that utilized a national data set to answer its research questions. Future research could build upon this body of work by utilizing qualitative methods such as case studies to compare and contrast the financial structure and student outcomes of a subset of institutions. In addition, future research could also include student level national data sets; thereby allowing for other quantitative methods such and hierarchical linear modeling (HLM) to be utilized.

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Appendices

Appendix A

Table A.1
Frequency Distributions for High School Performance Variables

	2005					2007				
	N	M	SD	MIN	MAX	N	M	SD	MIN	MAX
<i>High School Performance</i>										
SGPA	523	3.75	.524	2	4	531	3.77	.512	2	4
SRANK	523	3.03	.781	2	4	531	3.01	.779	2	4
SSRCD	523	3.83	.523	2	4	531	3.85	.496	2	4
CPREP	523	3.44	.659	2	4	531	3.45	.658	2	4
RECOM	523	2.43	.658	1	4	531	2.41	.646	1	4
FDCOMP	523	2.26	.604	1	4	531	2.24	.573	1	4
ADMNT	523	3.91	.363	1	4	531	3.91	.366	2	4
FACSA	523	1.61	.554	1	3	531	1.64	.540	1	3
PSAT	441	65.63	35.726	0	100	461	64.33	36.298	0	100
PACT	446	49.95	36.273	0	100	455	51.82	35.438	0	100
CR25TH	418	467.87	53.026	330	630	433	458.62	55.708	220	650
CR75TH	418	575.11	52.974	440	770	433	567.88	55.657	440	750
M25TH	418	475.75	58.909	310	650	440	469.36	63.119	200	650
M75TH	418	584.23	56.592	440	780	440	579.09	60.159	330	740
W25TH						170	452.82	60.814	220	620
W75TH						170	560.05	59.093	440	710
AC25TH	427	19.11	2.807	3	28	444	19.25	2.615	9	28
AC75TH	427	24.10	2.853	8	33	444	24.10	2.663	18	32

Appendix B

Table B.1
Univariate Statistics
 Complete List of Missing Data for 2005 Variables

	Missing		No. of Extremes ^b	
	Count	Percent	Low	High
<i>Dependent Variable</i>				
<i>Graduation Rates</i>				
PGT05	81	12.0	0	2
<i>Quantitative Covariants</i>				
<i>Source of Financial Aid</i>				
PFAID500_Composite	53	7.9	14	0
PFGRA500_Composite	53	7.9	0	17
PSLAID500_Composite	53	7.9	0	0
PIAID500_Composite	53	7.9	0	3
PLOAN500_Composite	53	7.9	0	0
<i>High School Performance</i>				
PSAT05	232	34.5	0	0
PACT05	227	33.7	0	0
CR25TH05	255	37.9	0	3
CR75TH05	255	37.9	0	3
M25TH05	255	37.9	2	9
M75TH05	255	37.9	1	5
AC25TH05	246	36.6	2	2
AC75TH05	246	36.6	2	1
<i>Carnegie Classification</i>				
<i>_Composite</i>				
CARNALL_BA	0	.0	.	.
CARNALL_PhD	0	.0	0	0
<i>Independent Variables</i>				
Anopmgn05_netd	45	6.7	51	1
Roppeg_05	45	6.7	53	1
Pctrev_tufee_da_05	45	6.7	0	11
Pctrev_fedop_grco_05	45	6.7	0	14

Table B.1 Continued

Pctrev_stop_grco_05	45	6.7	0	33
Pctrev_lcop_grco_05	45	6.7	0	39
Pctrev_gif_cao_05	45	6.7	0	38
Pctrev_addpermendow_05	45	6.7	0	120
Pctrev_invinc_05	45	6.7	0	51
Pct_auxentrel_05	45	6.7	0	6
Rel_otherev_mgn_05	45	6.7	0	141
Rel_statapp_mgn_05	45	6.7	0	45
<i>Categorical Covariants</i>				
<i>Credit Ratings</i>				
Aaa	248	36.8		
Aa1	248	36.8		
Aa2	248	36.8		
Aa3	248	36.8		
A1	248	36.8		
A2	248	36.8		
A3	248	36.8		
Baa1	248	36.8		
Baa2	248	36.8		
Ba3	248	36.8		
<i>High School Performance</i>				
SGPA05	150	22.3		
SRANK05	150	22.3		
SSRCD05	150	22.3		
CPREP05	150	22.3		
RECOM05	150	22.3		
FDCOMP05	150	22.3		
ADMNT05	150	22.3		
FACSA05	150	22.3		

b. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Appendix B

Table B.2

Univariate Statistics

Complete List of Missing Data for 2007 Variables

	Missing		No. of Extremes ^b	
	Count	Percent	Low	High
<i>Dependent Variable</i>				
<i>Graduation Rates</i>				
PGT07	61	9.1	0	3
<i>Quantitative Covariants</i>				
<i>Source of Financial Aid</i>				
PFAID607	51	7.6	12	0
PFGRA607	51	7.6	0	26
PSLAID607	51	7.6	0	0
PIAID607	51	7.6	0	4
PLOAN607	51	7.6	0	0
<i>High School Performance</i>				
CR25TH07	240	35.7	3	3
CR75TH07	240	35.7	0	2
M25TH07	233	34.6	4	5
M75TH07	233	34.6	1	2
W25TH07	503	74.7	3	7
W75TH07	503	74.7	0	3
AC25TH07	229	34.0	1	9
AC75TH07	229	34.0	9	6
<i>Carnegie</i>				
<i>Classification_Composite</i>				
CARNALL_BA	0	.0	.	.
CARNALL_PhD	0	.0	0	0

Table B.2 Continued

Independent Variables

Pctrev_tufee_da	45	6.7	0	12
Pctrev_fedop_grco	45	6.7	0	23
Pctrev_stop_grco	45	6.7	0	32
Pctrev_lcop_grco	45	6.7	0	37
Pctrev_gif_cao	45	6.7	0	31
Pctrev_addpermendow	45	6.7	0	136
Pctrev_invinc	45	6.7	0	58
Pct_auxentrel	45	6.7	0	11
Rel_otherev_mgn	45	6.7	1	156
Rel_statapp_mgn	45	6.7	0	46
Annoppar_07	45	6.7	52	2
Roppeg_07	67	10.0	61	75

Categorical Covariants

Credit Ratings

Aaa	248	36.8
Aa1	248	36.8
Aa2	248	36.8
Aa3	248	36.8
A1	248	36.8
A2	248	36.8
A3	248	36.8
Baa1	248	36.8
Baa2	248	36.8
Ba3	248	36.8

High School Performance

SGPA07	142	21.1
SRANK07	142	21.1
SSRCD07	142	21.1
CPREP07	142	21.1
RECOM07	142	21.1
FDCOMP07	142	21.1
ADMNT07	142	21.1
FACSA07	142	21.1

b. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Appendix C

Table C.1
2005 Financial Aid Variables

<i>Variables</i>	
<i>Variable Label</i>	<i>Variable Name</i>
Percent receiving any financial aid in 2004-2005	PFAID405
Percent receiving federal grant aid in 2004-2005	PFGRA405
Percent receiving state / local grant aid in 2004-2005	PSLAID405
Percent receiving institutional grant aid in 2004-2005	PIAID405
Percent receiving student loan aid in 2004-2005	PLOAN405
Percent receiving any financial aid in 2005-2006	PFAID506
Percent receiving federal grant aid in 2005-2006	PFGRA506
Percent receiving state / local grant aid in 2005-2006	PSLAID506
Percent receiving institutional grant aid in 2005-2006	PIAID506
Percent receiving student loan aid in 2005-2006	PLOAN506

Appendix C

Table C.2
 2007 Financial Aid Variables

Variables	
Variable Label	Variable Name
Percent receiving any financial aid in 2006-2007	PFAID607
Percent receiving federal grant aid in 2006-2007	PFGRA607
Percent receiving state / local grant aid in 2006-2007	PSLAID607
Percent receiving institutional grant aid in 2006-2007	PIAID607
Percent receiving student loan aid in 2006-2007	PLOAN607

Appendix C

Table C.3
2005_Composite Financial Aid Variables

Variables	
Variable Label	Variable Name
Percent receiving any financial aid in 2005_Composite	PFAID2005_Composite
Percent receiving federal grant aid in 2005_Composite	PFGRA2005_Composite
Percent receiving state / local grant aid in 2005_Composite	PSLAID2005_Composite
Percent receiving institutional grant aid in 2005_Composite	PIAID2005_Composite
Percent receiving student loan aid in 2005_Composite	PLOAN2005_Composite

Appendix D

Table D.1
 2005 Simple OLS Without Matching Sources of Financial Aid, High School Performance, Carnegie Classification, Financial Ratios Predicting Graduation Rates, and Prime High Grade (PHG) Credit Rating Models

Variables	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating(PHG)
<i>Intercept: 2005 Graduation Rates – Grand Total</i>	.68 (.06)***	-.72(.14)***	-.66(.14)***	-.60(.17)***	-.61(.17)***
<i>Financial Aid</i>					
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***	.00(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)**	0(.00)**	0(.00)	0(.00)
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)**	0(.00)**
<i>High School Performance</i>					
ACT Composite 25th percentile score (2005)		.02(.01)**	.03(.01)	.03(.01)**	.03(.01)***
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)**	-.01(.01)	-.01(.01)

Table D.1 Continued.

2005 High School Performance_SAT 25 th Percentile	0 (.00)**	0 (.00)**	0 (.00)	0(.00)
2005 High School Performance_SAT 75 th Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record	-.02(.02)	-.03(.02)	-.04(.02)	-.04(.02)
2005 High School Performance_College Prep. And Admission Test Scores	.07(.02)***	.07(.02)**	.08(.02)***	.08(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies	0(.02)	0(.02)	-.01(.01)	-.01(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA		-.03(.03)	-.04(.03)	-.04(.03)
Dummy Variable _ Carnegie _ PhD		.03(.02)**	.03 (.02)	.03(.02)
Financial Ratios				
2005 Percent revenue from tuition and fees net discounts and allowances			--.07(.09)	-.05(.09)
2005 Percent revenue from federal operating grants and contracts			.04(.12)	.03(.12)
2005 Percent revenue from state operating grants and contracts			.43(.23)	.39(.23)
2005 Percent revenue from local/private operating grants and contracts			-.09(.32)	.09(.32)
2005 Percent revenue from gifts, including contributions from affiliated organizations			1.15(.82)	1.06(.83)

Table D.1. Continued

2005 Percent revenue from additions to permanent endowments				.69(.99)	.79(.99)
2005 Percent revenue from investment income				.39(.29)	.42(.29)
2005 Auxiliary enterprise reliance				.30(.08)***	.31(.08)***
2005 Reliance on other revenue				-.11(.08)	-.10(.08)
2005 Reliance on state appropriations				.03(.07)	.03(.07)
2005 Annual Operating Margin				-.44(.40)	-.40(.40)
2005 Reliance on operating margin excluding gifts				.48(.38)	.45(.38)
<i>Credit Rating</i>					
Prime High Grade					.04(.03)
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4	Model 5
	.45	.73	.74	.78	.78

**p < 0.05

***p < .01

Appendix D

Table D.2
 2005 Simple OLS Without Matching Sources of Financial Aid, High School Performance, Carnegie Classification, Financial Ratios Predicting Graduation Rates, and Upper Medium Grade (UMG) Credit Ratings

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating(UMG)
<i>Intercept: 2005 Graduation Rates – Grand Total</i>	.68 (.06)***	-.72(.14)***	-.66(.14)***	-.60(.17)***	-.61(.17)***
<i>Financial Aid</i>					
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***	.00(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)**	0(.00)**	0(.00)	0(.00)
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)**	0(.00)**
<i>High School Performance</i>					
ACT Composite 25th percentile score (2005)		.02(.01)**	.03(.01)	.03(.01)**	.03(.01)***
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)**	-.01(.01)	-.01(.01)

Table D.2

2005 High School Performance_SAT 25 th Percentile	0 (.00)**	0 (.00)**	0 (.00)	0(.00)
2005 High School Performance_SAT 75 th Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record	-.02(.02)	-.03(.02)	-.04(.02)	-.04(.02)
2005 High School Performance_College Prep. And Admission Test Scores	.07(.02)***	.07(.02)**	.08(.02)***	.08(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies	0(.02)	0(.02)	-.01(.01)	-.01(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA		-.03(.03)	-.04(.03)	-.04(.03)
Dummy Variable _ Carnegie _ PhD		.03(.02)**	.03 (.02)	.03(.02)
Financial Ratios				
2005 Percent revenue from tuition and fees net discounts and allowances			--.07(.09)	-.05(.09)
2005 Percent revenue from federal operating grants and contracts			.04(.12)	.03(.12)
2005 Percent revenue from state operating grants and contracts			.43(.23)	.39(.23)
2005 Percent revenue from local/private operating grants and contracts			-.09(.32)	.09(.32)

Table D.2 Continued

2005 Percent revenue from gifts, including contributions from affiliated organizations				1.15(.82)	1.06(.83)
2005 Percent revenue from additions to permanent endowments				.69(.99)	.79(.99)
2005 Percent revenue from investment income				.39(.29)	.42(.29)
2005 Auxiliary enterprise reliance				.30(.08)***	.31(.08)***
2005 Reliance on other revenue				-.11(.08)	-.10(.08)
2005 Reliance on state appropriations				.03(.07)	.03(.07)
2005 Annual Operating Margin				-.44(.40)	-.40(.40)
2005 Reliance on operating margin excluding gifts				.48(.38)	.45(.38)
Credit Rating					
Upper Medium Grade					-.04(.03)
R Squares	Model 1	Model 2	Model 3	Model 4	Model 5
	.45	.73	.74	.78	.78

**p < 0.05

***p < .01

Appendix D

Table D.3
 2007 Simple OLS Without Matching Sources of Financial Aid, High School Performance, Carnegie Classification, Financial Ratios Predicting Graduation Rates, and Prime High Grade (PHG) Credit Rating

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios + Credit Rating (PHG)
<i>Intercept: 2007 Graduation Rates – Grand Total</i>	.72(.05)***	-.83(.14)***	-.77(.14)***	--.53(.16)***	-.53(.16)***
<i>Financial Aid</i>					
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**	0(.00)***
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***	0(.00)***

Table D.3 Continued

High School Performance

ACT Composite 25th percentile score (2007)	0(.01)	0(.01)	0(.01)	.02(.01)**
ACT Composite 75th percentile score (2007)	.01(.01)	.01(.01)	0(.01)	0(.01)
2007 High School Performance_SAT 25 th Percentile	0 (.00)***	0(.00)***	0 (.00)***	0(.00)**
2007 High School Performance_SAT 75 th _ Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record	0(.02)	0(.02)	-.02(.02)	-.03(.02)
2007 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)***	.06(.02)***	.07(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies	.04(.01)**	.04(.01)***	.03(.01)**	.02(.02)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA		-.04(.02)**	-.07 (.02)**	-.11(.03)***
Dummy Variable _ Carnegie _ PhD		.03(.01)**	.03(.01)**	.02(.02)

Financial Ratios

2007 Percent revenue from tuition and fees net discounts and allowances			-.22(.09)**	-.19(.09)**
2007 Percent revenue from federal operating grants and contracts			.05(.13)	.04(.13)
2007 Percent revenue from state operating grants and contracts			.27(.19)	.29(.19)
2007 Percent revenue from local/private operating grants and contracts			-.18(.32)	-.17(.32)

Table D.3 Continued

2007 Percent revenue from gifts, including contributions from affiliated organizations				.06(.19)	.04(.19)
2007 Percent revenue from additions to permanent endowments				1.78(1.35)	1.73(1.35)
2007 Percent revenue from investment income				-.41(.22)	.40(.22)
2007 Auxiliary enterprise reliance				.18(.07)**	.20(.08)**
2007 Reliance on other revenue				0(.05)	-.01(.05)
2007 Reliance on state appropriations				-.03(.02)	-.05(.06)
2007 Annual Operating Margin				0(.01)	-.01(.05)
2007 Reliance on operating margin excluding gifts				-.05(.06)	-.05(.06)
Credit Rating					
Prime High Grade					.03(.03)
R Squares	Model 1	Model 2	Model 3	Model 4	Model 5
	.37	.68	.70	.74	.74

**p < 0.05

***p < .01

Appendix D

Table D.4

2007 Simple OLS Without Matching Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates, and Upper Medium Grade (UMG) Credit Ratings

Variables	Models				
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios	Model 5: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios+ Credit Rating(PHG)
<i>Intercept: 2007 Graduation Rates – Grand Total</i>	.72(.05)***	-.83(.14)***	-.77(.14)***	--.53(.16)***	-.50(.16)***
<i>Financial Aid</i>					
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**	0(.00)***
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***	0(.00)***
<i>High School Performance</i>					
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)	.02(.01)**
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)	0(.01)

Table D.4 Continued

2007 High School Performance_SAT 25 th Percentile	0 (.00)***	0(.00)***	0 (.00)***	0(.00)**
2007 High School Performance_SAT 75 th _ Percentile	0(.00)	0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record	0(.02)	0(.02)	-.02(.02)	-.03(.02)
2007 High School Performance_College Prep. And Admission Test Scores	.06(.02)***	.05(.02)***	.06(.02)***	.07(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies	.04(.01)**	.04(.01)***	.03(.01)**	.02(.02)
<i>Carnegie Classification</i>				
Dummy Variable _ Carnegie _ BA		-.04(.02)**	-.07 (.02)**	-.11(.03)***
Dummy Variable _ Carnegie _ PhD		.03(.01)**	.03(.01)**	.02(.02)
<i>Financial Ratios</i>				
2007 Percent revenue from tuition and fees net discounts and allowances			-.22(.09)**	-.19(.09)**
2007 Percent revenue from federal operating grants and contracts			.05(.13)	.04(.13)
2007 Percent revenue from state operating grants and contracts			.27(.19)	.29(.19)
2007 Percent revenue from local/private operating grants and contracts			-.18(.32)	-.17(.32)
2007 Percent revenue from gifts, including contributions from affiliated organizations			.06(.19)	.04(.19)
2007 Percent revenue from additions to permanent endowments			1.78(1.35)	1.73(1.35)
2007 Percent revenue from investment income			-.41(.22)	.40(.22)

Table D.4 Continued

2007 Auxiliary enterprise reliance				.18(.07)**	.20(.08)**
2007 Reliance on other revenue				0(.05)	-.01(.05)
2007 Reliance on state appropriations				-.03(.02)	-.05(.06)
2007 Annual Operating Margin				0(.01)	-.01(.05)
2007 Reliance on operating margin excluding gifts				-.05(.06)	-.05(.06)
<i>Credit Rating</i>					
Prime High Grade					-.05(.03)
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4	Model 5
	.37	.68	.70	.74	.74
**p < 0.05					
***p < .01					

Appendix E

Table E.1
 2005 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates with Roppeg_05 and Relstatappr_mgn Excluded

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
Intercept: 2005 Graduation Rates – Grand Total	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.67(.13)***
Financial Aid				
% receiving any financial aid 2005_composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2005_composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)	0(.00)	0(.00)
% receiving institutional aid 2005_composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005_composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
High School Performance				
ACT Composite 25th percentile score (2005)		.02(.01)**	.02(.01)**	.02(.01)**
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile		0 (.00)***	0 (.00)***	0 (.00)***
2005 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record		-.01(.02)	-.01(.02)	-.03(.02)
2005 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)**	.07(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies		.02(.01)	.02(.01)	.02(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA			-.03(.02)	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.02(.01)	.03 (.01)**

Table E.1 Continued

Financial Ratios

2005 Percent revenue from tuition and fees net discounts and allowances					--.04(.08)
2005 Percent revenue from federal operating grants and contracts					.08(.09)
2005 Percent revenue from state operating grants and contracts					.42(.19)**
2005 Percent revenue from local/private operating grants and contracts					-.07(.27)
2005 Percent revenue from gifts, including contributions from affiliated organizations					.29(.26)
2005 Percent revenue from additions to permanent endowments					.07(.76)
2005 Percent revenue from investment income					.58(.26)**
2005 Auxiliary enterprise reliance					.32(.06)**
2005 Reliance on other revenue					0(.02)
2005 Annual Operating Margin					.00(.01)
R Squares	Model 1	Model 2	Model 3	Model 4	
	.39	.68	.69	.73	

**p < 0.05

***p < .01

Appendix E

Table E.2

2005 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates with Anppmar_05 and Relstatappr_mgn Excluded

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
<i>Intercept: 2005 Graduation Rates – Grand Total</i>	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.67(.13)***
<i>Financial Aid</i>				
% receiving any financial aid 2005 _composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2005 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)	0(.00)	0(.00)
% receiving institutional aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005 _composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
<i>High School Performance</i>				
ACT Composite 25th percentile score (2005)		.02(.01)**	.02(.01)**	.02(.01)**
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile		0 (.00)***	0 (.00)***	0 (.00)***
2005 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record		-.01(.02)	-.01(.02)	-.03(.02)
2005 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)**	.07(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies		.02(.01)	.02(.01)	.02(.01)
<i>Carnegie Classification</i>				
Dummy Variable _ Carnegie _ BA			-.03(.02)	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.02(.01)	.03 (.01)**

Table E.2 Continued

Financial Ratios

2005 Percent revenue from tuition and fees net discounts and allowances					--.04(.08)
2005 Percent revenue from federal operating grants and contracts					.08(.09)
2005 Percent revenue from state operating grants and contracts					.42(.19)**
2005 Percent revenue from local/private operating grants and contracts					-.07(.27)
2005 Percent revenue from gifts, including contributions from affiliated organizations					.29(.26)
2005 Percent revenue from additions to permanent endowments					.07(.76)
2005 Percent revenue from investment income					.58(.26)**
2005 Auxiliary enterprise reliance					.32(.06)**
2005 Reliance on other revenue					0(.02)
2005 Reliance on operating margin excluding gifts					.00(.01)
R Squares	Model 1	Model 2	Model 3	Model 4	
	.39	.68	.69	.73	

**p < 0.05

***p < .01

Appendix E

Table E.3
 2005 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates with Annoppar_05 and Roppeg_05 Excluded

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
Intercept: 2005 Graduation Rates – Grand Total	.70 (.04)***	-.76(.13)***	-.70(.13)***	-.66(.14)***
Financial Aid				
% receiving any financial aid 2005_composite	-.01(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2005_composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2005_composite	0(.00)***	0 (.00)	0(.00)	0(.00)
% receiving institutional aid 2005_composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
% receiving student loan aid 2005_composite	0(.00)***	0 (.00)***	0(.00)***	0(.00)***
High School Performance				
ACT Composite 25th percentile score (2005)		.02(.01)**	.02(.01)**	.02(.01)**
ACT Composite 75th percentile score (2005)		0(.01)	0(.01)	-.01(.01)
2005 High School Performance_SAT 25 th Percentile		0 (.00)***	0 (.00)***	0 (.00)***
2005 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2005 High School Performance_GPA, Rank, and Record		-.01(.02)	-.01(.02)	-.03(.02)
2005 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)**	.07(.02)***
2005 High School Performance_Recomm_Student Demonstration of Competencies		.02(.01)	.02(.01)	.02(.01)
Carnegie Classification				
Dummy Variable _ Carnegie _ BA			-.03(.02)	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.02(.01)	.03 (.01)**

Table E.3 Continued

Financial Ratios

2005 Percent revenue from tuition and fees net discounts and allowances					--.04(.08)
2005 Percent revenue from federal operating grants and contracts					.08(.09)
2005 Percent revenue from state operating grants and contracts					.42(.19)**
2005 Percent revenue from local/private operating grants and contracts					-.07(.27)
2005 Percent revenue from gifts, including contributions from affiliated organizations					.29(.26)
2005 Percent revenue from additions to permanent endowments					.07(.76)
2005 Percent revenue from investment income					.58(.26)**
2005 Auxiliary enterprise reliance					.32(.06)**
2005 Reliance on other revenue					0(.02)
2005 Reliance on state appropriations					.00(.02)
<i>R Squares</i>	Model 1	Model 2	Model 3	Model 4	
	.39	.68	.69	.73	

**p < 0.05

***p < .01

Appendix E

Table E.4

2007 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates with Annopmar_07 excluded

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
Intercept: 2007 Graduation Rates – Grand Total	.73(.04)***	-.72(.12)***	-.64(.12)***	-.45(.13)***
Financial Aid				
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***
High School Performance				
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)
2007 High School Performance_SAT 25 th Percentile		0 (.00)***	0(.00)***	0 (.00)***
2007 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record		0(.02)	0(.02)	-.02(.02)
2007 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)***	.06(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies		.04(.01)**	.04(.01)***	.03(.01)**
Carnegie Classification				
Dummy Variable _ Carnegie _ BA			-.04(.02)**	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.03(.01)**	.03(.01)**

Table E.4 Continued

Financial Ratios

2007 Percent revenue from tuition and fees net discounts and allowances					-.21(.07)**
2007 Percent revenue from federal operating grants and contracts					-.01(.04)
2007 Percent revenue from state operating grants and contracts					.175(.16)
2007 Percent revenue from local/private operating grants and contracts					-.204(.28)
2007 Percent revenue from gifts, including contributions from affiliated organizations					.116(.12)
2007 Percent revenue from additions to permanent endowments					6.7(.76)
2007 Percent revenue from investment income					-1.90(1.13)
2007 Auxiliary enterprise reliance					.19(.06)***
2007 Reliance on other revenue					-.01(.04)
2007 Reliance on state appropriations					-.03(.02)
2007 Reliance on operating margin excluding gifts					0(.00)
R Squares	Model 1	Model 2	Model 3	Model 4	
	.37	.64	.66	.70	

**p < 0.05

***p < .01

Appendix E

Table E.5

2007 Sources of Financial Aid, High School Performance, Carnegie Classification, and Financial Ratios Predicting Graduation Rates with Rel_statapp_mgn Excluded

Variables	Models			
	Model 1: Financial Aid	Model 2: Financial Aid + High School Performance	Model 3: Financial Aid + High School Performance + Carnegie Classification	Model 4: Financial Aid + High School Performance + Carnegie Classification + Fiscal Ratios
Intercept: 2007 Graduation Rates – Grand Total	.73(.04)***	-.72(.12)***	-.64(.12)***	-.50(.12)***
Financial Aid				
% receiving any financial aid 2007 _composite	0(.00)***	0(.00)***	0(.00)***	0(.00)***
% receiving federal grant aid 2007 _composite	-.01(.00)***	0(.00)	0(.00)	0(.00)
% receiving state/local grant aid 2007_composite	0(.00)**	0(.00)	0(.00)	0(.00)
% receiving institutional aid 2007 _composite	0(.00)***	0(.00)**	0(.00)**	0(.00)**
% receiving student loan aid 2007 _composite	0(.00)**	0(.00)***	0(.00)***	0(.00)***
High School Performance				
ACT Composite 25th percentile score (2007)		0(.01)	0(.01)	0(.01)
ACT Composite 75th percentile score (2007)		.01(.01)	.01(.01)	0(.01)
2007 High School Performance_SAT 25 th Percentile		0 (.00)***	0(.00)***	0 (.00)***
2007 High School Performance_SAT 75 th Percentile		0(.00)	0(.00)	0(.00)
2007 High School Performance_GPA, Rank, and Record		0(.02)	0(.02)	-.02(.02)
2007 High School Performance_College Prep. And Admission Test Scores		.06(.02)***	.05(.02)***	.06(.02)***
2007 High School Performance_Recomm_Student Demonstration of Competencies		.04(.01)**	.04(.01)***	.03(.01)**
Carnegie Classification				
Dummy Variable _ Carnegie _ BA			-.04(.02)**	-.07 (.02)**
Dummy Variable _ Carnegie _ PhD			.03(.01)**	.03(.01)**

Table E.5 Continued

Financial Ratios

2007 Percent revenue from tuition and fees net discounts and allowances					-.21(.07)**
2007 Percent revenue from federal operating grants and contracts					-.01(.04)
2007 Percent revenue from state operating grants and contracts					.175(.16)
2007 Percent revenue from local/private operating grants and contracts					-.204(.28)
2007 Percent revenue from gifts, including contributions from affiliated organizations					.116(.12)
2007 Percent revenue from additions to permanent endowments					6.7(.76)
2007 Percent revenue from investment income					-1.90(1.13)
2007 Auxiliary enterprise reliance					.19(.06)***
2007 Reliance on other revenue					-.01(.04)
2007 Annual Operating Margin					.01(.01)
2007 Reliance on operating margin excluding gifts					0(.00)
R Squares	Model 1	Model 2	Model 3	Model 4	
	.37	.64	.66	.69	

**p < 0.05

***p < .01