

The Prestige Treadmill: Connections between Prestige and Revenue in Higher Education

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Dedication

I dedicate my dissertation to my wife, Ginger, and my sons, Jacob and Ethan. Thank you for all your love, support, and sacrifices. You are my inspiration and motivation! This dissertation would not have been possible without you.

Abstract

This study examines the relationship between prestige and institutional funding profiles. Specifically, it analyses the relationship between increases in institutional prestige and an institution's dependency on traditional revenue sources, defined as tuition, fees, and state appropriations. Research and theory suggest that increases in prestige can reduce an institution's dependence on traditional revenue streams and therefore increase its revenue diversification. This analysis uses linear mixed models to examine cross-sectional, time-structured and balanced data over a period of 21 years. The findings suggest that prestige has no statistically significant relationship to an institution's ability to increase the proportion of its revenue coming from non-traditional sources, compared to its peer institutions.

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Chapter I

The pursuit of prestige by higher education institutions is far from a new phenomenon. As early as 1918, Thorstein Veblen warned that the pursuit of prestige would lead to increased competition, net losses, and wasting of resources (Veblen, 1918; Veblen, 1993). Howard Bowen, in his famous treatise, stated that the dominant goal of institutions is prestige, and in their quest to obtain it, institutions will raise all the money they can and spend all that they raise toward ever-increasing expenditures (Bowen, 1980). Historically, public research universities, many of which also serve as flagship institutions, have served a specific tripartite mission focused on education, service, and research to the benefit of their state's citizenry. Over the last three decades, however, the pursuit of prestige by public research universities has altered their behavior. Their institutional prestige goals conflict with their historical mission, leading to increasing criticism and scrutiny from the general public, government leaders, students, and parents. This transformation was influenced by the enormous influx of money to higher education that occurred between 1970 to 2005, as higher education spending grew from 2 percent of GDP to 2.6 percent (Lingenfelter, 2008), and then fostered by the popularity and attention garnered by external comparative institutional rankings, such as the National Research Council (NRC) rankings and those published by *U.S. News & World Report (USNWR)*.

This metamorphosis has been characterized by public research universities acting less like social institutions and more as an industry (Gumport, 2001). The pursuit of prestige can be identified with the endless pursuit of revenue. The noble pursuit for truth is now rivaled by the search for revenue and reputation (Newman, Couturier, & Scurry,

2004). It is clear that public institutions now operate under the assumption that they can increase the proportion of their revenue coming from non-traditional sources by increasing their prestige. Traditional revenue sources for public higher education comprise tuition and fees and state appropriations. Slaughter and Rhoades (2004) have said that these pursuits have led to a “shift from a public good knowledge/learning regime to an academic capitalist knowledge/learning regime” (p. 8). Anderson (2001) notes, that these shifts toward the marketization of public research universities “can lead to changes in the most fundamental assumptions about the mission and purpose of higher education institutions” (p. 234). Ayers and Hurd (2005) concur that these shifts may prevent “some of our best public institutions from fulfilling their public roles” (p. B12). Concerns about the pursuit of prestige by public research universities raise important questions about its impact on institutional behaviors.

Purpose of the Study

The purpose of this study is to examine the prevailing assumption that increases in prestige will lead to increased revenue diversification as measured by the percentage of revenue coming from non-traditional sources. In this dissertation, I examine this assumption by addressing the following research question: How are changes in institutional prestige related to changes in an institution’s revenue diversification?

The study examines how increases in prestige are related to an institution’s ability to diversify its revenue. The findings may be helpful for policymakers at the national and state levels, as they seek to understand and influence the aspirational behavior of institutions (Morphew & Baker, 2004). The findings may also be useful for campus

administrators who are considering implementing costly aspiration strategies in an attempt to diversify their revenue streams.

Research Questions & Hypothesis

In order to study the problem described above, I examine how increases in prestige are related to the percentage of revenues coming from non-traditional revenue sources over a period of 21 years. A “traditional revenue source” for higher education institutions is defined as tuition and fees and state appropriations. “Increase in prestige” in this study is defined as an increase in Carnegie classification in either 1994 or 2000 (The Carnegie Foundation for the Advancement of Teaching, 2009). Prior to 2000, Carnegie divided its research universities into Research I Universities (RU1s) and Research II Universities (RU2s) based on federal research expenditures and number of doctorates awarded in a year. Appendix A presents Carnegie’s classification criteria for RU1s and RU2s and how these criteria have changed over time. The study’s central research question is: How are changes in institutional prestige related to changes in an institution’s revenue diversification?

To address this question, this study utilizes linear mixed models to examine time-series and cross-sectional data obtained from nationally representative datasets to examine how the proportion of revenue from non-traditional sources changed for institutions that changed in classification over the study period compared to institutions that remained classified as Research I or Research II universities. The method used in this study, of comparing institutions that changed in Carnegie classification with those that did not change, has been utilized in previous studies as a way to model change in prestige

(Morphew & Baker, 2004).

Hypotheses stemming from the research questions articulated above, framed as alternative rather than null hypothesis, are:

1. Institutions that increase in Carnegie classification, from Research University II to Research University I, will initially show a lower proportion of their revenue from non-traditional sources compared to Research University I institutions.
2. Institutions that increase in Carnegie classification, from Research University II to Research University I, will show faster growth in their proportion of non-traditional revenue sources than Research University I institutions.
3. Institutions that increase in Carnegie classification, from Research University II to Research University I, will initially show no difference in their proportion of revenue from non-traditional sources compared to Research University II institutions.
4. Institutions that increase in Carnegie classification, from Research University II to Research University I, will show faster growth in their proportion of non-traditional revenue sources than Research University II institutions.

Background of the Study

“There is a long-standing yet unspoken compact between higher education and the public. That compact has overseen the complex and ever-shifting negotiations that ensure that public colleges and universities meet societal needs and that state governments—as representatives of the public—support their public institutions through special privileges such as academic freedom,

tax exemption, and state appropriations” (Couturier, 2005, p. 85).

Since the University of Georgia, the first-publicly chartered university, was chartered in 1785, institutions and their environments have evolved. Over the last four decades, higher education’s environment has changed dramatically. When the University of Georgia was founded, the state established a board of trustees and gave 40,000 acres to the University, which were to be used as the institution saw fit with the approval of the board of trustees. In his work, *History of the University of Georgia*, Reed (n.d) states, “Governor Hall and other leaders of thought in Georgia no doubt realized the need for a state-supported institution of learning of collegiate grade” (p. 22). This plan was quite a remarkable accomplishment, considering that Georgia, the last of the thirteen colonies, chartered the University of Georgia a mere nine years after the signing of the Declaration of Independence.

Within the next several decades, state-chartered universities began appearing all across the nation. While in their infancy, many of these institutions received only land as support from their states. Reed (n.d.) notes that the appropriation of land, instead of money, did not represent an intentional policy decision by the newly founded states; rather, “it was manifestly impossible” for them to give money, “however laudable the undertaking,” due to their financial deficiency (p. 27). Brubacher and Rudy (1976) agree stating, nor was it “accepted that they should receive all of their support from the state” (p. 145). In fact, public research universities received most of their funds from tuition and local tax receipts rather than state support or private gifts (Brubacher & Rudy, 1976). St. John and Parsons (2004) state that despite the small percentage of state support as a share of institutional revenues, and the share of state expenditures going to public higher

education, it was clear that “by the end of the 1800s, the state’s role of funding public colleges and universities had been firmly established” (p. 2). Raines and Leathers (2003) agree that despite these funding realities, “the notion that universities were to provide public service also [had] become entrenched during the late 19th and early 20th century” (p. 48). In the minds of the American public, state universities stood for service to their local community (Brubacher & Rudy, 1976).

Over the next century, new organizations and resources were introduced into the environment that would dramatically change the status of public higher education. The greatest impact came from the federal government’s entrance into the higher education environment. The passage of the Morrill Act of 1862 established the land-grant institutions and brought the resources necessary to bring public higher education to the industrial class. These institutions offered affordable and practical higher education to the states’ citizenry. The Hatch Act of 1887 brought additional federal support to state institutions by funding agricultural research (Brubacher & Rudy, 1976). Congress continued to reinforce the importance of public higher education’s ties to its community by providing funding for university extension in the Smith-Lever Act of 1914. Three years later, the Smith-Hughes Act focused on funding vocational education, further increasing access for the common citizen. When the second Morrill Act was passed in 1890, the federal government committed to providing annual federal support for the land-grant institutions (Brubacher & Rudy, 1976).

Finally, the passing of the Servicemen’s Readjustment Act of 1944 (the G.I. Bill) and the Higher Education Act of 1965, brought unprecedented access to higher education. These acts reinforced the idea that the role of public universities is to serve the people of

the state through access to education, service focused on local needs, and research that was applied and focused on improving the community. Brubacher and Rudy (1976) state the ideal this way: “the university would be a ‘watchtower,’ taking an active part in improving society, serving as an essential instrument of public service” (p. 166).

Interestingly, most institutions initially did not want to participate in federal funding, feeling that it would lead to compromising the pure pursuit of truth that had historically been characteristic of higher education (Cook, 1999). Over time, institutions embraced federal funding, seeing it as an opportunity to increase their success.

Public research universities exemplified the social compact between public higher education and the public, a compact that has been widely accepted both within the academy and in public policy. The compact between the public, states, and public research universities created a symbiotic relationship (Weerts & Ronca, 2006). Key to the compact’s success was that institutions focus on meeting the needs of the state and the state would provide funding to the institutions. Historically, as states became more financially solvent, they increased their support for public higher education, eventually becoming the primary source of revenues for public research universities.

Correspondingly, public research universities focused on undergraduate teaching, access, applied research, and service to the state’s citizens.

The Impact of Academic Capitalism

Increasingly, however, words like marketization, commodification, privatization, and academic capitalism are used to describe public higher education (Bok, 2003; Pusser, 2002; Slaughter & Leslie, 1997). Slaughter and Leslie (1997) characterize academic

capitalism as “institutional and professorial markets or market-like efforts to secure external moneys” (p. 8). The theory explains how institutions and members of the institution relate to the new economy developed through globalization.

These labels attempt to capture the trends that are emerging from the shift in public institutions’ priorities and the profit motive that has crept into the academy (Slaughter & Leslie, 1997). Raines and Leathers (2003) note, “firms will expand until the economic incentive has been eliminated by falling prices on the demand side and/or rising costs on the supply side. But educational expansion had not been subject to natural limits imposed by market conditions” (p. 165). The public-good characteristics that defined the social compact are threatening to be replaced by characteristics of industry (Gumport, 2001; Kezar, 2004). The open-enrollment admission policies that personified the public mission have been replaced by policies that seek to enroll the most academically successful students and meet revenue goals (Newman et al., 2004). Rhoades and Slaughter (2004) state that the teaching, research, and service missions that once focused on improving the state, now seek to “generate revenue from their core educational, research, and service functions” (p. 37).

Additionally, public research universities began competing with elite private colleges to be the best, as measured by indirect external indices such as the rankings of the National Research Council and *U.S. News and World Report* and membership status in prestigious organizations such as the Association of American Universities. It has been suggested that this increased competition, which has led to a kind of facilities arms race, duplication of programs and significant growth in administrative staff, may be fostering inefficiency. Raines and Leathers (2003) note that “the most visible result of

that competition is conspicuous waste, with excessive spending on buildings designed to impress rather than for service to scientists and scholars, and duplication of courses, programs, and publications” (p. 115). It is clear, however, that these shifts in institutional priorities are becoming out of sync with state priorities.

A recent attempt by University of California Irvine, to enter the top one percent of universities worldwide highlights this disconnection. UC Irvine asked the California Postsecondary Commission to fund a new law school at the campus, despite a current projected overpopulation of 60,000 lawyers for the state’s legal system. At the same time, the state had a projected shortfall of over 40,000 nurses. When the panel voted against UC Irvine’s request explaining that, if the campus would start a new nursing program instead of the law school, the Commission would provide the funding, UC Irvine rejected this idea, and went ahead with its agenda to open a law school. Provost Rory Hume told the regents, “CPEC’s view is there are enough lawyers in California,” he continued, “our view is there are not enough good lawyers in California” (Greenblatt, 2007). This example focuses attention on how competition fostered by the pursuit of prestige is contributing to the growing disconnection between the public, states, and public research universities across the nation.

The Arms Race

Newman et al. (2004) notes that in order to compete for top students, public institutions are also participating in a facilities “arms race”, that is, “offering amenities seemingly far removed from the traditional college experience, such as elaborate fitness centers, luxurious student unions, and other costly adaptations” (p. 13). The legitimacy of

this trend is questionable, considering that the demand for higher education is greater than it has ever been. There is more than enough demand to fill the classrooms of public research universities. The desire to become elite, however, has encouraged public research institutions to attempt to “keep up with the Joneses.” In his discussion of the arms race, Winston (1999) noted, “it may, in the extreme, involve expensive competitive amenities, that do not produce sufficient benefit to justify their cost directly, but are important to an individual school because others are offering these amenities” (p. 30). The arms race, encouraged by competition, has contributed to the escalating costs of public higher education and the disconnection between state and institutional priorities.

The competition for students is just as fierce. Hossler (2004) points out that the historical public research university open enrollment policy is being replaced by “an array of sophisticated, data-driven enrollment strategies that are closely linked to revenue and prestige goals for public universities” (p. 149). Now, public research universities continuously try to increase the quality of their incoming students by enrolling the academically best-prepared students, characterized by their high Scholastic Aptitude Test (SAT) scores and by having graduated in the top ten percent of their high school class. These students are targeted because research has shown that enrolling these students leads to higher 6-year graduation rates, which are rewarded in the rankings (Goenner & Snaith, 2003). Enrolling more full-pay students means increased revenue (Griffith & Rask, 2007). These trends raise questions about access and diversity, which have been shown to improve the quality of the undergraduate experience (Gurin, 1999; Pascarella, Palmer, Moye, & Pierson, 2001). For example, what does it mean for public research universities to become more academically homogenous in their student population as

their states are becoming more diverse in other ways? Administrators at elite institutions, and at institutions hoping to increase their ranking, know that admitting underprepared students will negatively impact their institution's ranking (Moore, 2004).

Typically, institutions that emphasize SAT scores but not diversity or affirmative action are ranked higher than institutions that are strongly committed to affirmative action and racial diversity (Moore, 2004). According to Clarke (2007), rankings, such as *U.S. News & World Report*, contribute to the increasing stratification of higher education by incentivizing institutions to recruit students who will increase the institution's ranking position (Clarke, 2007). In a recent article in the *Chronicle*, Gary Rhoades noted that the institutional chasing of revenue, students, technology-transfer money, "and the status seeking that comes from trying to recruit 'better' students – all of that has taken us away from the idea that education is a path for social mobility" (Glenn, 2009).

In Pursuit of Excellence

It is not uncommon to hear presidents at public research universities, such as Charles Steger at Virginia Tech, claim "we are competing against the best institutions in the nation and the world. Excellence costs money. There is no free ride" (Shear, 2004). Echoing Steger's sentiment, Michael Adams, president of the University of Georgia, noted that his institution was always near the top of the annual "Great Schools at Great Prices" list, which is good for students, but is not good for the quality of the institution (Adams, 2005). The "Great Schools at Great Prices" ranking's key variable, however, is quality-to-price ratio; in other words the rankings could be titled "Quality Schools at Great Prices". The ranking's purpose sounds similar to the historic public mission of

providing a high-quality education to state citizens at a low price. Steger's and Adam's comments point to another contributor to the state-institution disconnection: the state's desire for an affordable quality education and the attempt by public research universities to compete with elite private universities.

Virginia Tech and the University of Georgia are generally regarded as high-quality institutions; however, the pursuit of excellence is driving up costs (Gross & Grambsch, 1973). The question for the public, state officials, and institutional leaders is: Is the additional value added by the pursuit of excellence, over and above quality, worth the marginal costs? Johnstone (2001), citing a study by the American Council on Education, notes, "the public worries a great deal about the price of attending college, believes it is too expensive, and thinks the price can be brought down without affecting academic quality" (p. 144). The study further found that the public thinks that "college leaders are indifferent to their concerns about the price of attending college" (p. 144). It seems that public and state officials feel that the opportunity costs and the price of the pursuit of excellence are too high. As the disconnection between institutional and state priorities continues to widen, the calls for accountability have intensified.

Escalating Tuition

Four decades of rapidly increasing tuition serve as an alarm to the public of the disconnection between public research universities' and states' priorities. From 1970 to 2005, tuition and fees at four-year public institutions grew 177 percent in constant dollars (Lingenfelter, 2008). During the same time period, per student net tuition revenues (the funds public institutions have to spend after subtracting student aid) grew by 142 percent

in constant dollars (Lingenfelter, 2008). Heller (2001), in his study of trends in college affordability, found that “in 1971, a family with the median income used 3.7 percent of its income to pay tuition...by 1997 this proportion had almost doubled to 7.0 percent” (p. 18). From 1971 to 1998, research has shown that tuition increased over 600 percent in actual dollars (Heller, 2001). Tuition has even consistently outpaced revenues from state and local sources (St. John, 2003). During the most recent decade, for the first time, public higher education tuition increased at a rate higher than private tuition, and both outpaced inflation by almost 250 percent (National Association of State Universities and Land-Grant Colleges, 2008).

These trends have caused concern, because, historically public higher education utilized a low-tuition model to promote access to the state’s citizenry. Hauptman (2001) states “maintaining low or no tuition has been the principal public policy mechanism for providing access to higher education for most of U.S. history” (p. 68). Overwhelmingly, research has shown that tuition has a considerably negative effect on the enrollment patterns of low-income students (Heller, 1997; Jackson & Weathersby, 1975). Spiraling increases in tuition, combined with a shift in federal policy from grants to loans, has left students with a larger portion of the cost of college to finance. As a result, the average student debt burden has also increased at accelerated rates. Scherschel (1998) points out that in 1997 students’ average Stafford (federally guaranteed) loan debt was more than \$9,000. In their report on the rising rates of student loan debt, King and Brannon (2002) found that by the year 2000 almost 39 percent of college graduates graduated with unmanageable debt, which they define as debt of more than 8 percent of monthly income before taxes.

These trends have drawn outrage and skepticism from the public, state, and federal government. Three former Secretaries of Education addressed the skyrocketing costs and encouraged administrators to hold down costs, noting that it is discouraging students from attending higher education (U.S. Department of Education, 1990; Williams, 1985; Spellings, 2006). Mumper (2001) notes, a survey of legislators revealed that “many believe that higher education does not spend its money wisely, and that tuition increases could be avoided if colleges realigned their spending with those areas the public cares most about, especially undergraduate education and job preparation” (p. 55). Legislators believe that the central mission of public research institutions is the teaching of undergraduate students. Massy and Wilger (1992) point out that state officials argue that “as faculty members spend more time away from the classroom engaged in research and other professional activities...institutions are charging students more and at the same time they are delivering less” (p. 363).

They are not alone in their view. Lynne Cheney, former chair of the National Endowment for the Humanities, criticized colleges because they are straying from their mission by rewarding research over teaching. She noted that institutions are forced to hire more faculty and adjuncts to teach, which results in higher tuition rates for students, because faculty spend more time conducting research (Watkins, 1990). Students, their parents, and lawmakers fail to comprehend the rate at which tuition increases (DeLoughry, 1991). More than half of the public agrees that colleges could spend a lot less and still maintain a high quality of education. Additionally, forty percent believe that waste is a factor in explaining the spiraling increases in college costs (Immerwahr, Johnson, & Gasbarra, 2008). Administrators at public institutions, however, are quick to

say that declining state support has forced them to increase tuition to offset lost revenue. In fact, many have argued that the decline in state support has had a direct influence on tuition increases (Atwell & Hauptman, 1986; Hauptman, 1990).

State Support

The controversy surrounding state support for public higher education has been complicated by the numerous and diverse forms by which state support has been measured. These numerous measures have contributed to the confusion and debate among institutional leaders and state officials over states' support of higher education. Both sides argue that they are not at fault. It is now common to hear university presidents state that their institution, once state-supported, is now state-assisted (Hossler, 2004; Newman et al., 2004). Mark Yudof, currently president of the University of California, earlier stated that "the agreement between the states and their flagship universities has deteriorated for 25 years, leaving public research universities in a purgatory of insufficient resources – low tuition and flat appropriations" (Yudof, 2002). These claims are not unfounded. Mortenson (2002) examined the history of state investment in higher education from fiscal year 1962 to fiscal year 2003 and found that state appropriations per \$1,000 of personal income have been declining since the 1970s.

State appropriations have also been shown to decline as a percentage of state spending. Since fiscal year 1989-90, higher education has been the only major category of state spending whose share of the total public budgets declined continuously (Okunade, 2004; Roherty, 1997). Lingenfelter adds, "even though state investments in higher education have kept pace with CPI-inflations [consumer price index] and

enrollment growth, relatively more state funding is supporting healthcare, K-12 education, and other services” (Lingenfelter, 2008). The costs of healthcare have risen so fast that it has overtaken higher education as the second largest piece of the state revenue pie, behind K-12 education (National Association of State Budget Officers, 2001). As states are faced with increased competition for state resources, higher education is often seen as a discretionary item, making it an easy target for budget-cutting (Zumeta, 2004). Callan (2001) echoes Zumeta’s findings, stating, “higher education’s declining share of state expenditures does not represent any deliberate policy decision to substantially curtail state funding...the reasons for the decline in share can be found in the nature of competition for state funds” (p. 3). It is important to point out that higher education is not the only state budget priority to experience significant reductions as a percentage of the overall state budget between 1986 and 1998. According to the National Association of State Budget Officers (1997), several other state priorities experienced double-digit percentage losses (higher education, 13.8 percent; cash assistance, 40.4 percent; transportation, 16 percent; and all others, 11.6 percent). Only elementary and secondary education experienced single digit percentage losses (4.8 percent). During the same time, Medicaid (96.1 percent) and corrections (26.7 percent) experienced tremendous growth.

One of the most common complaints heard from public university administrators is that over time state appropriations represent a smaller percentage of an institution’s revenue, declining from 44 percent in 1980 to around 36 percent in 1998 (Mortenson, 2002; Reindl & Brower, 2001). Callan is quick to note that this trend has occurred not because state support was declining, but because other revenue sources were growing faster, which allowed institutions to feed their “insatiable appetites” (Callan as cited in

Allen, 2002, p. 1). Agreeing with Callan, Newman et al. (2004) states that it is clear that despite the growth in state funding, “colleges and universities were aggressively expanding other sources of revenue tuition, sponsored research, corporate contracting, fundraising” (p. 42), resulting in state appropriations now representing “a smaller share of the total budget of public institutions” (p. 42).

At the same time, legislators claim that they have raised appropriations consistently, and yet institutions continue to raise tuition (Mumper, 2001). Mumper (2001) states, “a member of the Iowa general assembly noted, ‘frankly, I have a hard time figuring out where all the money goes. Many of us deeply want to improve higher education. But the more money we give them, the more they want’” (p. 56). State officials point to research showing their increasing support for higher education. A recent article in *The Chronicle of Higher Education* noted that while administrators at public institutions often blame state officials “who the colleges say have not given them enough extra money to keep up with the rising costs, but this year, many states’ public colleges received sizable infusion of public money and then went ahead and raised tuition anyway”, some by double digits (Smith, 2007).

From 1993 to 2003 average state appropriations increased over 60 percent in actual dollars (Grapevine, 2003). In the last decade alone, state appropriations to higher education have increased by as much as 26 percent in constant dollars (The College Board, 2001), and from 1980 to 2000 state appropriations increased by over 12 percent in constant dollars per full-time equivalent student (Mumper, 2001). Hovey (1999) states, “in fact, many states have budgeted more favorably for higher education than necessary to match enrollment changes and inflation” (p. 4). In 1975 enrollments at public research

universities were 2,124,221, and in 1995 enrollments had risen to 2,443,682, an increase of 319,461 students over a 30 year period, or 10,649 students a year to be divided between more than one hundred public research universities (National Center for Education Statistics, 2007). With the exception of three fiscal years between 1992 and 2005, state funding for public higher education has increased (Grapevine 2005; Schuh, 1993; Slaughter & Leslie, 1997; Weerts & Ronca, 2006).

While, theoretically, competition for state funds by other state interests, such as healthcare, K-12 education, and corrections, had always been assumed to have a negative impact on state appropriations to higher education, recent research has shown otherwise. Weerts and Ronca (2006) examined factors that impact change in unrestricted state appropriations and found that additional state spending on healthcare was positively related to increases in unrestricted state appropriations in higher education. Specifically, for each additional dollar spent on healthcare, per capita, institutions can expect to receive approximately \$600,000. For K-12 education, for each additional dollar spent, higher education could expect to receive approximately \$95,000 additional dollars. The authors also noted that increasing enrollments were positively associated with increased appropriations, and that “the visibility of campus public service is critical to garnering state support for research universities, especially at land grant institutions” (p. 953). In a similar study, Okunade (2004) found that prison budgets were also complementary with appropriations for higher education.

So who is right? Are public institutions losing the support of the states, or are the states upholding their commitment to their institutions? Toutkoushian notes, “it is more correct to say that it is the relative state funding for higher education, and not the level of

state funding, that has decreased over time” (Toutkoushian, in press). At the same time, entitlement programs continue to grow and occupy a larger percentage of state budgets. Higher education, despite receiving increases in constant per student dollars, now represents a smaller percentage of state spending. Likewise, state appropriations now make up a smaller percentage of institutional revenue streams, because over the past four decades institutions have greatly increased their ability to generate other revenues. Millet (1984) notes that an “important factor to bear in mind is that public institutions have multiple sources of income and that as of 1980 less than half of the total income of these institutions came from state government appropriations” (p. 178). Callan (2001) states, “ironically, the fairly recent tendency on the part of some college and universities to characterize themselves as ‘state related’ and ‘state affiliated,’ in hopes of attracting private support, may also undermine the perception of state responsibility for their support” (p.5).

Pursuing New Revenue Streams

Regardless of whether declining state support or a shift in institutional priorities has forced public research universities to pursue other sources of revenue, universities have vigorously pursued them, displaying market-like behaviors (Bok, 2003). As a result, public higher education is increasingly being operated as a firm (Pusser, 2002). And these shifts in revenue streams may have implications for how institutions allocate their resources. Studies have shown that as institutions’ revenue distributions shift away from state support, they are less likely to fund instruction (Alpert, 1985; Hasbrouck, 1997). Several other studies have also found a similar effect on the composition of faculty, at the

cost of undergraduate instruction (Ehrenberg & Zhang, 2005; Barnett & Middlehurst, 1993; Slaughter & Leslie, 1997). Institutions are diversifying their revenue streams using a variety of initiatives: instructional initiatives (such as test-preparation programs, retiree-oriented courses, programming funded by state for workforce training), research and analysis initiatives (technology transfer offices, start-up firms, business partnerships, business incubators, research parks, e-commerce sales of institutional expertise, fee-based information services), pricing initiatives (differentiated pricing, unbundling of user fees for services), reforms in financial decision making and management (utilized investment pools, venture-capital investment, participation in arbitrage and options markets, revolving funds, internal cross-subsidization), human resource initiatives (limits on external consulting by faculty, compensation incentives for revenue generation, retirement/rehire incentives for senior faculty), franchising, licensing, sponsorship, and partnering relationships with third parties (tours and camps, concert series, sponsorships of on-campus events, outsourcing contracts with revenue guarantees, distributed learning partnerships logo-bearing licensing), initiatives in auxiliary enterprises, facilities, and real estate (upgrading athletic facilities, on-campus debit cards, off-campus extensions of debit cards, financial services, facility rentals, alumni services), and development office initiatives (appeals to donors abroad) (Hearn, 2003). Hossler (2004) states, it is clear that “universities in the United States are looking for ways to turn the research efforts of their faculty into patents and venture capital activities that will provide sources of money for their campuses” (p. 147). Rhoades and Slaughter (2004) note, public institutions “now develop, market and sell a wide range of products commercially in the private sector as a

basic source of income” (p. 37). Increasing institutional revenues is now viewed as a measure of prestige.

A key contributor to the growth in academic capitalism was the passage of the Bayh-Dole Act in 1980, which made it possible for institutions to own and license patents on research discoveries, which were often funded by the public (Slaughter & Leslie, 1997). Faulkner (2005) notes that the Act’s passage combined with the growth in federal support to universities, which grew in constant dollars from 405 million in 1960 to 13 billion in 1980 (National Science Foundation, 1996), would “vastly transform the purpose and ambition of various schools and colleges within the American university”. Zumeta (2004) points out that federal research and development (R&D) dollars are particularly attractive to institutions because they “not only support academic research projects and graduate students, but the substantial indirect cost allowances on federal grants are a major source of largely discretionary income to research universities” (p. 101). After the Act’s passage there was a boom in patent requests and income from research inventions (Feller, 1997).

Before the Act, institutions received about 250 patents a year. That number jumped to 4,800 by 1998 (Press & Washburn, 2000), and revenues grew from \$130 million in 1991 to \$998 million in 2002 (Couturier, 2005). Institutions were enticed to participate in these market behaviors as states and the federal government began to offer incentives through subsidies and tax breaks for joint ventures between public institutions and the corporate world, hoping to capitalize on the economic benefits of the new products and entities through academy-industry relations (AIR). Bok (2003) states, institutions across the nation began establishing technology-transfer and licensing offices

in order to “seek out commercially promising discoveries and patent them for licensing companies” (p. 12). Feller (1997) points out that as institutions experienced success, such as Gatorade at the University of Florida and Purdue University’s \$2 billion dollar deal with the Mann Foundation, technology transfer moved from a “contested and peripheral activity among America’s research universities to an accepted, indeed valued, part of core missions in a span of about 15 years” (p. 1). Increasingly, institutions began to develop research parks to capitalize on the academe-industry relationship. Across all industries, including academia, the number of research parks jumped from 39 in 1980 to over 270 in 1990 (Carlson, Keating, & Keller, 2001).

Despite the successes of the University of Florida and Purdue University, it may appear that these examples are exceptions rather than the norm. Powers (2006) notes that the rush by institutions to find the next Gatorade appears to be more the result of “irrational exuberance” than sound business decisions (p. B19). Feller (1997) found that the distribution of the royalties received by universities was limited to a small number of institutions. Specifically, he found that the top ten universities received 71 percent of the revenue. Powers (2006) notes, that “after subtracting their operating costs – i.e., expenditures for patenting, staffing, and overhead, more than half of universities consistently lose money on technology transfer.” Feller (1997) notes that the skewed distributions,

“raise questions about universities’ objectives in pursuing more aggressive patent policies and the strategies they use to transfer patented technology. Even allowing for economic effectiveness of having prospective licensees reimburse the university for its legal fees in filing and securing patents, the

net legal expenses plus administrative costs of technology licensing offices raise questions about their revenue-generating functions. It is questionable whether many offices break even, much less return net revenue” (p. 14)

In fact, Bok (2003) found that in 2000 only a small percentage of the nearly 200 university patent offices earned \$10 million, and the majority did not make a profit. Based on the current reality that the majority of these enterprises lose money, it is questionable whether investment of more public money into technology-transfer is a wise use of public funds. Feller (1997) suggests that “put in economic terms, aggressive university technology policies, as least as they relate to patents, may be entering a region of diminishing returns” (p. 16).

Unfortunately, the results appear to be similar for the research park boom that is occurring on public campuses. Carlson and associates’ (2001) research shows that “the only truly successful parks are 25 years old” (p. 8). In an attempt to receive state funding to support these parks, public universities market them to the legislature and public as key to economic development; however, Feller (1997) has found that their success has been “highly variable” (p. 20). Carlson et al. (2001) point out that, typically, research parks “create few additional jobs for low-skilled workers, and increase the loss of existing businesses within the region” (p. 6). Luger and Goldstein (1991) studied the success of research parks, and they judged 16 parks to be successful and 19 to have been unsuccessful. Feller (1997) notes that their study suggested that the “payoff from new investments in research parks ‘is slow to be realized’ at best, and at worst may be nonexistent as ‘the park fails to achieve its promise and objective’” (Feller, 1997, p. 20).

Yet Carlson et al. (2001) notes, “the building of research parks seems to be outpacing demand. Many facilities have vacancies and lower-than-expected growth rates” (p. 7).

Morphew and Baker (2004), tell the story of a recent capital project by Cornell University, a private land-grant research institution, which illustrates the challenges facing public research universities. In order to enhance the competitive position of the institution for research funding and faculty, Cornell built a \$40 million research facility. After conducting a feasibility study, Cornell’s leadership determined that through the combination of a variety of sources, including revenues generated from the facilities research activities, there would be sufficient revenue to fund the project. The feasibility study, however, had not included the annual maintenance for the facility, which was projected to cost \$1.6 million annually. In order to cover the annual maintenance of the facility, the fundraising staff estimated that the institution would need to raise an additional \$40 million endowment. The additional requirement dramatically changed the feasibility of the project. While in the end, Cornell has been able to fund the research facility, Morphew and Baker note that Ehrenberg rightly points out, “Inevitably then, this new building will compete for funds with new faculty positions, additional supports for graduate students, and higher faculty student” (in Morphew & Baker, 2004, p. 369). The story illustrates the true costs of these facilities, both the opportunity costs and the additional annual expenses to the public.

From these trends, it appears that the competition for prestige that comes from generating research and technology revenue ignores profitability. Put simply, it is more important to be a player in the game than to be profitable. The emphasis of public institutions on the generation of additional revenues was based more on potential and

perceptions than it was on reality (Olson, 1997). The growth in these areas has necessitated re-allocation of public institutional revenues and resources. Slaughter and Leslie (1997) point out that “within public research universities, fewer and fewer funds are devoted to instruction and more and more to research and other endeavors that increase institutional ability to win external funds” (p. 12). As a result, institutional expenditures have experienced a dramatic shift. Between 1985 and 1996, instruction, a top priority for the public and state, experienced a 6.6 percent loss, while all other categories saw increases, with research gaining the most at 12.2 percent (National Center for Education Statistics, 1999). These shifts in institutional expenditure patterns inform us about an institution’s lifestyle (or behavior), just as a family’s checkbook does (Bowen, 1980).

Rising Expenditures

Over the last three decades, a second area that saw significant increases was administrative costs. Leslie and Rhoades (1995), in their study on increases in administrative costs, found that between 1975 and 1985 institutions showed a 6 percent growth in full-time faculty; an 18 percent growth in executive, ‘administrative, and managerial employees’; and a 61 percent growth in ‘other professionals’ “who are degree-holding employees often discounted for in administrative categories” (p. 188). The authors also found a connection between revenue and administrative growth. Leslie and Rhoades (1995) state, “the more an institution emphasizes the generation of alternative revenues, the greater the proportion of resources that are directed to administrative units perceived as (potentially) generating such revenues” (p. 193). The

growth in administrative costs has been referred to as the management revolution of the academy (Keller, 1983). Higher education's transition to a managed organization may help to explain the shift from a societal institution to an industry.

There have been numerous explanations offered for the accelerated increases in administrative costs. Bureaucratic theory states that, as organizations increase in complexity, administrative costs increase (Brinkman & Leslie, 1986). These increases in administrative costs inevitably happen, because a new administration develops its own initiatives and priorities, usually one of which is to expand the area of its responsibility (Massy & Wilger, 1992). Baumol's (1967) cost-disease theory explains that costs rise because higher education is a personal-service industry, which traditionally has higher costs than manufacturing industries. Personal-service industries typically have higher costs than manufacturing industries because higher education relies on faculty, who are highly educated (Archibald & Feldman, 2008). Central to the theory is the idea that attempts to implement cost controls will negatively affect quality. For example, as institutions increase their average class size or faculties' teaching load, their productivity will grow. Archibald and Feldman (2008) note, "bigger classes are not likely to lead to a better education, and more time teaching might also come at the expense of research or public service" (p. 28). Increases in faculty salaries, however, are not where the spending growth is going. In fact, over the past ten years, they have barely kept pace with inflation. Moreover, the use of part-time faculty is growing fast, now making up 48 percent of all faculty, raising concerns of quality (Callan, 2007). In addition to their claims of declining state support, institutional administrators have pointed to the increased accountability reporting requirements placed on them from government as the contributor.

Zesty, Wegner, and Massy (2005) found that “although they frequently protested too much, university presidents were at least partially right when they blamed increased regulation and external micromanagement for their ballooning administrative functions” (p. 21). The authors specifically highlight the oversight from the Occupational Safety and Health Administration, the Equal Employment Opportunity Commission, Environmental Protection Agency, Fiscal Operations Report, Circular A-21, and Office of Federal Contract Compliance as culprits. While the regulations from these organizations may have caused increases in costs during the 1970s and early 1980s, all of them were enacted by 1979. The growth in administrative costs continued to balloon at least into the early 1990s (Clotfelter, 1996). Volkwein (1986b) in his study on state financial control administrative costs, found no relationship between government regulation and full-time equivalent (FTE) expenditures.

Massy and Wilger’s (1992) academic ratchet and administrative lattice are complementary theories. The academic ratchet refers to the increased emphasis on research, publication, and teaching one’s specialty rather than general courses. Focusing on these activities increases institutional costs and reduces the time faculty spend with undergraduate students. Most of the administrative functions that faculty no longer participate in as a result of the emphasis on prestige were passed on to newly hired administration, which resulted in the growth in academic support, otherwise known as the administrative lattice (Massy & Wilger, 1992). It seems that the pursuit of prestige was not the sole contributor to the increases; however, it appears to have been a major player.

While the pursuit of prestige by public research universities has been successful in raising revenues, their expenses have risen at comparable rates. The escalating costs of

public higher education have left institutional administrators lamenting declining state support and expressing gloom over insufficient revenues. The picture painted by institutional administrators, however, runs contrary to research on the health of public institutions. Callan (2001) showed that the decade of the 1990s, “was one of the best times for higher education. Even after accounting for inflation, average revenues per student increased to an all-time high during the decade” (pp. iv-v). Hovey (1999) agrees: “The last five years have been about as good as it gets in state funding of higher education. By all available measures of state government spending, appropriations per full-time equivalent (FTE) student have increased by substantially more than the rate of inflation” (p. 4).

Institutional Wealth

Two separate studies on institutional wealth in higher education reached similar findings, that public higher education is becoming wealthier. Bradburd and Mann (1993) examined the wealth of both private and public institutions and determined that public institutions dominated the upper half of the distribution of the institutional wealth measure. On the basis of endowments alone, private schools appear wealthy and public schools appear relatively poor. Based on total wealth, however, “private universities are poor, whereas public universities are relatively wealthy” (p. 480). The authors defined institutional wealth as “endowment plus the capitalized value of non-endowment income flows” (p. 476). Carbone and Winston (2004) reached similar findings in their study on institutional saving and wealth. The authors explored if and how institutions saved and built wealth (There were two possibilities: financial or physical capital). They found that

while private institutions saved more, public institutions saved an average of \$683 per student, of which only 17 percent was added to new financial wealth, but the remaining 83 percent was added to physical capital, and they saved much more consistently than private institutions (Carbone & Winston, 2004).

Contrary to institutional leaders' claims, the research discussed above tells a different story. It appears that public institutions are becoming wealthier (Carbone & Winston, 2004; Bradburd & Mann, 1993). Yet, at the same time tuition has increased at unprecedented rates. Bok (2003) believes that "universities share one characteristic with compulsive gamblers and exiled royalty: there is never enough money to satisfy their desires" (p. 9). Bowie (1994) states, "There is a growing concern that universities are overestimating the opportunities for financial gain and underestimating the financial risks" (p. 57). These underestimations have proven to be expensive for the public. Couturier (2005) states, "finally, it is already evident that higher education's commitment to serving the public's needs is eroding. For students and their families, the focus on revenue can mean double digit tuition increases" (p. 94). One Big-Ten university president told the *Chronicle of Higher Education* that the percentage of state appropriations as a part of the institution's budget was greater in 1914 than in 2001, having gone from 75 percent just before World War I to about 19 percent at the start of 2000 (Gose, 2002). Thelin notes,

"but such unadorned percentages invoked without accompanying institutional data from both eras, are unconvincing, and possibly misleading...the pleas of poverty begin to stretch credibility when one considers, for example, that in 2002 the University of Michigan had an annual operating budget of \$3.8

billion and a diversified operation of federal research grants, an endowment of more than \$2.5 billion, generous alumni support, out-of-state tuition income, commercial ventures, and patent rights to supplement its state per capita subsidies. One wonders if a professor or administrator at the University of Iowa or the University of Michigan would truly wish to exchange their contemporary workload and compensation with those of their university counterparts of about a century ago. This chronic whining seems to have sprung from a historical lag between the institutions' self-image and reality. In the minds of college and university presidents, their institutions still languished in a state of being underfunded, underappreciated, and vulnerable – despite having large endowments, high admission standards, and high enrollments” (Thelin, 2004, p. 360).

Eroding Public Trust

Historically, the public has had great faith and trust in public higher education, however, as it becomes clearer that public research universities' commitment to the social compact is eroding, this trust is fading (Couturier, 2005). Lingenfelter (2008) notes that, as a result, “many in the public lack the confidence that additional investment will generate the results we need” (p. 4). Alexander (2000) suggests that public higher education now finds itself in an “age of disenchantment” (p. 413), and the public is no longer willing to accept peer-review and accreditation as satisfactory forms of accountability. They are demanding accountability that focuses on institutional outputs, such as graduation rates and retention rates. Alexander (2000) points out that as a result,

“the entire nature of the traditional relationship between government and higher education is in the process of significant change in stretching the public dollar to serve more students in attempting to maximize economic returns” (p. 413).

Public institutions’ pursuit of prestige, manifested as a focus on revenue generation, participation in an arms race to build facilities and increase their reputation through rankings, has led to the misuse of state resources and a disconnection between state and public research universities’ priorities. Unfortunately, Massy (2003) explains, “markets generally reward prestige, although they don’t gauge the true quality of education, and therefore they produce a perverse set of incentives” (p. 5). These incentives have influenced institutional behavior. Slaughter and Leslie (1997) state,

“the fact is that university resource allocators acted too rationally. They shifted substantial amounts of those largely unstipulated resources provided by government and students to other purposes, which often were at some odds with state government and student interests. They used significant shares of the public and student moneys to leverage additional revenues in the more competitive area. They diverted money into research, research equipment and facilities, university companies, intellectual property offices, university foundations – all for the purpose of increasing supplementary revenues” (p. 240)

Decades of increasing tuition coupled with increasing class sizes and a shift from faculty to adjuncts in the undergraduate classroom, at the same time that institutions are setting records in giving, has ushered in an era of accountability and declining public trust. Thelin (2004) suggests,

“that universities must bear some responsibility for the mixed perceptions about higher education...universities have had increasing difficulty in explaining themselves to external audiences because they have drifted in character and mission. As a result, today’s colleges and universities face uncertainty in their societal roles. The result of all of these factors is that American higher education in the last quarter century has become a ‘troubled giant’” (p. 147).

While institutional administrators attribute the cost increases to declining state support and to the costs associated with the normal business of universities, research has suggested otherwise. A recent study by Johnstone (2001) found that there are dramatic cost variations among similar institutions, which corroborated Bowen’s finding nearly three decades before. Johnstone’s findings suggest that these variations can only be tied to variations in revenue. Bowen (1980) notes that in the pursuit of prestige, institutions will “raise all the money they can and spend all the money they raise toward ever increasing costs” (p. 20).

Massy (2003) points out that as the disconnection between state and institutional priorities widened, “universities and professors began a long slide from objects of awe to subjects of accountability” (p. 20). Public dissatisfaction became the dominant theme as students complained to institutional and governmental leaders, their parents, and to their representatives (Slaughter & Leslie, 1997, p. 240). Slaughter and Leslie (1997) point out that state officials charged public university administrators to fix the problem, but “when that was perceived to have failed to achieve results they were subjected to regulation and even legislation” (p. 240).

The public and states are pushing for public research universities to return to their historical mission of affordable, quality education for the sons and daughters of the state. They expect the majority of appropriations to be used for undergraduate instruction and for institutions to be more efficient in the use of state resources (Slaughter & Leslie, 1997). Newman et al. (2004) agrees stating, “as stewards of the public trust and investment, state colleges and universities are obligated to spend public funds in a way that most effectively responds to public needs” (p. 58). Public institutions are attempting to be more efficient through methods such as performance-based budgeting and reducing duplication on campuses. The type of efficiency they have chosen to focus on, however, is disconnected from the efficiency envisioned by the public and states, as they actually attempt to increase revenues.

Rhoades and Slaughter (2004) provide an example of this tension in their examination of how academic capitalism is affecting institutional practices. They illustrate the differences in departmental operation under former and current department heads. The previous head represented the traditional faculty management and disagreed with the decision to move the department in a more market-oriented direction. The current head had been hired for the specific purpose of generating more revenue from the department. His approach was to create a new introductory course that would be applied throughout the university, generating another 30,000-40,000 student credit hours. Rhoades and Slaughter (2004) note, that “when asked how his unit could possibly staff such a dramatic expanded set of course offerings, he replied, such courses are graduate teaching assistant compatible” (p. 40). His point was that the use of graduate labor would be more efficient and would create a better financial margin. The authors state, “he

sought to deliver education cheaply: yet his definition of ‘efficiency’ directly conflicts with the more decade-long pressure with regard to accountability and quality from state legislatures seeking to ensure that students are being taught by tenured track faculty” (p. 41). Perhaps even more surprising the authors point out, “prerequisites (e.g. math) and standards were lowered in order to attract students to what was clearly a lower-quality offering. In all cases when deciding on course and program offerings, the driving motivation was credit hour production, not educational quality” (p. 42). It is clear from this case that the pursuit of prestige does not mean that the quality of the education is improving. In summation, Rhoades and Slaughter (2004) conclude, “again, the pursuit of revenue was taking academic units in directions counter to what state policymakers and the public had been demanding for years” (p. 43)

As a result, higher education is entering unprecedented territory in its relationship with governmental oversight, a trend that is likely to continue according to Sullivan, senior scholar at the Carnegie Foundation for the Advancement of Teaching. William M. Sullivan, a senior scholar at the Carnegie Foundation for the Advancement of Teaching, noted, “in post-crash America, there will be more intense demands for scrutiny and accountability as to the effectiveness of academe at fulfilling its public mission” (Sullivan as quoted in Glenn, 2009). Alexander (2000) points out that the chief issue “is the general allegation by governmental leaders that higher education is simply not responsive to societal and economic demands” (p. 414).

In an attempt to change institutional behavior, states have altered their accountability strategies over time. Burke (2005) notes that, their methods have shifted from “system efficiency, to educational quality, to organizational productivity, and to

external responsiveness to public priorities or market demands” over time (p. 4). What is at stake, however, is institutional autonomy. Institutional leaders proclaim that they will not be able to survive in these market conditions with so much governmental oversight; rather, they need greater autonomy from the state. They argue that deregulation will lead to greater productivity and efficiency and that states should increase their financial support. Pusser (2002) agrees and notes that the current “lack of institutional efficiency and productivity has generated demands for market solutions, and that market-like behaviors on the part of postsecondary institutions will increase efficiency and productivity in higher education” (p. 106). Raines and Leathers (2003), however, have already demonstrated that education is not the typical firm and has not “been subject to natural limits imposed by market conditions” (p. 165). The governor of South Carolina proposed to let some public colleges and universities go private, provided that they agree to forego state funding; however, he got no takers (Schmidt, 2003). Couturier (2005) points out that in an attempt to gain independence, the big three public universities in Virginia, the University of Virginia, Virginia Tech, and William and Mary, “asked to become charter universities, a status that would give them greater autonomy from state regulations in exchange for agreeing to accept a lower state appropriations” (p. 90).

States have also tried using performance-based funding, performance budgeting, and performance reporting as a methods of accountability, trying to tie state funding to state priorities. These attempts at improving institutional behavior have proved mostly ineffective, because typically the percentage of state appropriations attached to the performance measures is about five percent of the total appropriations to institutions (Petridis, McCliland, Nodine, 2004). Weerts and Ronca (2006) state that what is certain is

that, “the relationship between states and public higher education is fundamentally changing across the country. And, this change is especially noticeable at major public research universities that are increasingly becoming quasi-private institutions” (p. 936). To restore the relationship, institutions must return to their historical mission and abandon the industry model they have adopted. Keezer (2004) explains that, “even though the research on how the industrial model impacts the public good and traditional charter is not free from problems, clearly little evidence to date supports the benefits of this model” (p. 450). Simply put, the costs outweigh the benefits. While it would be absurd to suggest that public institutions should end their revenue generating ventures, in which they have already invested so much of the public’s support, they should shift the focus from generating ever-increasing revenues to focusing on state priorities. Anderson (2001) states that, “the challenge for institutions is to find a way to exploit the opportunities provided by commercialization while maintaining, even enhancing their provision of instruction and service” (p. 239).

Organization of the Study

This chapter has provided an overview to the study and the ongoing scholarly dialogue of the impact of increasing in prestige on institutional behavior. The chapter laid out the studies objectives, research questions, and hypotheses. It also presented how the problem has evolved overtime in the background to the study, which informs the study’s hypotheses. In Chapter Two, existing empirical research surrounding the impact of prestige on institutional behavior is reviewed and discussed. Specifically, existing research on the impact of prestige on institutional behavior is discussed to provide a fuller

background on the ongoing conversation surrounding this relationship. Organizational theory is also presented and discussed in a framework to address gaps in the literature.

Chapter Three presents the study's guiding conceptual framework. The chapter also presents the research design and methodology informing the study's analyses. Finally, the data analyses utilized in the study to answer the research questions are presented and discussed. Chapter Four presents the results of the quantitative analyses. The chapter lays out the analytical methods used to address the research question, and the results of the modeling process. Specifically, the modeling building process is discussed in detail and presented for both analyses. Finally, Chapter Five provides conclusions based upon the results of the quantitative analyses. The study's findings are presented, and their implications for theory, policy, and practice are discussed. The study concludes with a conversation of the study's significance and presents opportunities for future research.

Chapter II

The purpose of this chapter is to review theories and empirical research that inform the author's understanding about the relationship between prestige and institutional behavior. The theories are drawn from multiple sources of literature, including organizational theory and management literature. Empirical research on the pursuit of prestige by organizations remains very limited in the field of higher education. The chapter also expands the review of empirical research to fields outside of higher education, which inform this study.

Theoretical Foundations

In lieu of presenting a single theory to explain why organizations choose to pursue prestige, this study employs a multi-theoretical approach. Multi-theoretical approaches are appropriate when dealing with ill-structured problems (Braxton, Hirschy, & McLendon, 2004; Seidman, 2005; Yorke & Longden, 2004; Lee, 2010). Ill-structured problems are controversial and complex, because reasonable people disagree about their solutions and causes. Institutional pursuit of prestige is a good example of an ill-structured problem.

In order to understand the relationship between the pursuit of prestige and institutional behavior, this study draws upon several different theoretical lenses: resource dependency theory, strategic balance theory, isomorphism, Perrow's theory of organizational prestige, and the revenue theory of costs. Resource dependency theory (Pfeffer & Salancik, 1978) explains that organizations are inescapably bound to the

conditions within their environment. Hasbrouck (1997) notes that Pfeffer and Salancik view organizations as being involved in a constant struggle for autonomy. Organizational survival, an organization's key objective, depends on the organization's ability to maintain and acquire resources from the environment. These transactions to acquire resources result in institutions becoming dependent on resources from the environment. Pfeffer and Salancik (1978) explain, "it is the fact of the organization's dependence on the environment that makes the external constraint and control of organizational behavior both possible and almost inevitable (p. 43). For higher education institutions, this increased dependence leads to conflict because institutions are constantly pursuing autonomy. Additionally, problems may also arise because the organization's environment is undependable. Organization's environments change. Other organizations enter and exit the environment and affect the supply of available resources. Resources can become more or less scarce, and the organization's survival is contingent on its ability to adapt in response to these environmental changes (Pfeffer & Salancik, 2005).

Institutions of higher education are open systems interacting with their environment. Over the last three decades, public higher education's environment has changed dramatically. Between 1970 to 2005, spending on higher education grew from two percent of GDP to over two and a half percent (Lingenfelter, 2008). The influx of money, from the federal government, private giving, and academic entrepreneurial sources, allowed public research universities to become less dependent on the state. Additionally, the entry of external comparative institutional rankings, such as the National Research Council (NRC) rankings and those published by *U.S. News & World Report (USNWR)*, increased public institutional market dependency. O'Meara (2007)

notes, that while there has always been a pecking order in higher education, rankings have increased competition.

The theory of strategic balance provides perspectives on how the introduction of rankings and external validators may have informed the behavior of institutions. Strategic balance theory (Deephouse, 1999) examines the relationship between being different and being the same. The theory states that firms benefit from being different because they face less competition, but also benefit from being the same because they are recognized as being more legitimate. Strategic balance theory suggests that institutions may view rankings as an opportunity to differentiate themselves from their competition. Over time, however, rankings have garnered increased national public attention, and contributed to an environment of increasing competition.

As institutions become aware of the academic and financial implications of increasing or falling in the rankings, they became more strategic in trying to influence their ranking (Monks & Ehrenberg, 1999; Griffith and Rask, 2007; Jin & Whalley, 2007). The benefits of improving their rank have led some institutions to manipulate or omit data that impacts institutional rank. Institutions may see gaining prestige as a way to differentiate themselves from their peer institutions. Firms are forced to balance the benefits of differentiation (reduced competition) against the costs of not being the same (reduced legitimacy). Strategic balance theory suggests that firms seeking a competitive advantage should be as different as legitimately possible. In short, Deephouse (1999) explains that a firm will achieve maximum performance, often referred to as the “Competitive Cusp” (Porac, Thomas, & Baden-Fuller, 1989, p. 414), when “the gains from reduced competition are equal to the costs of legitimacy challenges” (p. 154).

The theory of isomorphism provides perspectives on organizational pursuit of prestige and legitimacy. Isomorphism explains the process of organizations becoming homogenous. DiMaggio and Powell (1983) theorized that this occurs by three mechanisms: coercive, mimetic, and normative. The coercive mechanism occurs when outside organizations apply formal and informal pressures. These pressures occur because the organization is dependent upon outside organizations. The mimetic process results from uncertainty and ambiguity. Organizational goals are often ambiguous, as is the case with public research universities, and these organizations may attempt to mimic other organizations in their field that have been deemed successful or legitimate.

Finally, normative pressures can lead to isomorphism. Highly technical organizations rely on professionalization and the professionalization of their labor force to establish their legitimization and to gain autonomy. DiMaggio and Powell (1983) point out that professionalization is achieved through the legitimization of formal education and through the “growth and elaboration of professional networks that span organizations” (p. 152). DiMaggio and Powell (1983) note that organizations that rely on a professional labor force “will be driven primarily by status competition. Organizational prestige and resources are key elements in attracting professionals. The process encourages homogenization as organizations seek to ensure that they can provide the same benefits and services as their competitors” (p. 154).

Perrow’s (1961) theory of organizational prestige expands on the previous organizational theories examined in this chapter. Perrow’s theory of organizational prestige makes two major claims: “that an organization may control its dependency upon the environment by acquiring prestige,” and the emphasis upon indirect indexes may

“subvert quality, since the indexes become more important and valuable to the organization than the quality they are supposed to suggest” (p. 338). This study posits that public research universities attempt to maximize their prestige in order to diversify their revenue streams, and thereby reduce their dependency on traditional revenue sources.

According to Perrow’s theory, prestige can be based on either intrinsic (preferred) or extrinsic characteristics of its quality. For higher education as an industry, prestige is not reflective of the actual quality of the goods or services, but rather is contingent on the judgment of the external validating groups who are viewed as capable of indirectly evaluating the product. Perrow (1961) notes, “external characteristics are not essential to maintaining production standards, though they may be vital in insuring acceptance and standards” (p. 336). In cases where the quality of a product cannot be determined by its own intrinsic nature, its association with another organization, measure, or product may determine its quality. Core to the success of external validation is the assumption that “the image based on extrinsic referents will promote public favor and even be a substitute for an image based on intrinsic referents” (p. 336), despite their inability to actually measure this assumption. For institutions, this is key because the marketing of a product is based upon its intrinsic quality. The endorsement of external organizations may allow for marginal differentiation, which is crucial for organizational survival when trying to compete in a competitive market.

Perrow’s theory was developed as a part of his study of hospitals. He recognized that highly technical or specialized organizations tend to utilize indirect measures of quality. For example, Perrow (1961) cites the “reputation of the personnel, the

specialized equipment, the number of research projects in operation” (p. 337) as some examples of common measures used in evaluating hospitals. The external validating agencies acknowledgement of quality becomes even more important in a highly competitive environment. In this kind of environment institutions will emphasize their extrinsic endorsements to gain a competitive advantage. Perrow (1961) notes

“patients are incompetent to judge the care they receive from the hospital: they are unable to gain the information required to make a judgment, and they lack the knowledge to interpret correctly what they do experience. They may, however, judge many superficial aspects of the professional care and especially the “hotel” aspects of hospital care” (p.339).

According to Perrow (1961), in a highly competitive environment, hospitals will increase their focus on producing the superficial items that patients are able to evaluate, and then use their public relations arm to promote them aggressively.

Perrow (1961) suggests that organizations that promote outside agencies validations of their organization’s quality, may lead to the development of internal problems for the organization. Individuals, both within and external, to the organization raise concerns that valuable resources are being diverted from the organization’s core purposes to nonessential programs or activities. As the focus moves toward external validation, Perrow (1961) points out that an unintended result of this behavior may be the attraction of a consumer that continually demands more of these services. However, this comes at the expense of addressing the core activities. As organizations become dependent upon a number of agencies within its environment, this becomes even more complex. Perrow (1961) summarizes the

challenges of external validation as measures of quality,

“the production of indirect indexes of intrinsic quality may take precedence over maintaining the quality of goods and services.

Resources may be diverted from activities supporting official goals to those which produce and market extrinsic characteristics (p. 341).”

For public research universities, this has become problematic due to the decline in public confidence produced by these new market behaviors.

Bowen’s (1980) revenue theory of costs, explains that the revenues available to the institution determine an institution’s per student costs. The author qualifies the theory by stating, “it is a short-run theory” (p. 18). It describes what happens on year-to-year basis at institutions. In the long run, the revenue institutions receive will be affected by several factors, including public trust in higher education, the labor market, economic conditions, students’ willingness to pay tuition, and other factors. Bowen (1980) is clear that costs are not determined by “rigid technological requirements of delivering educational services nor by some abstract standard of need” (p. 18). As revenues are increasingly derived from numerous sources, the ability to control the unit costs is diffused.

Bowen (1980) identified five laws that outline how institutions behave as they administer their annual business. The five laws are: (1) the dominant goals of institutions are educational excellence, prestige, and influence. The criteria that define institutional prestige are inputs, most of which are costly, not educational outputs. The real outcomes of higher education (such as learning) are unexamined and vaguely understood. (2) In the quest of excellence, prestige, and influence, there is virtually no limit to the amount of

money an institution could spend for seemingly fruitful educational ends. (3) Each institution raises all the money it can. The third law is understood within the context of the theory being a short-run theory, implying that institutions behave this way within the limits of legitimization. In other words, institutions will not increase tuition at a rate beyond the accepted norms. (4) Each institution spends all it raises. The exception to this rule is saving in institutional endowments. (5) The cumulative effect of the preceding four laws is toward ever-increasing expenditure (pp. 19-20). The trend toward ever-increasing expenditures occurs because the goal of prestige is not “counteracted within the higher education system by incentives leading to parsimony or efficiency” (p. 20). Even when these outside organizations, such as the state, attempt to incentivize efficiency, for example through performance funding, institutions are able to refute these attempts or at least hold the incentives to a negligible amount. Burke (2002) notes that traditionally, performance funding has been held to around 5 percent of a state’s unrestricted appropriations.

Bowen (1980) points out that the pursuit of prestige does not occur within a vacuum. The pursuit of prestige leads to waste. For example, institutions expend revenue and resources in an attempt to increase their reputation. While these expenditures may help an individual institution increase its reputation, they may add no value to the core production functions of higher education. Bowen (1980) points out that “they are basically moves in a zero sum game. They force competitors to make similar expenditures with the result that all the players are worse off while their relative positions remain about unchanged” (p. 23). Institutions’ need for legitimization, by these external validating organizations, is the reason this occurs.

In summary, these theories combined provide a theoretical framework for understanding the relationship between the pursuit of prestige and institutional behavior. Traditionally, higher education institutions have been dependent on two revenue sources for their survival and success, state appropriations and tuition and fees. As a result, public institutions relied almost solely on state revenue. The entrance of new revenue streams and external validating organizations in the 1970s and 1980s offered institutions a chance to decrease their dependence on these traditional sources and expand sources of revenue.

Over time, however, external validating agencies also became sources of legitimization. Being perceived as legitimate is crucial for institutional survival for highly technical organizations where the quality of the product cannot be measured. As a result, institutions began to mimic one another, and higher education began to become increasingly homogenous. Eventually the costs of not being considered legitimate may have forced institutions to pursue prestige in order to survive.

Empirical Research Findings

Next, empirical research on the relationship between prestige and institutional behavior is examined. The literature focuses on two major themes: the relationship between prestige and institutional expenditures, and the relationship between prestige and institutional revenues. Following the review of the empirical research, expected relationships that inform this study are presented.

Relationship between Prestige and Institutional Expenditures (Priorities)

The pursuit of prestige has altered the behavior and expenditure patterns of public

higher education institutions. As institutions have become more similar, competing for the same students, their expenditure patterns have also been altered. Morpew and Baker (2004) examined the expenditure pattern of institutions that recently reached the Research I Universities (RU1s) classification. Specifically, the study sought to determine if new RU1s administrative costs increased. The authors selected the population ($N = 88$) based on several criteria: research I universities are the most organizationally complex higher education institutions, which they hypothesize will make them more likely to be susceptible to growth in their administrative costs. Research I universities also represent the most prestigious institutions in higher education, and therefore, are likely to serve as models for institutions with aspirational goals. Finally, this group of institutions has experienced considerable growth.

Finance and enrollment data from the Integrated Postsecondary Education Data System for the years 1976, 1988, 1992, and 1996 were included in their analysis. The sample represented 88 institutions that were classified RU1s as of 1994, 18 of which were rising RU1s (institutions that were originally classified as RU2s and were later reclassified as RU1s), and 37 institutions classified as research II institutions (RU2s) as of 1994. The authors performed multiple analyses on the institutions' expenditures. They first examined whether these rising universities spent significantly more on administrative costs as a portion of their expenditures in 1996 compared to 1998, when they were classified as RU2 institutions. Next, they determined whether the spending patterns of these new RU1s more closely followed the previously existing RU1s in 1996 compared to 1988. They hypothesized that rising RU1s increased their expenditures on administrative costs, as a result of their aspirational behavior. The authors relied on

Zemsky and Massey's (1990) theory of the administrative lattice to inform their study. Their independent variables in the analysis were: the natural log of total revenues, the natural log of enrollment, the percentage of revenues that were restricted, a dummy-coded variable indicating the institution's 1994 classification, a dummy variable for institutional control, a dummy variable for year, and an interaction variable of (RU2 x 1996).

Results of the first analyses revealed that, in general, RU1s spent proportionally less on institutional instruction and support than did RU2s. There were also differences in spending on research as a percentage of institutional budgets. RU1s proportion of spending on research increased almost 30 percent from 1976 to 1996. RU2s also saw increases in spending on research; however, it occurred on a much smaller scale (10 percent). The results show that a shift occurred at RU1s, with the institutions spending a greater percentage on research and less on instruction. The results also showed that RU2s spent a significantly ($p < .10$) larger percentage over time on instruction. They conclude that rising RU1s expenditure patterns became more like continuing RU1s over the 20-year period studied. As rising institutions sought to achieve the new RU1 classification, they spent proportionally less on instruction, becoming more like the continuing RU1s.

The authors' study and their findings have important ramifications for state policymakers. Specifically, their findings suggest that "institutions that seek out and achieve their goal of becoming members of this most research-intensive group are prone to the same disease that afflicts other affluent research spending: increased spending on nonacademic staff rather than increased spending on academic-related services" (p. 379).

In short, the pursuit of prestige affects institutional expenditure patterns, with proportionally less money being spent on instruction and more on research. The authors' findings provide support for Bowen's (1980) research on the revenue theory of costs.

In his study, which is based on his doctoral dissertation, David Garvin (1980) sought to explain how universities actually behave. Garvin's research focuses on change in institutional behavior during the 1960s ($N=101$). The author tested several propositions:

- Proposition 1: "Public universities gained in prestige relative to private institutions" (p. 85).
- Proposition 2: Public institutions are more likely to have experienced increases in prestige due to increases in faculty salaries, while private institutions are more likely to have experienced increases due to increases in the number of faculty.
- Proposition 3: Elite and non-elite institutions use different methods for upgrading their departments.
- Proposition 4: Low prestige institutions increased their enrollments more than their counterparts.
- Proposition 5: Public institutions focused on teaching assistantships when upgrading their graduate programs, while private institutions focused on research assistantships and fellowships.
- Proposition 6: Public institutions likely focused on upgrading their humanities departments, while private institutions focused on science and engineering.
- Proposition 7: Increases in prestige at the departmental level will be more closely associated with increases in the number of tenured positions rather than untenured

in the short run.

Employing a utility-maximizing model, Garvin identifies institutional utility as the pursuit of prestige. Garvin, however, assumes that institutional prestige is a positive function of the combined prestige of individual departments [$pr(pr^1, pr^2, \dots, pr^n)$], and the prestige of the departments is a positive function of the faculty quality and size of the faculty = [$pr^i(facqual^i, fac\#^i)$]. An important explanation of this work for the current study, was that the study was set in a market context, which allowed the study to emphasize the role the competitive environment plays in shaping the behavior of institutions. The model developed in the study accounts for alternate costs and revenues. Garvin's formal model of the utility of the university is: $u = u(pr, studqual, stud\#; Z)$, where pr = the overall prestige of the university; $studqual$ = the quality of the university's students; $stud\#$ = the number of students enrolled, and Z = a vector of other attributes contributing to the utility of the university. The model states that utility is a positive function of prestige, quality, and quantity of students, and other factors. Results of the research revealed:

- Proposition 1: Public universities outperformed private institutions on all four improvement indexes and were significant at the 1 percent level.
- Proposition 2: Change in faculty salaries was almost always larger and more significant for public institutions, while change in the number of faculty was for private institutions.
- Proposition 3: High and low prestige institutions utilized different methods to improve.
- Proposition 4: Low prestige institutions increased their enrollments significantly

more than did high prestige institutions.

- Proposition 5: Public institutions utilized teaching assistantships to improve, however, the private institutions did not use this strategy.
- Proposition 6: Public universities performed better than their private counterparts in all disciplines except the humanities.
- Proposition 7: Increases in the number of tenured faculty in English, history, and philosophy, were strongly correlated with increased prestige, however non-tenured were not. In the science fields, both tenured and non-tenured faculty were correlated with prestige, as proposed.

Garvin's research provides evidence that the pursuit of prestige by universities has been occurring for almost three decades. His research showed that beginning in the 1960s, in the quest for prestige, public institutions started making gains on private institutions. Also, his findings show that institutions at differing levels of prestige use different methods in an attempt to improve. Garvin (1980) correctly predicted that the market would lead to an "increasing split between institutions of high prestige and those of lesser renown. As many state universities gain in prestige, the lower quality private institutions-especially the large urban universities-will be forced to resort to a service strategy, responding largely to the manpower needs of their local communities in an effort to remain competitive" (p. 62).

McPherson and Shapiro's (1990) studied the expenditure trends in higher education and the resulting implications for institutional quality. Specifically, the authors examined if the increases in higher education costs were being used efficiently to enhance the educational quality. The authors suggest that both families and state and federal

governments have the right to be concerned that they are getting a fair return on their investment even though they may not make up a majority of the budget. The study merged three data sets for the analysis: the Higher Education General Information Survey (HEGIS), the Fiscal-Operations Report and Application to Participate (FISAP), and the HEGIS Enrollment Survey. The analysis examined the change in institutional expenditures from 1978 to 1986. The authors found that during the period, research spending grew more rapidly at public universities than at private universities. Private universities, however, were found to have spent more than their public counterparts on instructional support. The authors suggested that the combined trends of increased expenditures on research and less support for instruction is concerning. The authors conclude, “the evidence reviewed here suggests that there may be more reason to worry about trends in quality at public colleges and universities than elsewhere” (p. 10).

Impact on Institutional Revenue

Most of the literature on the impact of prestige on institutional revenues focuses on one indicator of prestige – *U.S. News & World Report*. The literature on *U.S. News & World Report* has shown that there are direct and indirect financial benefits to increasing in prestige (rank). Institutions that move into the top quartile of the rankings reflect changes in the socioeconomic composition of the student body. Institutions in the top quartile have a reduced number of students receiving the Pell Grant (Meredith, 2004). Decreasing the number of students receiving the Pell Grant is associated with higher 6-year graduation rates, which is rewarded by the rankings (Pell Institute for the Study of Opportunity in Higher Education, 2004). The rankings create a prestige loop where

institutions attempt to enroll better academically prepared students, which leads to better rankings, and attracts more academically prepared students.

Enrolling more academically prepared students also has several additional indirect financial incentives. Monks and Ehrenberg (1999) showed that indirectly, decreases in rank can lead to institutions offering more aid, and less self-financing from students was expected. Additionally, full-pay students are more likely to attend higher ranked institutions (Griffith & Rask, 2007). While tuition is not directly responsive to ranking, institutions that increase their rank can offer less financial aid to their enrolling students, and receive more revenue from their incoming students who are paying a greater share of the cost of attending. For institutions in a competitive market, attracting full-pay students is a priority.

In one of the few studies to examine the direct effect of *U.S. News & World Report* rankings on per student financial resources of public colleges, Jin and Whalley (2007) found a relationship between an institution's ranking, expenditures, and income. The authors examined whether colleges added exogenously into the rankings increased their per-student expenditures and revenue in comparison to institutions already in the rankings, institutions previously in the rankings, and institutions that are never in the rankings. The authors found that inclusion in the *U.S. News & World Report* rankings increases college expenditures per full time equivalent (FTE) on items included in the rankings by 3.2 percent. Additionally, inclusion in the rankings leads to an increase in the per-FTE state appropriation revenue of 6.8 percent.

The effect of the increase in state appropriation revenue accounts for almost all of the additional institutional expenditure, because public institutions receive approximately

40-50 percent of their revenue from state appropriations. The increase in state appropriations was found not to be a redistribution of resources away from other state institutions, but rather an actual increase in state appropriations per FTE. The study also confirmed Monks and Ehrenberg's (1999) findings that institutions are not charging more tuition as a result of their inclusion in the rankings.

McLendon, Mokher, and Doyle's (2009) study on states' privileging of public research universities, reaches similar conclusions to Jin and Whalley's (2007). The authors examined 501 public four-year universities, including 155 institutions classified as research universities, for the 2003-2004 academic year. Their analysis excluded institutions that had hospitals, health profession schools, and other specialized schools. The dependent variable in the analysis was the logged state and local appropriations per full-time equivalent (FTE). The authors employed a linear mixed model to account for the nesting effect of the data, and controlled for numerous institutional and state level variables in the analysis.

Their findings showed that on average, appropriations per FTE were \$8,261 at research universities, and \$5,712 at non-research institutions. The difference was statistically different, which indicates that research universities are privileged by the state, with considerable variations in this difference across states. Two of the other predictors were also found to be significant, the proportion of completions in STEM fields and a larger proportion of graduate students. These fields are typically more costly for institutions, so states may be trying to supplement these associated costs. Several political variables were also found to moderate this privileging effect. Even after controlling for the basic institutional and state level predictors, however, there remained

unexplained variation in the differences, suggesting that states do privilege research universities. McLendon, Mokher, and Doyle's (2009) research suggests that institutions may receive more revenue from the state by attaining research university status.

Other Factors

Several other factors may be associated with varying levels of funding profile among colleges and universities. For instance, only recently have public institutions entered into philanthropic fundraising, while private institutions have a long history of soliciting private sources for additional revenue (Worth, 1993). Fund-raising campaigns did not appear at public institutions until around 1975 (Cook & Lasher, 1996).

Increasingly, private support is becoming a critical revenue source for public colleges and universities. By 2007, this revenue stream had grown to \$29.8 billion for U.S. colleges and universities, with alumni contributing almost half of the total (Wolverton, 2008).

The age of an institution may also contribute to an institution's ability to increase its proportion of funds from non-traditional sources. Institutional legacies and philanthropic traditions have been shown to have a significant effect on an institution's ability to generate revenue from non-traditional sources. Past studies indicate that older institutions fare better than younger institutions in raising private support (Boyle, 1990; Grunig, 1995; Baade & Sundberg, 1996, Liu, 2006).

Institutions are attempting to diversify their revenue streams through establishing technology transfer offices, research parks, and the sale of core educational technology (Hearn, 2003). While no empirical study has been conducted on the impact of geography on institutional success in generating revenue from outside sources, one might suggest

that location could play a role. For example, the University of Minnesota is located in Minneapolis, a city that is home to 19 *Fortune* 500 companies in 2009. The University may benefit from its close connection to industry compared to a more rural institution, such as Iowa State University.

Finally, institutions that have a medical school may generate more external research funding than their counterparts. Campbell (2009) notes that federal funding is the single largest source of support for academic life-sciences research. The National Institutes of Health's (NIH) funding of medical research has grown from \$3.9 billion in 1991 to \$14.8 billion in 2000, representing over 50 percent of the institute's entire awards (Quon, 2000).

Summary

A review of the empirical research revealed that institutional behaviors change with the pursuit of prestige. The existing research showed that increasing, or attempting to increase in prestige is associated with changes in institutional expenditures (priorities), and institutional revenue sources. Guided by the existing theory and research, study's research questions, conceptual framework, and hypotheses are presented in chapter 3. Chapter 4 presents the study's analytical findings and their connection to the study's hypotheses. Finally, chapter 5 discusses the study's findings and their implications for theory, policy, and practice.

Chapter III

The purpose of this study is to examine the prevailing assumption that increases in higher education institutions' prestige will lead to increased revenue diversification, as measured by the percentage of revenues coming from non-traditional sources. A review of the literature reveals that institutions are altering their behavior in an attempt to increase their prestige (Bowen, 1980; Slaughter & Leslie, 1997; Anderson, 2001; Pusser, 2002; Bok, 2003; Morphew & Baker, 2004; Weerts & Ronca, 2006; O'Meara, 2007). An underlying assumption supporting this aspiring behavior is that increases in prestige will lead to increased revenue diversification by decreasing their proportion of revenues coming from traditional revenue sources. This study tests this assumption by answering the following question: How are changes in institutional prestige related to changes in an institution's revenue diversification?

This chapter begins with an overview of the Carnegie classifications, which inform the study's predictor of interest. Next, the study's research question is discussed, followed by a presentation of the study's hypotheses and an explanation of how they are connected to the review of the existing literature and theory. The conceptual framework that guides the study is then introduced, followed by an explanation of the study's data sources and data collection. Finally, the chapter concludes with discussion of the research methodology employed by the study.

Carnegie Classification

The Carnegie Foundation for the Advancement of Teaching classifies institutions

according to mission. According to the Carnegie Foundation (2009), the purpose of the classification was to identify “categories of colleges and universities that would be homogeneous with respect to the functions of the institutions and characteristics of students and faculty members” (p. VII). Historically, Carnegie divided its research universities into Research I Universities (RU1s) and Research II Universities (RU2s) based on federal research expenditures and number of doctorates awarded in a year. An institution’s classification is determined by the amount of federal research expenditures and the number of doctoral degrees awarded in a single year.

An unintended use of the institutional classifications by the Carnegie Foundation, has been its use as a measure of institutional prestige. O’Meara (2007) notes that historically, institutions have wanted to “move to what institutional leaders consider more prestigious Carnegie classification categories” (p. 125). In fact, in response to the widespread use of the classification system to measure prestige, the Carnegie Foundation revised the rankings in 2000 and 2005 into a less hierarchical structure. Despite this reality, Morphew and Baker (2004) point out that the classification “has served as a prestige barometer for many institutions because it classifies institutions using variables linked to normative models of prestige and stature” (p.367).

In order to examine the relationship between an institution’s change in Carnegie classification and its revenue diversification, institutions were assigned to one of three groups. The first group consists of institutions that Carnegie categorized as Research I Universities (RU1s). These institutions remained in the RU1 classification throughout the period studied. The second group comprises institutions that Carnegie categorized as Research II Universities (RU2s). The second group also remained constant throughout

the analysis. Finally, the third group, rising institutions, contains institutions that Carnegie classified as RU2s in 1987, but as RU1 in either 1994 or 2000. In order to be classified as a RU1 in 1994, an institution had to annually have federal research funding of \$40 million and award at least 50 doctoral degrees.

For the year 2000, however, Carnegie created new classifications. The changes in classification in 2000 resulted in the elimination of the research universities I and research universities II categories. As a result, the change in classification criteria prevents the study from tracking change in these categories over time. In order to project which institutions would have increased to RU1 in 2000, the study followed the methodology previously used by Carnegie in 1987 and 1994 to classify institutions. As an example, in 1987 Carnegie required \$33.5 million in federal research funding for an institution to be classified as an RU1. By 1994 they had increased their requirement to \$40 million in federal research expenditures, an increase of almost 20 percent (19.4 percent). Under the new requirement, 18 institutions moved up from RU2 to RU1 status.

This study uses the same increase in percentage to determine the projected cutoff of federal research expenditures required to reach RU1 status. The new cutoff was determined to be \$48 million, an increase of 20 percent. After the cutoff was determined, the study used the same source for identifying federal research expenditures as the previous Carnegie Classifications had utilized, the Survey of Research and Development Expenditures at Universities and Colleges. The 1987 and 1994 classifications were based on the average of federal research expenditures for the years 1983-1985 for 1987, and 1990-1992 for 1994. Here, the analysis was based on average federal research expenditures for the years 1996-1998. Based on these criteria, 19 institutions would have

increased from RU2 to RU1 in 2000, almost the same number that increased in 1994, suggesting that the method for projecting the rising institutions within reason. Table 1 shows the institutions that increased in Carnegie classification in 1994 and 2000.

Morphew and Baker (2004) note, “many larger universities aspired to this status because of the prestige accord these institutions. To reach this classification, however, they needed to find ways of increasing the amount of federal funding they received for research, as this was generally the most difficult hurdle for RU2s aspiring to RU1 status” (p. 368). Morphew and Baker’s statement identifies a major assumption underlying this analysis. This study assumes that an increase in an institution’s classification reflects a deliberate decision by the institution.

Research Questions and Hypotheses

The study’s overarching research questions is: How are changes in institutional prestige related to changes in an institution’s revenue diversification? Increases in prestige could be represented by a variety of indicators; however, this study adopts Morphew and Baker’s (2004) use of change in Carnegie classification to operationalize increases in prestige. An institution’s revenue diversification refers to an institution’s mix of revenue streams and how they combine to determine an institution’s total revenue. Specifically, this study is concerned with how the percentage of non-traditional revenue sources changes as a proportion of an institution’s funding profile when an institution increases in prestige. Traditional revenue streams are defined as tuition and fees and state appropriations; non-traditional revenue streams represent all other sources of revenue. As a result, the overarching research question addressed in this study is operationalized as:

Table 1: Rising Institutions

Institutions that Changed from RU2 to RU1

Rising Institutions in 1994 <i>(Actual)</i>	Rising Institutions in 2000 <i>(Projected)</i>
Arizona State University	Auburn University
Brown University	Clemson University
Emory University	George Washington University
Florida State University	Kansas State University
Georgetown University	Mississippi State University
Iowa State University	Oklahoma State University
SUNY at Buffalo	SUNY at Albany
Temple University	Tulane University
Tufts University	University of Arkansas
University of Alabama at Birmingham	University of California at Riverside
University of California - Santa Barbara	University of California at Santa Cruz
University of Kansas	University of Delaware
University of Massachusetts at Amherst	University of Idaho
University of Nebraska	University of Oklahoma
Utah State University	University of South Carolina
Virginia Commonwealth University	University of South Florida
Wayne State University	University of Vermont
West Virginia University	Wake Forest University
	Washington State University

Did institutions that rose in Carnegie Classification (rising institutions) distinguish themselves from their RU2 peer institutions and become more like their aspirational peers (RU1s) in the proportion of their revenue from non-traditional sources?

Based upon a review of the literature and theory, the study poses the following hypotheses stemming from the research question articulated above, framed as alternative rather than null hypothesis: *1) Institutions that increase in Carnegie classification, from Research University II to Research University I, will initially show a lower proportion of their revenue from non-traditional sources compared to Research University I institutions.* That is, rising institutions, which have less prestige than RU1s, by definition in this study, and are more dependent on traditional revenue streams than the RU1s they aspire to be like. This hypothesis reflects Perrow's (1961) theory of organizational prestige, that organizations can reduce their dependency on the environment by increasing their prestige. Additionally, research has shown that the distribution of royalties associated with technology transfer and patents is heavily skewed to the most prestigious institutions (Feller, 1997). The same is true of private giving and endowments (Michael, 2005). In summary, RU1s have more prestige and therefore are less dependent on traditional revenue sources.

2) Institutions that increase in Carnegie classification, from Research University II to Research University I, will show faster growth in their proportion of non-traditional revenue sources than Research University I institutions. This hypothesis captures the intention of rising institutions to increase their prestige and thereby reduce their dependency on traditional revenue sources. Research has shown that despite growth in state funding, institutions have been assertively pursuing non-traditional revenue sources

(Newman et al., 2004, p. 42). Informed by Bowen's theory that institutions are prestige-maximizing organizations, the study does not expect RU1 institutions to maintain their prestige; however, the hypothesis suggests that rising institutions to increase their non-traditional revenue at a faster pace than RU1 institutions.

3) Institutions that increase in Carnegie classification, from Research University II to Research University I, will initially show no difference in their proportion of revenue from non-traditional sources compared to Research University II institutions. At the start, rising institutions' are classified as RU2s. The hypothesis proposes that there is no statistical difference in the proportion of revenue from non-traditional sources.

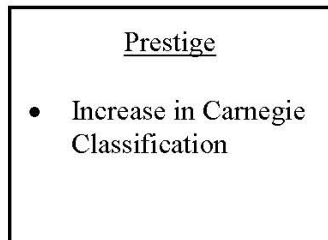
4) Institutions that increase in Carnegie classification, from Research University II to Research University I, will show faster growth in their proportion of non-traditional revenue sources than Research University II institutions. This hypothesis captures the intention of rising institutions to increase their prestige and differentiate themselves from their competition, which reflects Deephouse's (1999) theory of strategic balance. Perrow (1961) suggests that this differentiation related to increases in prestige will open them to new revenue streams. These new revenue streams allow rising institutions to reduce their dependency on traditional revenue sources, and thereby differentiate themselves from RU2 institutions.

Conceptual Framework

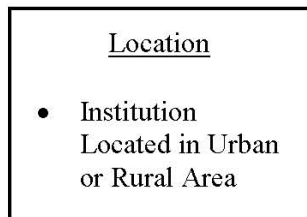
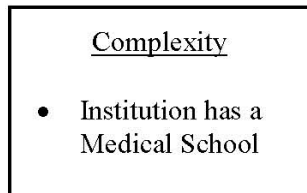
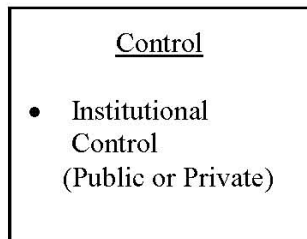
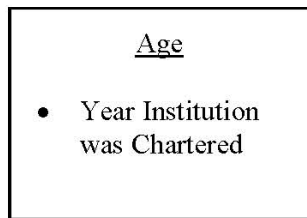
Figure 1 presents a diagram of the conceptual framework. The dependent variable (proportion of non-traditional revenue) is the percent of revenue received by an institution from sources other than tuition and fees and unrestricted state appropriations.

Figure 1:
Conceptual Framework

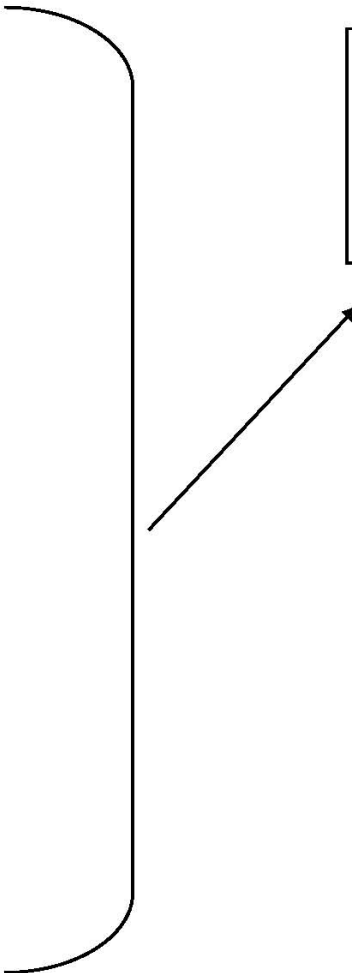
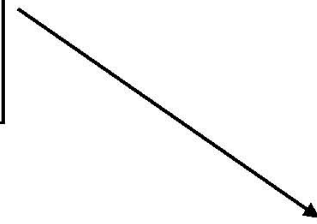
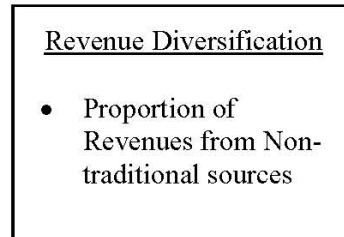
Independent Variable



Control Variables



Dependent Variable



Informed by the study's guiding theory, the following control variables were used for each of the analyses: institutional age, institutional control, institutional complexity, and institutional location. Prestige is the main predictor of interest in both analyses, as measured by change in Carnegie classification. All of the control variables are static predictors, meaning they were measured at the beginning time point and remained constant throughout the period studied.

Dependent Variable

Pfeffer and Salancik's (1978) theory of resource dependency and Perrow's (1961) theory of organizational prestige informed the choice of the dependent variable. Pfeffer and Salancik (1978) believe that organizations are involved in a constant struggle for autonomy. An organization's ability to survive depends on its ability to maintain and acquire resources from its external environment. An organization's dependence on its environment for survival also leads to its becoming dependent on the outside organizations that make up the external environment. Outside organizations that provide the resources necessary for institutional survival almost inevitably place external constraints on and control organizational behavior (Pfeffer & Salancik, 1978).

According to Perrow (1961), an organization may mitigate this control "by acquiring prestige" (p. 338). Acquiring prestige opens new revenue streams and opportunities to the organization. This study posits that public research universities attempt to maximize their prestige in order to increase their revenue diversification. Traditionally, public institutions rely on two main revenue streams for their survival, tuition and fees and state appropriations. To capture an institution's dependency on

traditional revenue sources, the dependent variable in the analyses is the *proportion of revenue from non-traditional sources*, that is, sources other than unrestricted state appropriations and tuition and fees.

Independent Variables

The predictor of interest in the study, *prestige*, is operationalized as an institution's change in Carnegie classification. Morpew and Baker used the same method to operationalize change in prestige (Morpew & Baker, 2004). O'Meara (2007) also points out that institutions have used Carnegie classification as a measure of prestige. While Carnegie did not intend for their classification system to be used as a measure of prestige, the literature is clear that institutions have used it as a prestige barometer, and have attempted to move up to higher classification in an attempt to increase their prestige (Morpew & Baker, 2004; O'Meara, 2007).

Control Variables

The *age of an institution* may also contribute to an institution's ability to increase the proportion of its funds from non-traditional sources. Previous research has shown that institutional legacies and philanthropic traditions may have a significant effect on an institution's ability to generate revenue from non-traditional sources. More specifically, previous research indicates that older institutions fare better than younger institutions in raising private support (Boyle, 1990; Grunig, 1995; Baade & Sundberg, 1996, Liu, 2006).

The study must also control for *institutional control* for several reasons. Public

research universities were late bloomers in raising private support compared to their private counterparts, and, as a result, lag behind in the amount that they raise from private sources (Brubacher & Rudy, 1976). Private institutions also do not receive state appropriations, a key component of traditional revenue. The lack of state support provides private institutions with more autonomy than their public counterparts.

The literature also suggests that the study should control for the presence of a *medical school*. Research has shown that institutions that have a medical school may generate more external research funding than their counterparts. Campbell (2009) notes that federal funding is the single largest source of support for academic life-sciences research. The National Institutes of Health's (NIH) funding of medical research has grown from \$3.9 billion in 1991 to \$14.8 billion in 2000, representing over 50 percent of the institute's entire awards (Quon, 2000).

While no empirical study has examined the impact of *institutional location* on institutional success in generating new revenue from outside sources, institutional location may impact an institution's ability to diversify its revenue streams. Specifically, being located in an urban environment may have a positive impact on an institution's ability to diversify their revenue streams away from traditional sources compared to those located in rural areas. For example, the University of Minnesota is located in Minneapolis, a city that was home to 19 *Fortune-500* companies in 2009, and may benefit from having such a wealth of industry nearby compared to an institution located in a rural area, such as Iowa State University. Access to major corporations may contribute to institutional success in establishing technology transfer offices, research parks, and the sale of core educational technology.

Data Collection

The primary sources of data are the nine annual interrelated surveys that constitute the U.S. Federal Integrated Postsecondary Education Data System (IPEDS). IPEDS is an annual nationally representative dataset of information from every institution that participates in federal student aid programs that were authorized by the Patsy T. Mink Equal Opportunity in Education Act (Title IX) (National Center for Education Statistics [NCES], 2008). Participation is required and mandated by the Higher Education Act of 1965. The purpose of IPEDS is to collect longitudinal postsecondary institutional data in order to analyze postsecondary trends and make the data available to the public. There are 6,800 public and private institutions included in the survey sample. Participation is mandatory, and so, response rates for all IPEDS survey components are above 99 percent. The surveys are distributed to all institutions, and as a result, there is no sampling error. They are, however, subject to non-sampling error, the sources of which vary across survey instruments.

In 2000, a TaskForce was established by NCES (National Center for Education Statistics, 2008) to redesign the surveys because of issues related to the consistency of data definitions and “accuracy, reliability, and validity of other quality measures within and across surveys” (p. 637). The new revised survey was sent out to institutions in 2003-2004. Institutions were allowed to revise previous years’ data to assess the accuracy of the data. The changes had minimal impact on the data, indicating that the instruments and the data were substantially accurate. IPEDS also represents an integrated system of data that forms the institutional sampling frame for other databases, such as the National Postsecondary Student Aid Study and the National Survey of Postsecondary Faculty

(National Center for Education Statistics, 2008).

The nine interrelated surveys are collected annually over three periods, with the exception of the Fall Staff section, which is part of the Human Resources component; it is collected biennially in odd years (National Center for Education Statistics, 2008). In the fall the following components are collected: Institutional Characteristics, Completions, and 12-month enrollment. The Institutional Characteristics survey gathers information related to institutional demographics, admissions requirements, and student charges. The Completions survey contains information about degree completion by race, gender, award, and program, while the 12-month Enrollment component provides information about student headcounts.

The Human Resources component is collected in the winter, and collects information on employee headcounts; faculty information including salary and benefits, rank, gender, ethnicity, and number. The Fall Enrollment, Finance, Student Financial Aid, Graduation Rates, and Graduation Rates 200 percent surveys are all collected in the spring. The Fall Enrollment survey gathers information regarding the residency status and age of students, the student-to-faculty ratio, and identifies cohort numbers that are used to compute retention rates. Information about an institution's revenues, expenditures, assets, liabilities, and scholarships are collected in the Finance survey. The Student Financial Aid survey provides information on the number of students receiving financial aid and the average amount received by the type of aid. Finally, both the Graduation Rates and Graduation Rates 200% components collect information regarding the number of students graduating and their time to degree (National Center for Education Statistics, 2008).

A secondary source of data is the Carnegie classifications of institutions of higher education developed by The Carnegie Foundation for the Advancement of Teaching. Carnegie began classifying institutions in 1973 with revisions occurring in 1976, 1987, 1994, 2000, and 2005. Carnegie classifies institutions according to mission, as informed by their behavior (The Carnegie Foundation for the Advancement of Teaching, 2009). According to the Carnegie Foundation (2009), the purpose of the classification was to identify “categories of colleges and universities that would be homogeneous with respect to the functions of the institutions and characteristics of students and faculty members” (p. VII). During the period examined in this study (1987-2007), Carnegie published four new classifications: 1987, 1994, 2000, and 2005.

The sample for the study is limited to institutions that were classified as research universities in either 1987 or 1994. Carnegie divides its research university categories into two subsections, Research I (RU1s) and Research II Universities (RU2s), based on federal research expenditures and number of doctorates awarded in a year. The criteria for being classified either a research I or a research II university have changed from 1987 to 1994, and from 1994 to 2000. Appendix A presents the differences in classification between the 1987 and 1994 classifications. For this study the 2000 classifications were projected utilizing the methodology explained above. The projection is used for the 2000 classifications instead of the new reclassified classifications created by the Carnegie foundation, because changes in classification by Carnegie in 2000 resulted in the elimination of the Research I and Research II Universities categories.

Finally, data on the age of institutions were collected by a variety of methods. A primary source for the data was institutional websites. Occasionally, institutional archives

were contacted by e-mail or phone in order to obtain the data. The age of an institution was determined by the date the institution was chartered.

The data collected for this study were guided by the review of the literature and theoretical framework. From this review, data was collected on all five variables identified by the review. All of the variables met the criteria of being available and readily quantifiable. There was no missing data in the sample over the period studied. Additionally, there are several advantages for utilizing these data sources. First, all of the data were obtained from nationally representative samples that survey annually. Secondly, with the exception of two of the variables included in the analysis, all of the variables are derived from the Integrated Postsecondary Education Database System. Third, the data are cross-sectional, time-structured and balanced, having all been measured on the same occasions and having the same number of measurements (Singer & Willet, 2003). Fourth, all of the data collected are derived from instruments with high response rates.

The Institutional Review Board of the University of Minnesota granted “Exempt from Review” status. Appendix B presents the Institutional Review Board’s communication granting “Exempt from Review” status.

Methods

The research question addressed in this study is: How are changes in institutional prestige related to changes in an institution’s revenue diversification? For the purposes of the study, the research question is operationalized as: Did institutions that rose in Carnegie Classification (rising institutions) distinguish themselves from their RU2 peer

institutions and become more like their aspirational peers (RU1s) in the proportion of their revenue coming from non-traditional sources? In order to answer the research question, two separate analyses are conducted. The first analysis compares the rising institutions with their aspirational peers (RU1s), to see if rising institutions became more like RU1s in the proportion of their revenue from non-traditional sources. The second analysis compares rising institutions with RU2 institutions to see if rising institutions are receiving proportionally more revenue from non-traditional sources, thereby distinguishing themselves from their RU2 peers.

Linear Mixed Model

Linear mixed models (LMM) are useful and appropriate in addressing questions about individual change and variability, questions concerning the mean growth curve, and questions concerning covariates of change. Linear mixed models are called mixed, because they incorporate both fixed and random effects. LMM's allow the researcher to ask questions about and model within-group change and between-group change simultaneously. There are several advantages to using a linear mixed model to answer the questions proposed in this study.

First, one of the challenges in conducting longitudinal analyses is accounting for nested or clustered data. Observations in a longitudinal study have a temporal order and are nested within subjects overtime, and as a result are correlated or dependent. The dependency among the repeated measures and nested nature of the data violates the traditional assumption of independence in multiple regression. The linear mixed model (LMM), however, accounts for the dependency among the repeated measures through the

model's variance-covariance matrix structure (Fitzmaurice, Laird, & Ware, 2004; Singer & Willett, 2003).

Second, LMM's can accommodate missing data under the assumption that they are missing at random (Long & Pellegrini, 2003; Collins, Schafer, & Kam, 2001). Long and Pellegrini (2003) note that under the assumption of missing at random, "listwise deletion over time is not required, although listwise deletion across variables at each time point is required," (p. 404) and an institution needs to have only a single valid observation to be included in the analysis. For example, if an institution is missing information for one year, but is not missing information for the other years included in the analysis, the year with the missing data is the only year of data not included in the analysis.

Third, LMM's can handle data in which the number or the timing of observations (or both) are different for institutions. Stated simply, the time intervals at which institutions are observed to increase in prestige do not need to be the same, nor do the number of observations (Long & Pellegrini, 2003). The model's flexibility in handling time was essential for the current study.

When modeling change over time, a model must have at least three time points included in the model before and after the event occurred. For the current study, six years were modeled before the change in Carnegie classification and seven years were modeled after the change. In order to align the beginning years for both populations (1988 and 1994), their beginning year was recoded and modeled as Time 1. Realigning the time scales for both populations so that they began at the same time point, allowed the study to model all institutions' increase in prestige to occur at Time 7.

Fourth, LMM's incorporate a random error term that accounts for measurement

unreliability. Fifth, LMM's can incorporate both fixed and random effects. The incorporation of random effects allows the study to treat increase in prestige as a treatment effect, with the institutions changing in prestige receiving the treatment. The random effects account for all institutional differences, allowing the study to test if increase in prestige still explains unique variance in the proportion of revenues from non-traditional sources, while accounting for other institutional factors. Finally, LMM's can also accommodate both dynamic and static predictors.

In order to understand the LMM, recall that the ordinary least squares regression (OLS) model:

$$(3.1) \quad Y_{ij} = \beta_0 + \beta_1 X_i + e_i$$

In the OLS model, there is a single i subscript, $i = 1, 2, \dots, N$. Longitudinal data, however, are characterized by repeated observations per institution, and so, another subscript is added to the LMM to indicate the wave at which an institution's information was collected. The wave subscript will be denoted as j with $j = 1, 2, \dots, n_i$. To symbolize a response value with longitudinal data, the notation Y_{ij} is used. The subscripts apply to the other variables in the LMM. Below, the LMM is presented in its simplest form (other than the intercepts-only model).

$$(3.2) \quad Y_{ij} = \beta_1 + \beta_2 X_{1ij} + e_{ij}$$

As in the OLS model, β_1 is the intercept and β_2 is the linear slope. These are group-level parameters as they do not have the subject-specific i subscript. In the LMM, these parameters are called fixed effects. The fixed effects define the group-level mean growth curve. That is, β_1 and β_2 define a straight line for mean growth over time. β_1 indicates the starting level of the curve and β_2 indicates how it changes over time.

The values of X_{1ij} are special because X_{1ij} is a time metric for the observations. For this reason, it is conventional to change X to t for “time” and drop the first subscript. The main reason for dropping the first subscript is that we only deal with one time metric in an analysis and in its basic form there is no need to index different variables.

$$(3.3) \quad Y_{ij} = \beta_1 + \beta_2 t_{ij} + e_{ij}$$

Also, e_{ij} is a residual that represents two types of deviations: The i deviation of an individual’s response from their individual growth curve, and the j deviation of an individual’s growth curve from the group growth curve.

Equation 3.3 adds the random effects to the LMM, often referred to as the mixed-

$$(3.3) \quad Y_{ij} = (\beta_1 + b_{1i}) + (\beta_2 + b_{2i})t_{ij} + e_{ij}$$

effects model. In the mixed-effects LMM, b_{1i} is the random intercept term for the i th institution, representing the institution’s deviation (if any) from the mean intercept of the group-level growth curve. The random slope term, b_{2i} , represents the institution’s deviation (if any) from the mean slope of the group-level growth curve. By allowing institutions to deviate from the mean group-level growth curve, the random effects account for the heterogeneity among the institutions.

Exploratory Analysis Methodology

Due to the study’s exploratory nature, step-up statistical analyses are used to find the best fitting model (Raudenbush & Bryk, 2002; Hox, 2002). The step-up approach is useful when the shape of the growth curves, the number of random effects, and the number of predictors are unknown. The study’s questions meet these criteria. The step-up approach requires that ordered steps be followed when conducting the analyses. The

statistical significance of each step is evaluated using the nested χ^2 test.

First, the intercept-only fixed-effect model is fitted. Second, the time transformation is added to the fixed-effects portion of the model, which allows the researcher to see if there is any variance in the slopes that needs to be modeled. Next, polynomial time transformations are added one at a time to the fixed-effects portion of the model. Fourth, random effects are added to the model, followed by static predictors. The static predictors can be entered one at a time, or multi-parameter tests can be used. Fifth, time by predictor interactions are added and evaluated. Finally, the tenability of the LMM's assumptions should be evaluated. There are three major assumptions of the LMM (Long, 2011): 1) the observations of institutions are independent, 2) the random effects are normally distributed, and 3) the random residuals are normally distributed.

Measures

Table 2 presents the variables included in the analysis. Their characteristics are discussed in the following section.

Revenue Diversification: The revenue diversification variable represents the percentage of total current fund revenues that are not from traditional revenue sources. Traditional revenue sources are defined as tuition and fees and unrestricted state appropriations. The measure was calculated by dividing an institution's non-traditional revenue by its total revenue in 2007 constant per student dollars, which takes enrollment and inflation into account. The variable is continuous and is a percentage.

**Table 2:
Variable Measures**

<i>Variable Type</i>	<i>Name</i>	<i>Measure</i>	<i>Source</i>	<i>Coding Note</i>
<i>Dependent</i>	Revenue Diversification	Proportion of Non-traditional Revenue	Derived from Integrated Postsecondary Education Data System (IPEDS)	Continuous - The percentage of total revenue from all sources other than State Appropriations and Tuition and Fees
<i>Independent</i>	Prestige	Change in Carnegie Classification	Derived from Carnegie Foundation	"0" - No "1" - Yes
<i>Control</i>	Age	Institution's Age	Institutional Websites	"0" - 1960 to Present "1" - 1911 to 1959 "2" - 1861 to 1910 "3" - 1785 to 1860 "4" - pre-1785
	Control	Institutional Control (Public or Private)	IPEDS	"0" - Public "1" - Private
	Complexity	Institution has a Medical School	IPEDS	"0" - No "1" - Yes
	Location	Institution Located in Urban or Rural Area	IPEDS	"0" - City: Territory inside an urbanized area and inside a principal city "1" - Suburban: Territory outside a principle city and inside an urbanized area "2" - Town: Territory inside an urban cluster "3" - Rural: Census-defined rural territory

Prestige: is a dichotomous variable with institutions that remained in their original Carnegie classification throughout the period of the study coded as “0”, and rising institutions coded as a “1”.

Age: Data for the variable were collected from institutional websites or archives. The variable is categorical and is coded: 0 = 1960 to present, 1 = 1911 to 1959, 2 = 1861 to 1910, 3 = 1785 to 1860, and 4 = pre-1785.

Control: The institutional control variable is a dichotomous variable with a “0” representing an institution being publicly controlled, and a “1” representing an institution being privately controlled. The data for this variable were obtained from the annual Institutional Characteristic survey component of the Integrated Postsecondary Education Data System.

Complexity: The medical school variable is a dichotomous variable coded “0” if an institution has no medical school, and “1” if the institution has a medical school. Data were obtained for this variable from the Institutional Characteristic survey component of the Integrated Postsecondary Education Data System.

Location: The data for the location variable were obtained from the annual Institutional Characteristic survey component of the Integrated Postsecondary Education Data System. The variable is dichotomous variable coded: “0” if the institution is not located in a city, and “1” in the institution is located in a city.

Institutions in the Study

For the first analysis, the population included 70 institutions that were classified as RU1 institutions in 1987 and remained RU1s throughout the period studied (coded

“0”), and 37 rising institutions that were classified RU2 institutions in either 1987 or 1994, but were later reclassified RU1s (coded “1”). For the second analysis, there were 19 institutions that were classified RU2s in 1987 and remained in their original classification (coded “0”), and the 37 institutions that were classified rising (coded “1”). Table 1 shows the institutions that increased from RU2 classification to RU1 during the study period. The period of study examined, 1987 to 2007, is the same for both analyses.

Chapter IV

This chapter presents the descriptive and analytical findings related to the study's research question: Did institutions that rose in Carnegie Classification (rising institutions) distinguish themselves from their RU2 peer institutions and become more like their aspirational peers (RU1s) in the proportion of their revenue coming from non-traditional sources? First, a review of the study's methodology is presented, followed by a discussion of the study's assumptions. Next, the longitudinal analyses are discussed and presented. Finally, the chapter concludes by summarizing the results of the analyses.

Overview

In order to answer the research question, linear mixed models were utilized to conduct two separate analyses. The first analysis compares the institutions that changed in Carnegie classification (rising institutions) during the study with their aspirational peers (RU1s), to see if rising institutions became more like RU1s in the proportion of revenue from non-traditional sources. The second analysis compares rising institutions with RU2 institutions, and examines if rising institutions received proportionally more revenue from non-traditional sources, thereby distinguishing themselves from their RU2 peers.

The question posed by this study requires an exploratory methodology to the statistical analyses that are conducted. Due to its exploratory nature, the study utilizes a step-up (Raudenbush & Bryk, 2002; Singer & Willet, 2003) and weight of evidence

(Burnham & Anderson, 2004) approach for finding the best fitting model. The step-up approach is useful in exploratory analyses when the shape of the growth curves is not known, the number of random effects is not known, and the number of static predictors is not known. All of these situations apply to the two analyses being conducted. A 0.05 alpha level was utilized to test for statistical significance of parameters and variance components. All analyses were conducted using R statistical software version 2.6.2.

Key Assumptions

A key assumption of the study is that institutions that become more independent of traditional revenue streams, as a proportion of their total revenue, achieve this increase because of growth in other revenue source, not as a result of a decline in traditional revenue. As a first step in the analyses, graphical and descriptive representations of the data were examined to test this assumption. Plots for the three prestige groups were reviewed and suggest that the tenability of the assumption is reasonable. Figure 2 shows that revenue from traditional sources grew in constant per student dollars during the period studied for all three prestige groups. Additionally, it shows that rising institutions' revenue from traditional sources was below RU1s, but higher than their RU2 peers. When traditional revenue is broken down into its two components, unrestricted state appropriations and tuition and fees, differences are discernable by prestige group.

Figure 3 shows a plot of unrestricted state appropriations in 2007 constant per student dollars. While, RU1s and rising institutions had higher revenue from state appropriations than RU2s, the plot shows little difference among the three groups. All

Figure 2: Revenue from Traditional Sources (2007 constant per student dollars)

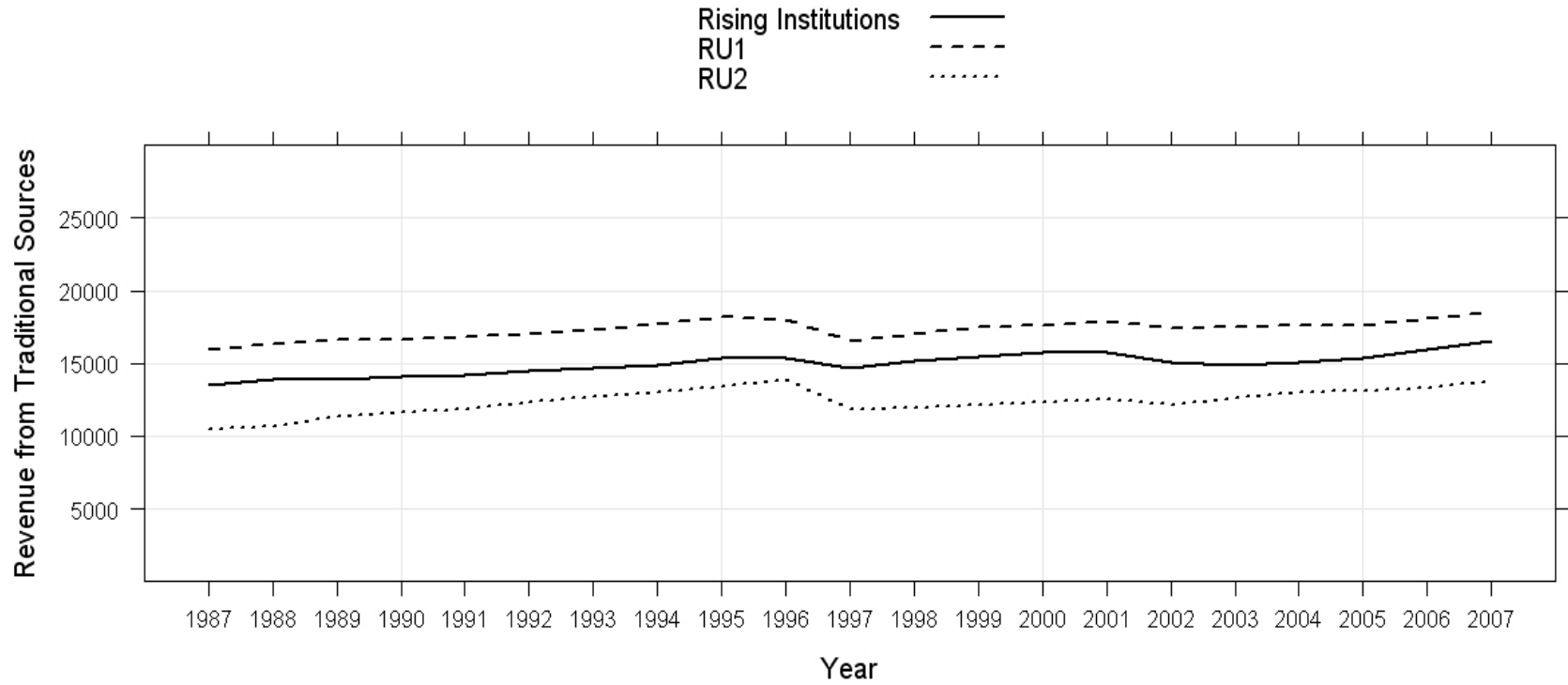
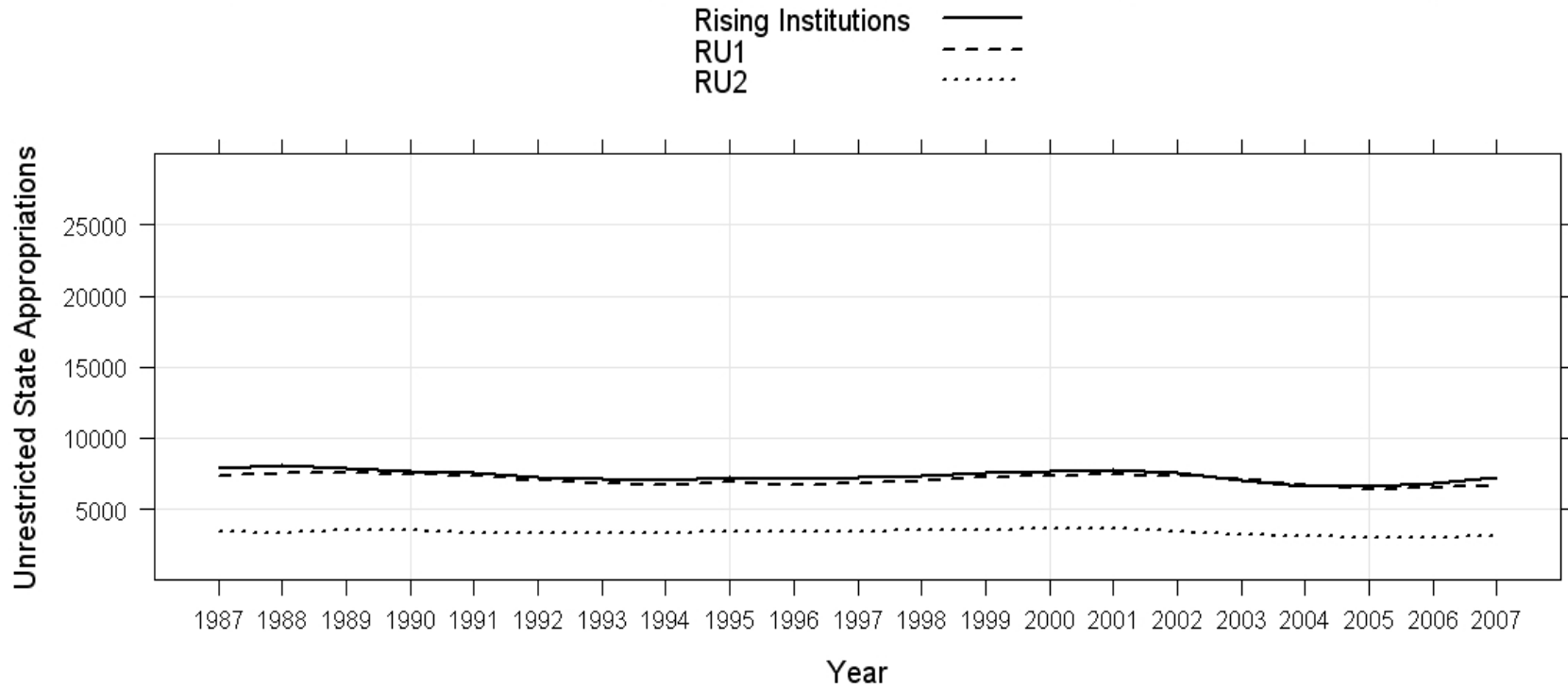


Figure 3: Unrestricted State Appropriations (2007 constant per student dollars)



three prestige groups' slopes appear to show a small decrease in state appropriations from 1987 to 2007. While all three appear to slightly decrease, the slope patterns for the three groups differ suggesting a difference in behavior concerning state appropriations.

Figure 4 examines the mean change in tuition and fees for the three prestige groups over the 21-year period. While the slopes for all three prestige groups are relatively flat or slightly declining in the state appropriations graph, all three prestige groups show an obvious increase in constant per student dollars associated with tuition and fees. It is clear from the three graphs that traditional revenue sources increased in constant per student dollars regardless of prestige group over the period of the study. It is also clear that tuition and fees is the primary contributor to the increase in traditional revenues. Despite tuition and fees accounting for a majority of the growth, the graph of unrestricted state appropriations suggests a flat growth curve across the groups. More importantly, it is evident that state appropriations did not experience a dramatic decline, suggesting that the assumption is reasonable.

Table 3 presents the descriptive statistics of institutional funding profiles by prestige group in constant per student dollars over time. The descriptive analysis confirms the graphical representations of the data. For all three prestige groups, mean traditional revenue increased from 1987 to 2007. RU1 institutions' revenue from traditional sources increased from a mean of \$15,913 in constant per student dollars to a mean of \$18,533, an increase of 16 percent. Rising institutions' increased 22 percent from a mean of \$13,493 to \$16,529, and RU2 institutions' increased from \$10,517 to \$13,830, an increase of 31 percent. While traditional revenue grew in constant per student

Figure 4: Tuition & Fees (2007 constant per student dollars)

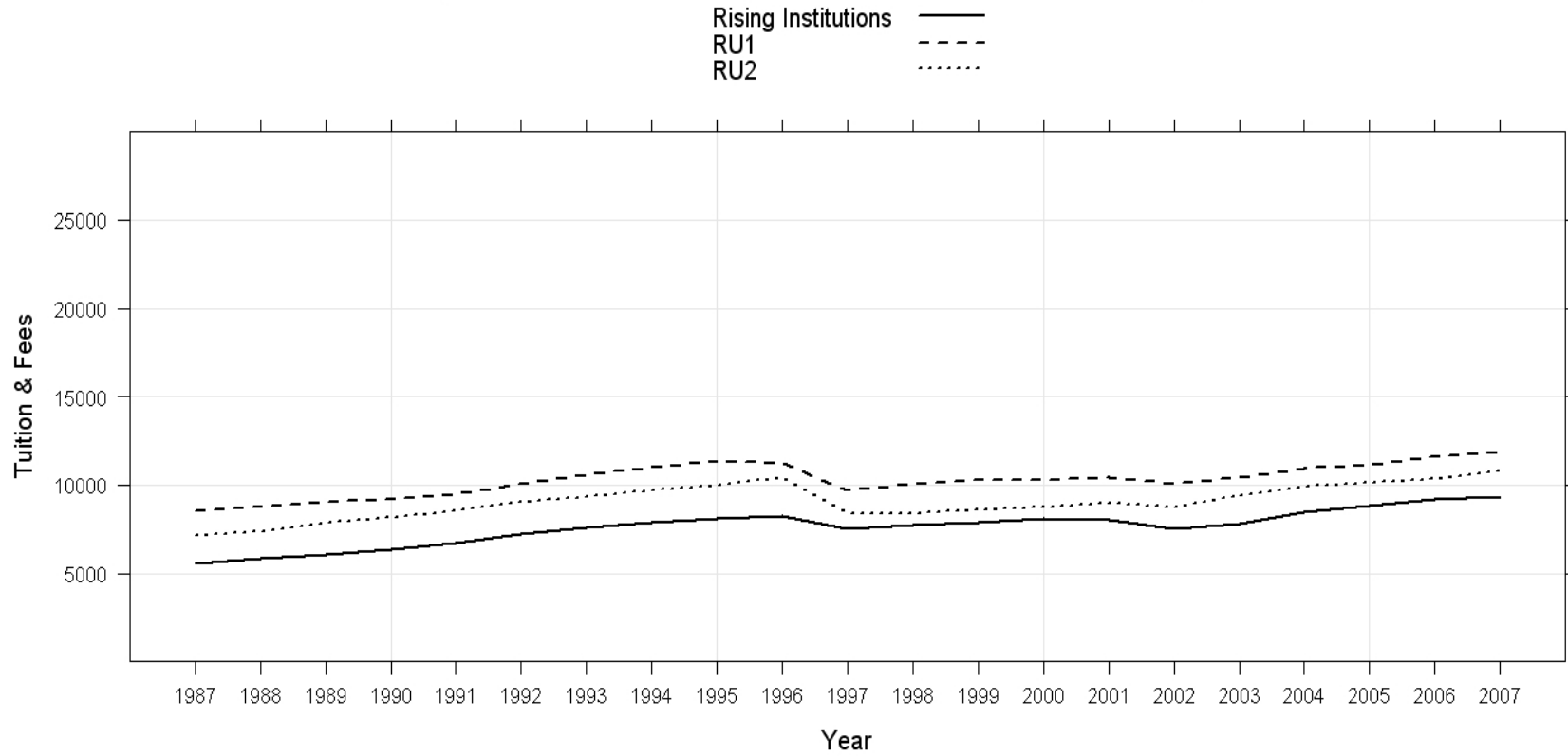


Table 3:
Descriptive Statistics of Funding Profiles by Prestige Group
(2007 constant per student dollars)

1987	RU2 (N=19)		Rising Institutions (N=37)		RU1 (N=67)		F(2,120)
	Mean	SD	Mean	SD	Mean	SD	
	Traditional Revenues	\$10,517	\$4,440	\$13,493	\$3,838	\$15,913	
State Appropriations	\$3,364	\$3,936	\$7,912	\$5,106	\$7,336	\$6,214	4.62 *
Tuition & Fees	\$7,153	\$5,742	\$5,581	\$5,511	\$8,546	\$6,769	2.69 *
Other Revenue	\$11,131	\$9,698	\$12,433	\$8,931	\$43,676	\$126,540	1.73
1994	RU2 (N=19)		Rising Institutions (N=37)		RU1 (N=67)		F(2,120)
	Mean	SD	Mean	SD	Mean	SD	
	Traditional Revenues	\$13,032	\$4,755	\$14,914	\$4,164	\$17,743	
State Appropriations	\$3,314	\$3,358	\$7,047	\$4,095	\$6,745	\$5,560	4.28 *
Tuition & Fees	\$9,717	\$6,959	\$7,867	\$6,778	\$10,997	\$7,886	2.12
Other Revenue	\$14,056	\$11,379	\$15,005	\$13,941	\$44,919	\$109,944	2.07
2000	RU2 (N=19)		Rising Institutions (N=37)		RU1 (N=67)		F(2,120)
	Mean	SD	Mean	SD	Mean	SD	
	Traditional Revenues	\$12,324	\$2,872	\$15,750	\$3,203	\$17,630	
State Appropriations	\$3,569	\$3,612	\$7,676	\$4,304	\$7,320	\$5,999	4.48 *
Tuition & Fees	\$8,755	\$7,458	\$8,074	\$5,817	\$10,309	\$5,865	1.98
Other Revenue	\$34,413	\$56,567	\$20,326	\$23,778	\$86,541	\$177,026	3.29 *
2007	RU2 (N=19)		Rising Institutions (N=37)		RU1 (N=67)		F(2,120)
	Mean	SD	Mean	SD	Mean	SD	
	Traditional Revenues	\$13,830	\$3,989	\$16,529	\$3,842	\$18,533	
State Appropriations	\$3,045	\$3,614	\$7,181	\$4,407	\$6,654	\$5,522	4.85 **
Tuition & Fees	\$10,784	\$5,822	\$9,347	\$6,575	\$11,878	\$6,591	1.83
Other Revenue	\$38,520	\$53,874	\$30,609	\$34,816	\$96,429	\$173,973	3.51 *

*** p < .001; ** p < .01; * p < .05

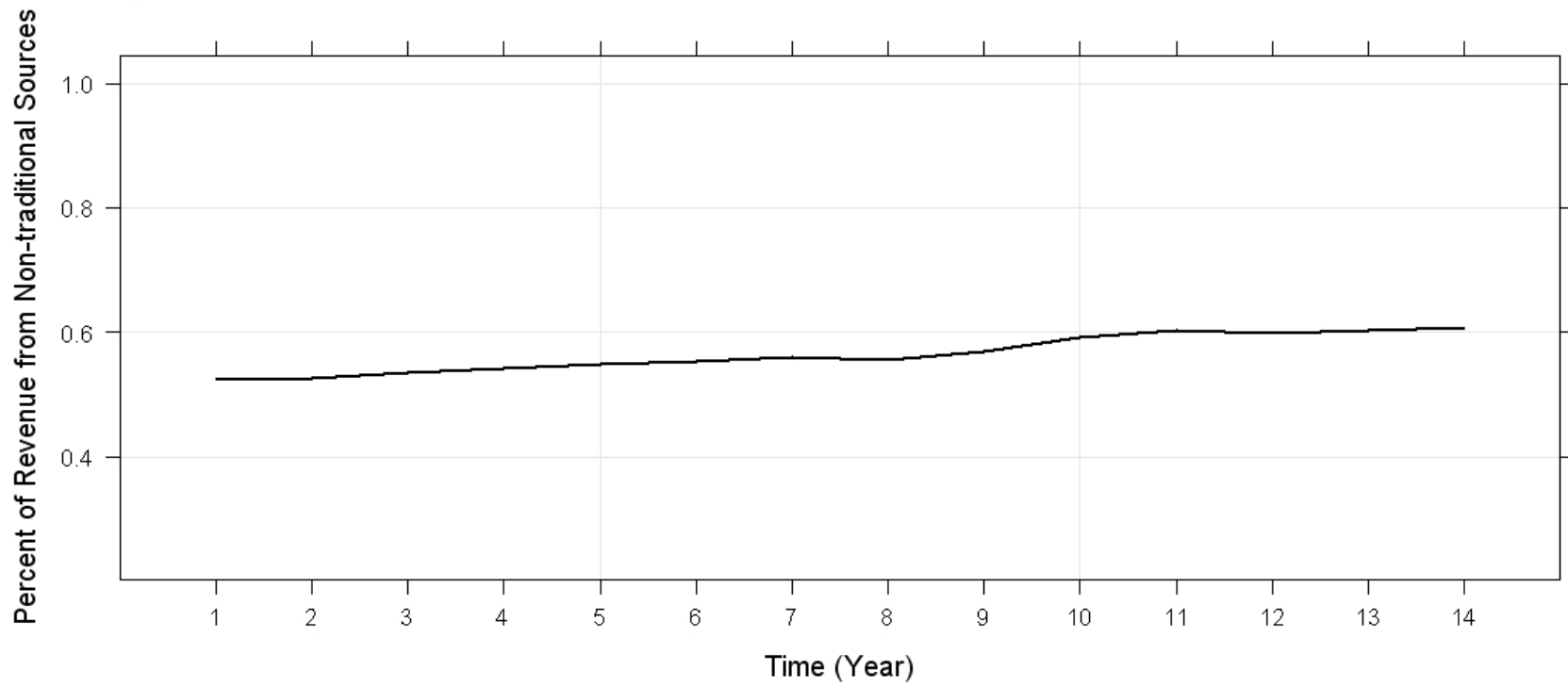
dollars, the descriptive analysis reveals that the increase was not due to increases in state appropriations. For all three prestige groups, state appropriation means decreased by 10 percent; meaning that the growth in tuition and fees made up for the decline in state appropriations and still grew by over 20 percent for rising institutions and RU2 institutions. Despite the decline in state appropriations, it is clear that the proportion of traditional revenues did not decline because of a decline in real dollars. All three groups' traditional revenue grew by at least 16 percent. Additionally, individual plots for each institution that increased in prestige were reviewed. The plots showed that none of the institutions' traditional revenue decreased over the period studied. The descriptive analysis confirms the assumption that if there was proportional growth in non-traditional revenues it did not occur due to declining revenues from traditional sources in real dollars.

Analysis I

Comparing rising institutions with their aspirational peers (RU1s) in the proportion of revenues from non-traditional sources over time.

Several analyses were conducted to answer the study's research question. The first step in any analysis is to examine graphical representations of the data. Figure 5 presents the mean proportion of revenue coming from non-traditional sources for all three prestige groups over time. The plot suggests that a linear model may be appropriate for modeling

Figure 5: Connected Means Plot of the Proportion of Revenue from Non-traditional Sources



the proportion of revenues coming from non-traditional sources. The plot also shows that the proportion of revenues coming from non-traditional sources increased over time.

Figure 6 compares RU1 and rising institutions' proportion of revenue from non-traditional sources. Based on Figure 6, it appears that the proportion of revenues coming from non-traditional sources differs by prestige group. There appears to be an intercept effect, meaning the prestige groups differ, with RU1 institutions having a higher overall intercept than rising institutions. The slope trajectories for both RU1 and rising institutions are similar, suggesting a similar behavior pattern. In sum, the graphical analysis suggests that both RU1 and rising institutions increased their proportion of non-traditional revenue over time. At the beginning of the study, however, rising institutions started with a lower proportion of their revenue coming from non-traditional sources and failed to increase this proportion at a greater rate than RU1 institutions.

Second, descriptive analyses were performed. Table 4 presents descriptive statistics for the variables included in the analyses. Descriptive statistics allow the researcher to understand and uncover patterns or abnormalities in the data. Descriptive statistics also allowed for a more detailed comparison between the two groups of interest. The descriptive statistics in Table 4 tell a similar story and support the inferences derived from the graphical representations of the data.

In the beginning year of the analysis, RU1 institutions' mean proportion of their revenue from non-traditional sources was 56 percent. Rising institutions' mean proportion of revenue from non-traditional sources, however, was only 45 percent. By the end of the period studied, RU1 institutions' mean proportion of their revenue from non-

Figure 6: Differences by Prestige Group in the Proportion of Revenue from Non-traditional Sources

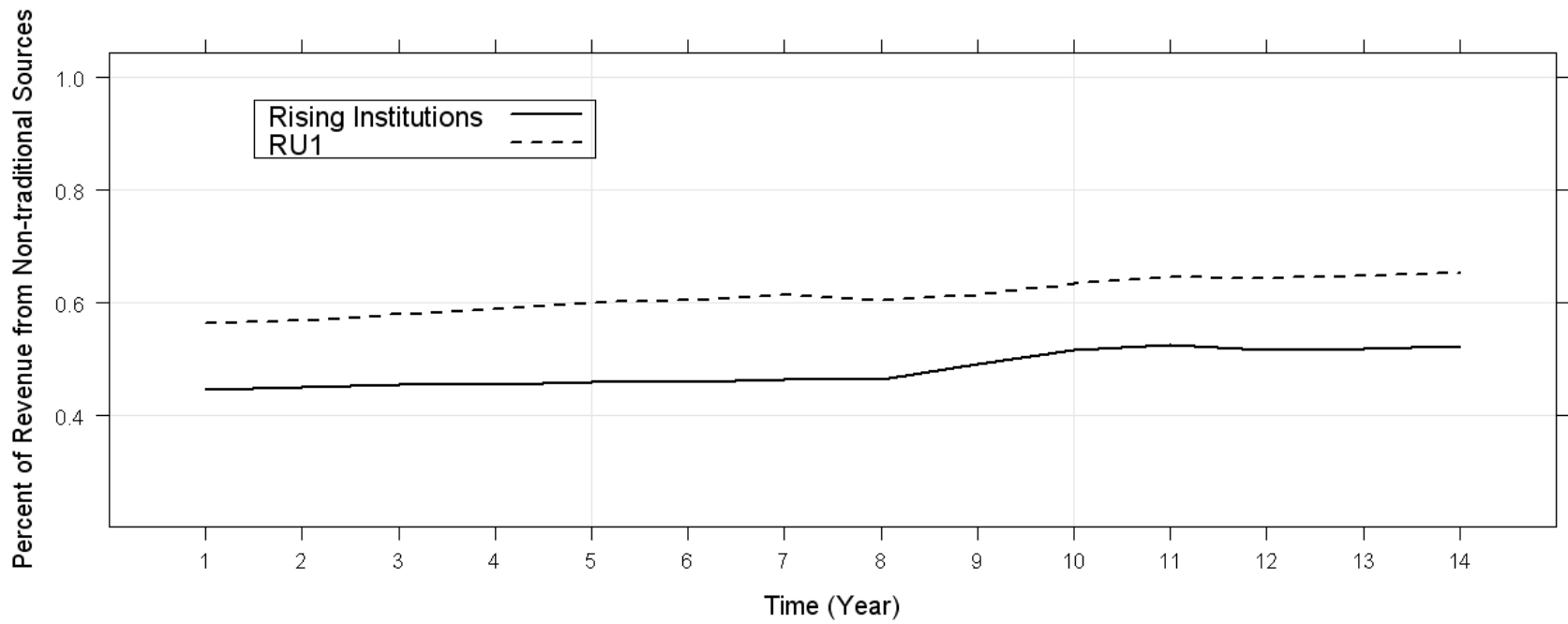


Table 4
Descriptive Statistics

Variable	Name	Time	RU2 (N=19)		Rising Institutions (N=37)		RU1 (N=67)		Time	F(2,120)
			Mean	SD	Mean	SD	Mean	SD		
Dependent	Revenue Diversification	1	0.45	(0.17)	0.45	(0.11)	0.56	(0.15)	1	10.03 ***
		2	0.47	(0.15)	0.45	(0.11)	0.57	(0.15)		
		3	0.49	(0.17)	0.46	(0.11)	0.58	(0.16)		
		4	0.52	(0.19)	0.46	(0.12)	0.59	(0.17)		
		5	0.52	(0.19)	0.46	(0.12)	0.60	(0.17)		
		6	0.51	(0.18)	0.46	(0.11)	0.60	(0.16)		
		7	0.53	(0.19)	0.46	(0.11)	0.61	(0.17)	7	11.52 ***
		8	0.50	(0.18)	0.47	(0.10)	0.61	(0.15)		
		9	0.51	(0.16)	0.49	(0.12)	0.61	(0.16)		
		10	0.52	(0.17)	0.52	(0.13)	0.63	(0.16)		
		11	0.55	(0.19)	0.53	(0.14)	0.65	(0.17)	14	8.89 ***
		12	0.54	(0.18)	0.52	(0.13)	0.64	(0.17)		
		13	0.55	(0.19)	0.52	(0.13)	0.65	(0.17)		
		14	0.56	(0.19)	0.52	(0.12)	0.66	(0.16)		

Variable	Name	Mean	Standard Deviation
<i>Independent</i>	Prestige	0.30	(0.45)
<i>Control</i>	Age	2.33	(0.83)
	Control	0.33	(0.46)
	Complexity	0.25	(0.43)
	Location	0.33	(0.68)

*** p < .001; ** p < .01; * p < .05

traditional sources had increased by 10 percent to 66 percent. At the same time, rising institutions increased their mean proportion of revenue from non-traditional sources by 7 percent to 52 percent. While mean revenues rose in constant per student dollars, the question remains: Did revenue from non-traditional sources increase as a proportion of total revenue at a faster rate for rising institutions compared to RU1 institutions controlling for other factors?

Table 5 presents the correlations between the proportion of revenue from non-traditional sources (revenue diversification), the control variables, and change in Carnegie classification (prestige). The results show that the proportion of revenue from non-traditional sources and change in Carnegie classification are negative related and that the relationship is statistically significant, $r(1706) = -0.30, p < .05$. The lower the Carnegie classification of an institution, the smaller proportion of an institution's revenue comes from non-traditional sources.

Additionally, the control of an institution was strongly related to the proportion of revenue from non-traditional sources, $r(1706) = 0.736, p < .05$, with private institutions having a higher proportion than publics. Having a medical school (Complexity) was also positively related and statistically significant, $r(1706) = 0.124, p < .05$. Finally, being located in an rural environment (Location), $r(1706) = -0.217, p < .05$, was negatively related and statistically significant.

To answer the research question, a linear-mixed model (LMM) was employed to examine the relationship between prestige and an institution's proportion of revenue from

**Table 5:
Correlation Matrix**

<i>Variable</i>	<i>Name</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Dependent	1 Revenue Diversification	1.000					
Independent	2 Prestige	-0.300 **	1.000				
Control	3 Age	0.034	0.000	1.000			
	4 Control	0.736 **	-0.190 **	0.125 **	1.000		
	5 Complexity	0.124 **	-0.136 **	-0.002	-0.003	1.000	
	6 Location	-0.217 **	0.147 **	0.125 **	-0.186 **	-0.174 **	1.000

*** p < .001; ** p < .01; * p < .05

non-traditional sources, while controlling for other factors identified by the conceptual framework. Throughout the discussion of the model-building process below, the models in *italics* referred to in the discussion correspond to the models displayed in Table 6 and Table 7. Not all of the models are displayed; Tables 6 and 7 are provided so that the reader can follow the model-building steps. Table 6 presents the models in LMM notation, and Table 7 presents the statistical results of the model building process

The first step in the modeling process is to examine the unconditional means model and the unconditional growth model (Singer & Willett, 2003; Raudenbush & Bryk, 2002).

$$(4.1) \quad Y_{ij} = \beta_1 + e_{ij}$$

The unconditional means model (Model 1) was significant, $t(1352) = 36.86$, $p < .001$), informing us that there is variation to be modeled in the response. The interclass correlation ($\hat{\rho} = .83$) shows that 83 percent of the variation in the response can be explained by differences between institutions.

The unconditional growth model (*Model 2*) has no predictors at any level other than time. The unconditional growth model focuses on the mean change of the entire population over time as was presented in Figure 4. In linear mixed model (LLM) terms, the hypothesis being tested by the unconditional growth model is that the slope ($\beta_2 = 0$) is zero. The test of the parameter reveals that we reject the null hypothesis (*Model 2*),

$$(4.2) \quad H_0 : \beta_2 = 0$$

$t(1351) = 29.44$, $p < .001$. The model also shows a drop in the residual variance from the unconditional mean model of 0.0022 to 0.0013 in the unconditional growth model.

Table 6: Analysis I

Taxonomy of Multilevel Models for Change in Proportion of Non-traditional Revenue in LMM notation

Model	Level-1/Level-2 Specification		
	Level-1 Model	Level-2 Model	Mixed Model
2	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + e_{ij}$	$\beta_{1i} = \beta_1$ $\beta_{2i} = \beta_2$	$Y_{ij} = \beta_1 + \beta_2t_{ij} + e_{ij}$
7	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + \beta_{3i}t_{ij}^2$ $+ \beta_{4i}(\sin(t_{ij})) + \beta_{5i}(\cos(t_{ij})) + e_{ij}$	$\beta_{1i} = \beta_1$ $\beta_{2i} = \beta_2$ $\beta_{3i} = \beta_3$ $\beta_{4i} = \beta_4$ $\beta_{5i} = \beta_5$	$Y_{ij} = \beta_1 + \beta_2t_{ij} + \beta_3t_{ij}^2$ $+ \beta_4(\sin(t_{ij})) + \beta_5(\cos(t_{ij})) + e_{ij}$
10	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + \beta_{3i}t_{ij}^2$ $+ \beta_{4i}(\sin(t_{ij})) + \beta_{5i}(\cos(t_{ij})) + e_{ij}$	$\beta_{1i} = \beta_1 + \beta_6Age_i + \beta_7Control_i + \beta_8Complexity_i$ $+ \beta_9Location_i + \beta_{10}Prestige_i + b_{1i}$ $\beta_{2i} = \beta_2 + b_{2i}$ $\beta_{3i} = \beta_3$ $\beta_{4i} = \beta_4$ $\beta_{5i} = \beta_5$	$Y_{ij} = \beta_1 + \beta_2t_{ij} + \beta_3t_{ij}^2 + \beta_4(\sin(t_{ij})) + \beta_5(\cos(t_{ij}))$ $+ \beta_6Age_i + \beta_7Control_i + \beta_8Complexity_i$ $+ \beta_9Location_i + \beta_{10}Prestige_i +$ $+(b_{1i} + b_{2i}t_{ij} + e_{ij})$
12	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + \beta_{3i}t_{ij}^2$ $+ \beta_{4i}(\sin(t_{ij})) + \beta_{5i}(\cos(t_{ij})) + e_{ij}$	$\beta_{1i} = \beta_1 + \beta_6Age_i + \beta_7Control_i + \beta_8Complexity_i$ $+ \beta_9Location_i + \beta_{10}Prestige_i + b_{1i}$ $\beta_{2i} = \beta_2 + \beta_{11}Age_i + \beta_{12}Control_i + \beta_{13}Complexity_i$ $+ \beta_{14}Location_i + \beta_{15}Prestige_i + b_{2i}$ $\beta_{3i} = \beta_3 + \beta_{16}Age_i + \beta_{17}Control_i + \beta_{18}Complexity_i$ $+ \beta_{19}Location_i + \beta_{20}Prestige_i$ $\beta_{4i} = \beta_4 + \beta_{21}Age_i + \beta_{22}Control_i + \beta_{23}Complexity_i$ $+ \beta_{24}Location_i + \beta_{25}Prestige_i$ $\beta_{5i} = \beta_5 + \beta_{26}Age_i + \beta_{27}Control_i + \beta_{28}Complexity_i$ $+ \beta_{29}Location_i + \beta_{30}Prestige_i$	$Y_{ij} = \beta_1 + \beta_6Age_i + \beta_7Control_i + \beta_8Complexity_i$ $+ \beta_9Location + \beta_{10}Prestige_i +$ $(\beta_2 + \beta_{11}Age_i + \beta_{12}Control_i + \beta_{13}Complexity_i$ $+ \beta_{14}Location + \beta_{15}Prestige_i)t_{ij} +$ $(\beta_3 + \beta_{16}Age_i + \beta_{17}Control_i + \beta_{18}Complexity_i$ $+ \beta_{19}Location + \beta_{20}Prestige_i)t_{ij}^2 +$ $(\beta_4 + \beta_{21}Age_i + \beta_{22}Control_i + \beta_{23}Complexity_i$ $+ \beta_{24}Location + \beta_{25}Prestige_i)(\sin(t_{ij})) +$ $(\beta_5 + \beta_{26}Age_i + \beta_{27}Control_i + \beta_{28}Complexity_i$ $+ \beta_{29}Location + \beta_{30}Prestige_i)(\cos(t_{ij})) +$ $(b_{1i} + b_{2i}t_{ij} + e_{ij})$

** Results of model fitting appear in Table 7: Analysis I

Table 7:
Analysis I: Multilevel Model Results ($N = 104$)

Parameter	Model 2 <i>df</i> (1351)			Model 7 <i>df</i> (1348)			Model 10 <i>df</i> (1257)			Model 12 <i>df</i> (1241)		
	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>
<i>Fixed</i> Intercept	0.5130	(.0154)	***	0.5222	0.0156	***	0.5129	0.0282	***	0.4947	0.0316	***
<i>Effects</i> Time	0.0070	(.0002)	***	0.0040	0.0010	***	0.0040	0.0010	***	0.0131	0.0034	***
Time ²				0.0002	0.0001	***	0.0002	0.0001	***	-0.0005	0.0002	**
sin(Time)				-0.0070	0.0012	***	-0.0070	0.0012	***	0.0021	0.0038	
cos(Time)				-0.0005	0.0012		-0.0005	0.0012		0.0018	0.0038	
Age							-0.0178	0.0099		-0.1044	0.0127	
Control							0.2616	0.0185	***	0.2451	0.0210	***
Complexity							0.0166	0.0187		0.0103	0.0213	
Location							-0.0063	0.0131		0.0049	0.0149	
Prestige							-0.0819	0.0181	***	-0.0710	0.0205	***
Age*Time										-0.0034	0.0012	**
Age*Time ²										0.0002	0.0000	**
Age*sin(Time)										-0.0008	0.0013	
Age*cos(Time)										-0.0006	0.0013	
Control*Time										0.0049	0.0023	*
Control*Time ²										-0.0002	0.0001	*
Control*sin(Time)										-0.0139	0.0025	***
Control*cos(Time)										0.0068	0.0025	**
Complexity*Time										0.0013	0.0023	

Table 7:
Analysis I: Multilevel Model Results cont.

Parameter	Model 2			Model 7			Model 10			Model 12		
	Mean	SE	Sig.	Mean	SE	Sig.	Mean	SE	Sig.	Mean	SE	Sig.
Complexity*Time ²										-0.0001	0.0001	
Complexity*sin(Time)										-0.0008	0.0013	
Complexity*cos(Time)										0.0021	0.0256	
Location*Time										-0.0036	0.0016	*
Location*Time ²										0.0002	0.0000	*
Location*sin(Time)										-0.0009	0.0017	
Location*cos(Time)										-0.0013	0.0017	
Prestige x Time										-0.0053	0.0022	*
Prestige x Time ²										0.0004	0.0001	***
Prestige x sin(Time)										-0.0060	0.0025	*
Prestige x cos(Time)										-0.0082	0.0025	***
							<i>Std. Dev.</i>	<i>Variance</i>		<i>Std. Dev.</i>	<i>Variance</i>	
<i>Random Effects</i> b_{1i}							0.0904	0.0082		0.0906	0.0082	
b_{2i}							0.0053	0.00002		0.0054	0.00002	
Goodness-of-Fit Statistics												
AIC	-4904			-5314			-5438			-5505		
BIC	-4889			-5272			-5369			-5331		
LogLik	2455			-2665			2732			2785		
χ^2	670	***					19	**		41	***	
df	1						1			5		
2log(BF)				15.72								

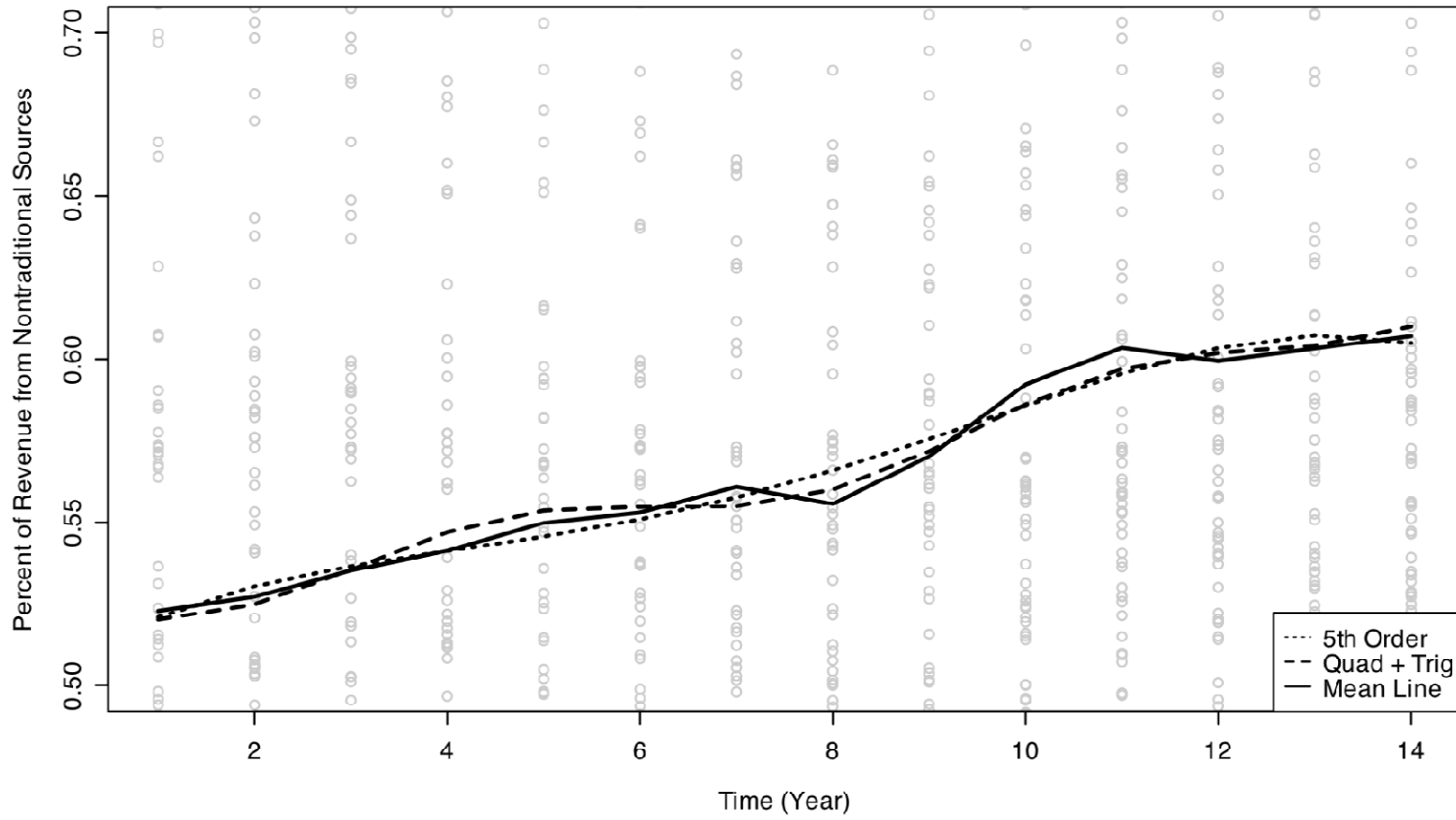
* $p < .05$; ** $p < .01$; *** $p < .001$

The decline reveals that 59 percent of the within institution variation in the response is systematically associated with time. The decline suggests that it may be worth adding theoretical predictors into the level-1 sub-model (Raudenbush & Bryk, 2002).

Next, polynomial time transformations were entered into the model one at a time and evaluated using the nested χ^2 test. Polynomials were tested until two in a row were found not to be statistically significant (Models 3-7). Time polynomials were found to be statistically significant to the 5th order (Model 6), $\chi^2(1) = 14, p < .001$. The use of the higher order polynomials raises concerns of interpretability. Due to the high-order polynomial that was found to fit the data and a review of the graphical analysis, it suggests that a trigonometric function may have been appropriate (Eubank & Speckman, 1990). The data were fitted with a combined quadratic and trigonometric function (*Model 7*), which was found to be a better fitting model, $BIC = -5272$, compared to the fifth order polynomial model ($BIC = -5010$). The results were also confirmed using $2\log(BF)$, which is based on the BIC and appropriate for non-nested models. A positive value indicates evidence for the trigonometric model, while a negative value indicates evidence for the 5th order model. The results support modeling the data using a trigonometric function, $2\log(BF) = 15.72$.

There are several reasons to use trigonometric and higher order polynomials to model the data. A key reason is that the trigonometric model may provide a better approximation to the data. Secondly, the trigonometric model is appropriate if there is reason to believe the trends reflect period effects or if there are cyclical trends in the data.

Figure 7: Plot of Nonlinear Trend Options



Higher education's revenues are contingent upon economic fluctuations, and these fluctuations are often cyclical, suggesting that a trigonometric model may be appropriate. Most often trigonometric functions are combined with lower-order polynomials, such as the quadratic, because the combined effect fits the observations at the edges of the study period better (Eubank & Speckman, 1990). The plot shown in Figure 7 suggests that the quadratic and trigonometric function is a better approximate to the mean line and fits the data better therefore, it was retained in the model (*Model 7*).

Next, random effects for intercepts and slopes were added into the model and evaluated (*Model 8*). Both the random effects for intercepts and slopes were statistically significant and retained in the model, $\chi^2(2) = 396, p < .001$.

$$(4.3) \quad Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_3 t_{ij}^2 + \beta_4 (\sin(t_{ij})) + \beta_5 (\cos(t_{ij})) + (b_{1i} + b_{2i} t_{ij} + e_{ij})$$

Predictors were next entered into the model. First, the control variables were added as a Group (*Model 9*).

$$(4.4) \quad Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_3 t_{ij}^2 + \beta_4 (\sin(t_{ij})) + \beta_5 (\cos(t_{ij})) + \beta_6 Age_i \\ + \beta_7 Control_i + \beta_8 Complexity_i + \beta_9 Location_i + (b_{1i} + b_{2i} t_{ij} + e_{ij})$$

Next, prestige was added (*Model 10*). The hypothesis being tested by adding prestige to the model is that there is no statistically significant difference in intercepts of the mean proportion of revenue from non-traditional sources by prestige group. The test of the parameter reveals that we reject the null hypothesis (*Model 10*),

$$(4.5) \quad H_0 : \beta_7 = 0$$

$t(1257) = -4.52, p < .001$. The test shows that the prestige groups differ in the proportion of revenue from non-traditional sources in the initial year of the study. Specifically,

rising institutions had a lower intercept than did RU1 institutions. The addition of prestige was also evaluated using the nested χ^2 test. The nested χ^2 test confirmed the previous results, $\chi^2(1) = 19, p < .001$. Institutional control also accounted for intercept differences, with privately controlled institutions having higher intercepts than publicly controlled institutions. Institutional control and prestige were the only predictors found that accounted for unique variance in the response (*Model 10*).

The last step in the model-building process was to add interaction terms for time and other predictors. Once again, the control variables were added to the model first (*Model 11*). Next, the prestige and time interactions were added to the model (*Model 12*). The hypothesis being tested by adding prestige and time interactions to the model is that the slope (the change in the proportion of non-traditional revenues) does not differ by prestige group. The multi-parameter χ^2 test reveals that we reject the null hypothesis (*Model 12*), $\chi^2(5) = 41, p < .001$. That is, rising and RU1 institutions' slopes differ in the proportion of revenue from non-traditional sources.

$$(4.6) \quad H_0 : \beta_{13} = \beta_{15} = 0$$

Both control and time interactions and prestige and time interactions were found to be significant at the linear, quadratic, sine, and cosine levels. When higher order polynomials are found to be significant, interpretation should be limited to the highest order polynomial and graphical evidence should be considered (Jeffrey Long, personal communication, November 13, 2008). Additionally, because the sine and cosine interactions are part of the same polynomial time transformation, the direction of the coefficients should be in agreement in order to be interpretable. In this case, the trigonometric polynomial interactions between time and prestige were both statistically

significant and both their coefficients are negative (sin = -0.006; cosine = -0.008), meaning that rising institutions did not increase at the same rate as RU1 institutions in their proportion of revenue from non-traditional sources. Simply put, they were losing ground to their new peers in the proportion of revenue from non-traditional sources, as was shown in Figure 5. No other interactions between time and predictors fit the criteria for interpretation outlined above. Once again, Table 7 shows that Model 12 is the final model.

The models were also analyzed using the weight of evidence (Burnham & Anderson, 2004). The weight of evidence is based on the Bayesian Information Criterion (BIC) of each model and can be interpreted as the approximate posterior probability of the model (Kadane & Lazar, 2004). BIC is a statistic used in model selection, when a researcher is trying to identify the best fitting model among a group of parametric models with differing numbers of parameters. Simply, it is a criterion for model selection. According to Schwarz (1978), BIC is calculated as: $BIC = -2 \ln(\mathcal{L}) + K \log(n)$, where \mathcal{L} is the maximized value of the likelihood function for the estimated model; K is the number of regressors (including the intercept); and n is the sample size.

To determine the weight of evidence, first we define the difference between the model with the smallest BIC value and all other models being compared: $\Delta_k = BIC_k - BIC_{min}$, [where BIC_{min} is the smallest value of the smallest BIC of the models under consideration], and BIC_k is the BIC for the k th model. The formula for the weight of

evidence is: $w_k = \frac{\exp(-.5 \cdot \Delta_k)}{\sum_{k=1} \exp(-.5 \cdot \Delta_k)}$, so that $0 \leq w_k \leq 1$, and $\sum w_k = 1$. Each of the models

discussed in the model building process are then plotted and evaluated. Burnham and

Anderson (2004) provide guidelines for interpreting Δ_k . A value under 2, provides substantial support for the model's fit. A value between 4 and 7 offers considerably less support, and a value greater than 10 essentially offers no support. Table 8 presents the model selection process utilizing the weight of evidence. There is only one model found below 2, the cutoff for substantial support, model 12. Both methodological approaches, (step-up and weight of evidence), support the final model.

In the final phase of the analysis, the assumptions of the linear mixed model were tested. To examine the assumptions, the predicted level-1 and level-2 random effects and the model residuals were checked for normality. Figure 8 shows density, Q-Q plots, and boxplots of the residuals and the level-1 and level-2 random effects. The graphs of the level-1 random effects reveal a relatively normal distribution with a single potential outlier at both the high and low ends, while the graphs for the level-2 random effects indicate that violation of normality is not an issue. The plots of the residuals show some evidence of non-normality, however, the departures do not appear to be extreme. The results of the diagnostics show that the tenability of the models assumptions is reasonable.

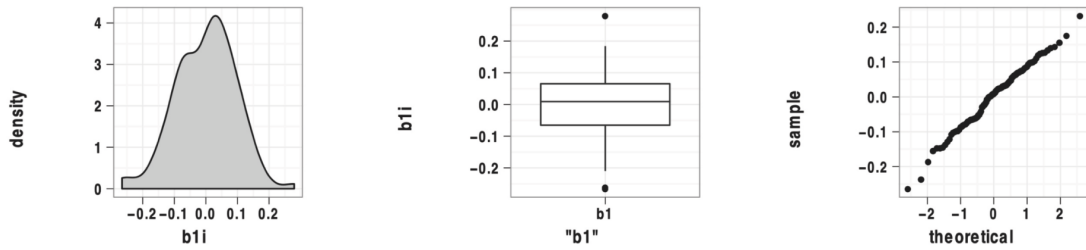
Table 8:
Weight of Evidence (Delta K) values – Analysis I

<i>Model</i>	<i>Delta K*</i>
1	1143
2	480
3	487
4	489
5	487
6	494
7	479
8	97
9	12
10	38
11	43
12	0

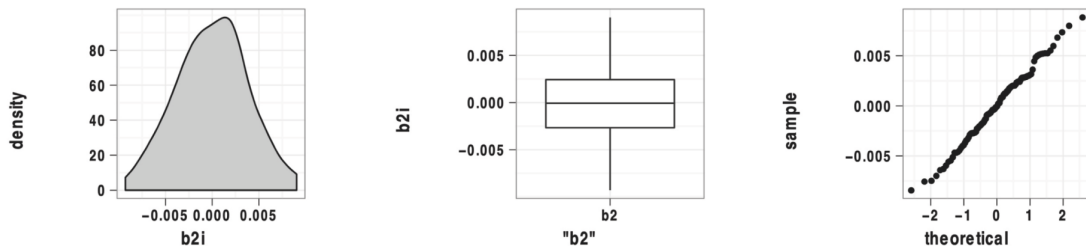
* Values are rounded

Figure 8:
 Analysis I – Level-1 Random Effects, Level-2 Random Effects, and Residual Plots

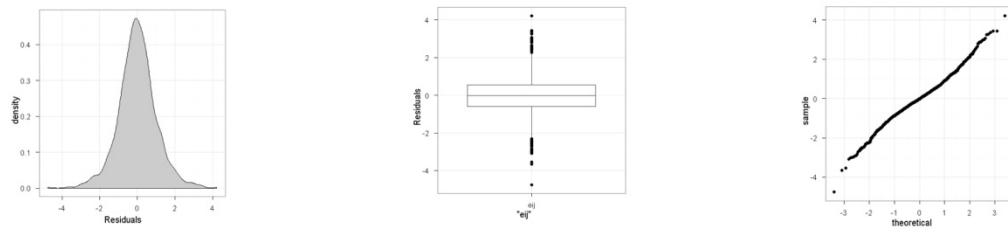
Level-1 Random Effects



Level-2 Random Effects



Residuals



Analysis II

Comparing institutions that increased in prestige (rising institutions) with their former peer institutions (RU2s) in the proportion of revenues from non-traditional sources over time.

In the first analysis, comparisons were made between RU1 and rising institutions. For the second analysis, rising institutions are compared to RU2 institutions, which have remained classified as RU2 institutions throughout the period of study.

The same exploratory methodology is utilized to compare rising institutions with RU2 institutions as was used in the previous analysis. The first step is to examine graphical representations of the data. Figure 9 displays the unconditional means plot of the proportion of revenue from non-traditional sources. The plot shows an upward slope over time, meaning institutions increased the proportion of their revenue from non-traditional sources. The trajectory of the slope suggests a linear model may be appropriate. Figure 10 shows that the proportion of revenue from non-traditional sources differs by prestige group, with RU2 institutions having a greater proportion of their revenue from non-traditional sources. While there appears to be no difference in the intercepts of the prestige groups, the slopes do appear to differ. Although both slopes increased, it appears that RU2 institutions increased at a greater rate than did rising institutions. It is not clear however, if these differences are statistically different.

Next, descriptive statistics were examined to understand and uncover patterns or abnormalities in the data. Table 4 presents the descriptive statistics. The descriptive

Figure 9: Connected Means Plot of the Proportion of Revenue from Non-traditional Sources

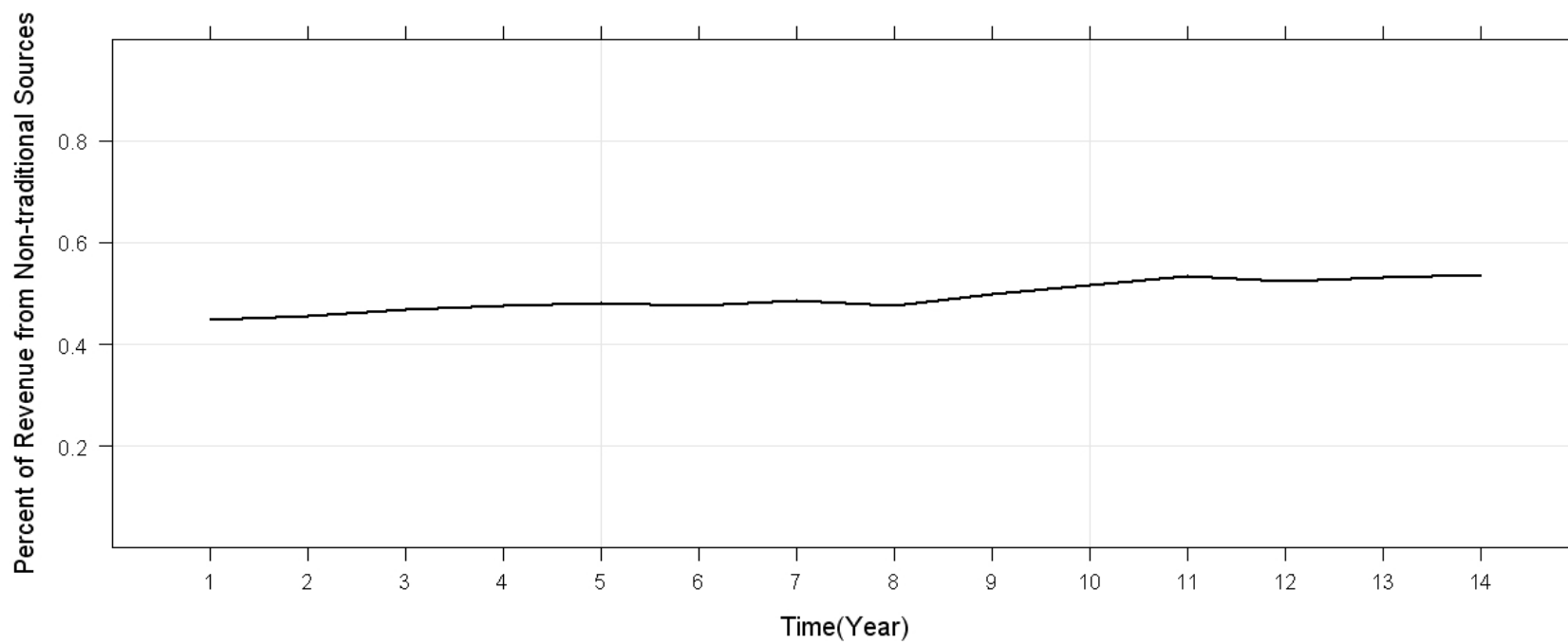
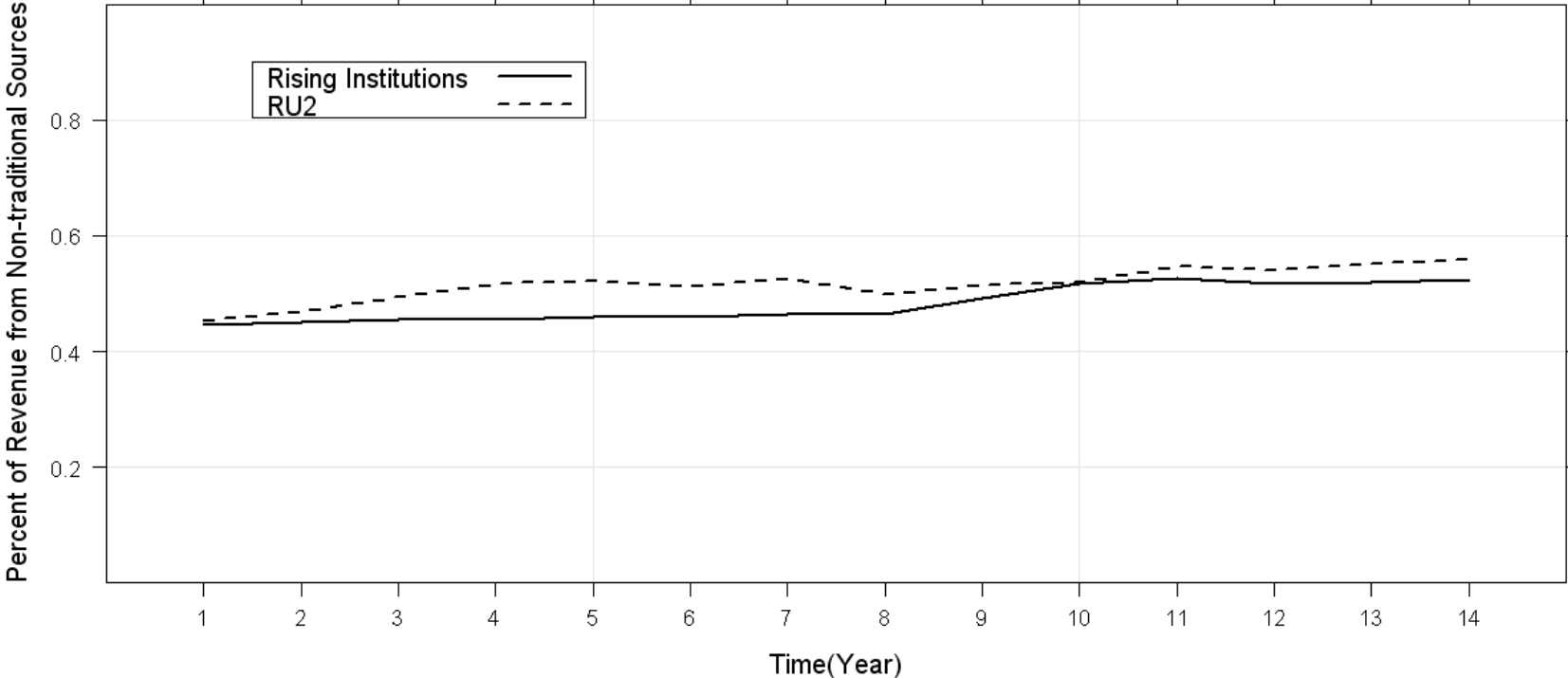


Figure 10: Differences by Prestige Group in the Proportion of Revenue from Non-traditional Sources



statistics support the inferences made from the graphical representations of the data. In the initial year of the study, both rising institutions and RU2 institutions' mean proportion of revenue from non-traditional sources was 45 percent. By the end of the period studied, rising institutions had increased the proportion of revenue coming from non-traditional sources to 52 percent. Over the same period, RU2 institutions increased the proportion of their revenue coming from non-traditional sources to 56 percent. While in the beginning year of the study, RU2 and rising institutions had the same proportion of revenue from non-traditional sources, by the final year examined RU2 institutions had a higher proportion of their revenue coming from non-traditional sources. The descriptive statistics support the inferences that were made concerning the graphical representations of the data.

In order to provide a more robust analysis, a linear-mixed model was used to examine the relationship between prestige and the proportion of revenue from non-traditional sources. The model also controls for other variables identified by the study's conceptual framework that may explain unique variation in the response variable. Table 9 presents the models in LMM notation, and Table 10 presents the results of the model comparison, and the final model (Model 8).

The first step in longitudinal modeling is to test the unconditional means model. The unconditional means model (Model 1) was found to be statistically significant, $t(728) = 27, p < .001$, meaning that there is significant variation to be modeled in the response. Specifically, the interclass correlation ($\hat{\rho} = 0.61$) shows that 61 percent of the variation in the response can be explained by differences between institutions. Next the

unconditional growth model was tested (*Model 2*). The unconditional growth model contains no predictors other than time. The test of the unconditional growth model tests if the mean trajectory is flat. The mean trajectory was presented in Figure 9. If time is not statistically significant, than a LMM is not needed, and a regression model may be appropriate. In linear mixed model (LLM) terms, the hypothesis being tested by the unconditional growth model is that the slope ($\beta_2 = 0$) is statistically different than zero.

$$(4.7) \quad H_0 : \beta_2 = 0$$

The test of the parameter reveals that we reject the null hypothesis, $t(727) = 17, p < .001$.

The mean growth trajectory is not flat and therefore, time is included (*Model 2*).

Following the step-up approach recommended for exploratory analysis (Raudenbush & Bryk, 2002; Singer & Willet, 2003), polynomial time transformations were next entered into the model one at a time. Polynomials were tested until two in a row were found not to be statistically significant using the nested χ^2 test (Models 3 & 4). No higher order time polynomials were found to be statistically significant, meaning that a linear model was appropriate for the data.

Fourth, random effects for intercepts and slopes were added to the model. The random effects for intercepts and slopes were statistically significant and were retained in the model (Model 5), $\chi^2(2) = 159, p < .001$, suggesting that the institutional variation in intercepts and slopes may be able to be accounted for by relevant predictors.

$$(4.8) \quad Y_{ij} = \beta_1 + \beta_2 t_{ij} + (b_{1i} + b_{2i} t_{ij} + e_{ij})$$

Fifth, the control variables were entered into the model (*Model 6*).

$$(4.9) \quad Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_6 Age_i + \beta_7 Control_i + \beta_8 Complexity_i \\ + \beta_9 Location_i (b_{1i} + b_{2i} t_{ij} + e_{ij})$$

Table 9: Analysis II

Taxonomy of Multilevel Models for Change in Proportion of Non-traditional Revenue in LMM notation

Model	Level-1/Level-2 Specification		Mixed Model
	Level-1 Model	Level-2 Model	
2	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + e_{ij}$	$\beta_{1i} = \beta_1$ $\beta_{2i} = \beta_2$	$Y_{ij} = \beta_1 + \beta_2t_{ij} + e_{ij}$
6	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + e_{ij}$	$\beta_{1i} = \beta_1 + \beta_3Age_i + \beta_4Control_i + \beta_5Complexity_i$ $+ \beta_6Location_i + b_{1i}$ $\beta_{2i} = \beta_2 + b_{2i}$	$Y_{ij} = \beta_1 + \beta_2t_{ij} + \beta_3Age_i + \beta_4Control_i +$ $\beta_5Complexity_i + \beta_6Location_i$ $+ (b_{1i} + b_{2i}t_{ij} + e_{ij})$
8	$Y_{ij} = \beta_{1i} + \beta_{2i}t_{ij} + e_{ij}$	$\beta_{1i} = \beta_1 + \beta_3Age_i + \beta_4Control_i + \beta_5Complexity_i$ $+ \beta_6Location_i + b_{1i}$ $\beta_{2i} = \beta_2 + \beta_7Age_i + \beta_8Control_i + \beta_9Complexity_i$ $+ \beta_{10}Location_i + b_{2i}$	$Y_{ij} = (\beta_1 + \beta_3Age_i + \beta_4Control_i + \beta_5Complexity_i$ $+ \beta_6Location_i) + (\beta_2 + \beta_7Age_i + \beta_8Control_i$ $+ \beta_9Complexity_i + \beta_{10}Location_i)t_{ij}$ $+ (b_{1i} + b_{2i}t_{ij} + e_{ij})$

* Results of model fitting appear in Table 10: Analysis II

Table 10:
Analysis II: Multilevel Model Building Results ($N = 56$)

Parameter	Model 2 <i>df</i> (727)			Model 6 <i>df</i> (680)			Model 8 <i>df</i> (680)		
	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>	<i>Mean</i>	<i>SE</i>	<i>Sig.</i>
<i>Fixed Effects</i>									
Intercept	0.4424	0.0184	***	0.4284	0.0371	***	0.3924	0.0437	***
Time	0.0068	0.0003	***	0.0068	0.0008	***	0.0084	0.0026	***
Age				-0.0247	0.1525		-0.0149	0.0169	
Control				0.2350	0.0291	***	0.2239	0.0350	***
Complexity				-0.0039	0.3776		0.0181	0.0420	
Location				0.0053	0.0161		0.0126	0.0179	
Age*Time							-0.0013	0.0010	
Control*Time							0.0043	0.0021	*
Complexity*Time							-0.0030	0.0025	
Location*Time							-0.0010	0.0010	
<i>Random Effects</i>				Std. Dev.	Variance		Std. Dev.	Variance	
	b_{1i}			0.1003	0.01006		0.0998	0.0099	
	b_{2i}			0.00003	0.00579		0.0056	0.00003	
<i>Goodness-of-Fit Statistics</i>									
	AIC	-2414		-2609			-2609		
	BIC	-2400		-2567			-2539		
	LogLik	1210		1313			1320		
	χ^2	262	***	46	***		12	*	
	<i>df</i>	1		4			6		

* $p < .05$; ** $p < .01$; *** $p < .001$

Next, prestige was added to the model (Model 7). Again, the hypothesis being tested is if there is a statistically significant difference in the mean proportion of revenue from non-traditional sources by prestige group at the beginning of the study. The test of the parameter reveals that we fail to reject the null hypothesis (Model 7), $t(680) = 1.84$, $p = .06$. The test shows that the prestige groups did not differ in the proportion of revenue

$$(4.10) \quad H_0 : \beta_4 = 0$$

from non-traditional sources in the initial year of the study. Specifically, the results show that there was no statistical difference in intercepts for rising and RU2 institutions. The addition of prestige was evaluated using the nested χ^2 test. The nested χ^2 test shows that Model 6 fit the data better than Model 7, which included prestige, $\chi^2(1) = 3.4$, $p = .06$. Institutional control was the only predictor found to account for a statistically significant difference in intercepts, with private institutions having higher intercepts than public institutions.

Finally, interaction terms for time and static predictors were added to the model. Once again, the control variables and time interactions were added to the model first (Model 8). Next, the prestige and time interaction was added to the model (Model 9). The hypothesis being tested by adding the prestige and time interaction is that the slope (the change in the proportion of non-traditional revenues) does not differ by prestige group. The multi-parameter χ^2 test reveals that we fail to reject the null hypothesis, and that Model 8 was statistically a better fitting model than Model 9; $\chi^2(2) = 5.9$, $p = .52$, which included the time-by-prestige interaction.

$$(4.11) \quad H_0 : \beta_{13} = \beta_{15} = 0$$

The interaction between time and control was the only variable found to explain significant variation in the response's mean change over time, $t(680) = 6.5, p < .001$. Once again, prestige was not found to account for unique variation in the slopes, suggesting that rising institutions were no better than their RU2 peers in obtaining a greater proportion of their revenue from non-traditional sources. Table 6 presents the final model (*Model 8*), and the results of the model building process.

To provide further confirmation of the final model (*Model 8*), the selection of the final model was also conducted using the "weight of evidence" approach (Burnham & Anderson, 2004). Table 11 presents the model selection process utilizing the weight of evidence. Only one model, (*Model 8*) is found below 2, the cutoff for substantial support. Both methodological approaches agree in their selection of the final model.

In the last phase of the analysis, the assumptions of the linear mixed model were examined. The predicted level-1 and level-2 random effects, as well as the model residuals, were tested for normality. Figure 11 shows density, Q-Q plots, and boxplots of the level-1 and level-2 random effects and the residuals. The boxplots for the level-1 random effects show a potential outlier at both the high and low end, while the boxplots for the level-2 random effects show a potential outlier at the high end and two potential outliers at the low end. The Q-Q plots for both random effects show slight non-normality. The residuals, however, show more evidence of non-normality. The boxplot shows several outliers, and the Q-Q plot reveals deviations from normality. These deviations are probably influenced by the large number of outliers relative to the small number of

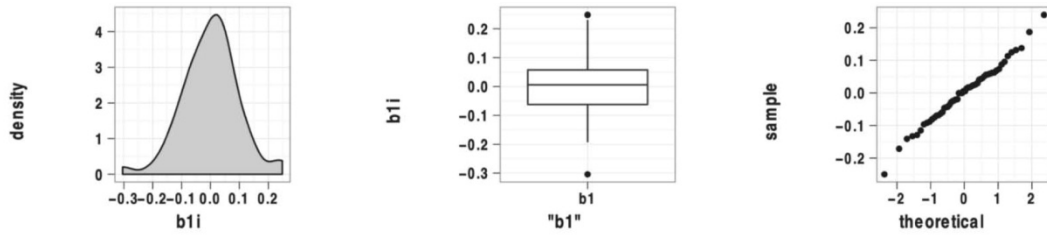
Table 11:
Weight of Evidence (Delta K) values – Analysis II

<i>Model</i>	<i>Delta K*</i>
1	423
2	167
3	173
4	179
5	20
6	20
7	3
8	0
9	27

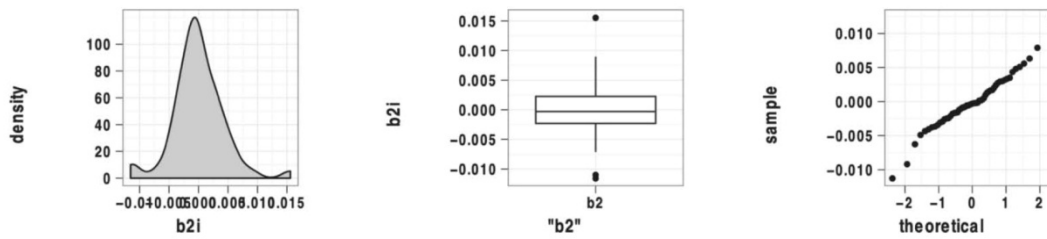
* Values are rounded

Figure 11:
Analysis II - Level-1 Random Effects, Level-2 Random Effects, and Residual Plots

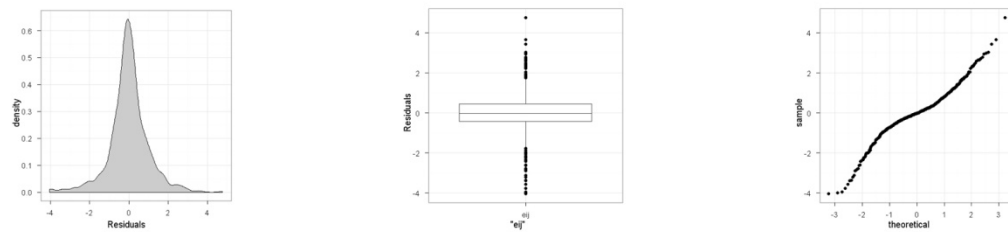
Level-1 Random Effects



Level-2 Random Effects



Residuals



institutions included in Analysis II (N = 56). Given the fit of the level-1 and level-2 random effects, and the small number of institutions included in the analysis, the moderate asymmetry of the residuals is not sufficient to cast serious doubt on the plausibility of the normality assumption (Long, 2011).

The analysis suggests that rising institutions were not statistically different than their RU2 peers in increasing the proportion of their revenue from non-traditional sources over time. Specifically, their growth rate was not statistically different than RU2 institutions, suggesting rising institutions' new found prestige was not associated with greater growth in the proportion of their revenue from non-traditional sources compared to their peers.

Summary

The research question addressed by the study is: How are changes in institutional prestige related to changes in an institution's revenue diversification? The study's research question is operationalized as: Did institutions that rose in Carnegie Classification (rising institutions) distinguish themselves from their RU2 peer institutions and become more like their aspirational peers (RU1s) in the proportion of their revenue coming from non-traditional sources? Based upon the review of the existing theory and literature, the study proposed four hypotheses related to the study's research questions. The following section discusses the results of the study's analyses and presents these results in the context of the proposed hypotheses.

1. Rising institutions will initially show a lower proportion of their revenue from non-traditional sources compared to RU1 institutions. The results of the analysis show

that rising institutions' proportion of non-traditional revenue was lower than RU1 institutions' at the beginning of the study. Figure 6 shows the difference by prestige group in the mean proportion of revenue coming from non-traditional sources. In the beginning year of the study, rising institutions' mean proportion of revenue from non-traditional sources was 45 percent, while RU1 institutions' was 56 percent. The statistical analysis showed (Model 10) that prestige was significant in explaining differences in the proportion of non-traditional revenue at the beginning of the study, with rising institutions having a lower proportion than RU1 institutions. The analysis supports the study's hypothesis that rising institutions did initially demonstrate receiving a lower proportion of their revenue from non-traditional sources compared to RU1 institutions.

2. *Rising institutions will show faster growth in their proportion of non-traditional revenue sources than RU1 institutions.* Contrary to the study's a priori hypothesis, rising institutions failed to grow their revenue from non-traditional sources at a faster pace than RU1 institutions. Figure 6 suggests that rising institutions were actually losing ground to existing RU1 institutions over time in the proportion of their revenue from non-traditional sources. While both groups increased their proportion of non-traditional revenue, RU1 institutions' grew by 18 percent, while rising institutions' grew by only 16 percent. Additionally, the statistical analysis showed that prestige explained statistically significant differences in the proportion of revenue from non-traditional sources over time, with rising institutions having a slower rate of growth (Model 12).

3. *Rising institutions will initially show no difference in their proportion of revenue from non-traditional sources compared to RU2 institutions.* The results show that the proportion of revenue from non-traditional sources was not statistically different

for rising and RU2 institutions at the beginning of the study. To test this hypothesis, plots of the mean proportion of revenue from non-traditional sources were examined. Figure 10 shows that there is little difference between prestige groups in time 1 (the initial year of the analysis) in their proportion of non-traditional revenue. In fact, both rising and RU2 institutions' proportion of non-traditional revenue was 45 percent. The results of the analysis confirmed these findings. The analysis showed that prestige was not significant in explaining differences in the mean proportion of revenue from non-traditional sources at the beginning of the study (Model 9), meaning that RU2s and rising institutions were correctly classified as peer institutions.

4. *Rising institutions will demonstrate growing their proportion of non-traditional revenue sources at a faster pace than RU2 institutions.* Contrary to the study's hypothesis, the results show that rising institutions failed to increase their proportion of revenue from non-traditional sources at a faster pace than RU2 institutions. While both rising and RU2 institutions started with the same proportion of their revenue from non-traditional sources, Figure 10 shows that rising institutions actually lost ground to their former peers over time. Descriptive statistics revealed a similar trend. Rising institutions increased the proportion of their revenue from non-traditional sources to 52 percent. RU2 institutions, however, increased their proportion of non-traditional revenue to 56 percent. While the graphical and descriptive analysis suggested that rising institutions lost ground over time to their former RU2 peers in the proportion of their revenue from non-traditional source, the results of the statistical analysis show that the difference was not statistically significant. Model 8 shows that rising institutions failed to outpace their former RU2 peers in the proportion of their revenue from non-traditional

sources over time. These findings were contradictory to the study's a priori hypothesis.

The results of the analyses show that rising institutions' proportion of their revenue coming from non-traditional sources was lower initially than RU1 institutions. During the period studied, and despite their gain in prestige, rising institutions did not close the gap with RU1s (their aspirational peers) in the proportion of their revenues from non-traditional sources. Rather, the rising institutions fell further behind their new peers. Furthermore, rising and RU2 institutions were not statistically different in the proportion of revenue that came from none traditional sources at the beginning of the study. Nor, did rising institutions rate of growth outpace RU2 institutions. These findings contradict current institutional assumptions and behavior, and suggest implications for theory and practice, which are presented in chapter five. Finally, these findings create opportunities for future research regarding the relationship between prestige and an institution's ability to increase their revenues from non-traditional sources.

Chapter V

Summary of Findings

In 1978 Pfeffer and Salancik introduced resource dependency theory to help explain organizational behavior. Resource dependency theory states that the survival and the success of institutions depend on their ability to maintain and acquire resources from an unstable environment. Pfeffer and Salancik (1978) note that an institution's dependency "makes the external constraint and control of organization behavior both possible and inevitable" (p. 43). Institutions, however, are always seeking to reduce their dependency on outside organizations and increase their autonomy. Perrow (1961) theorized that organizations could mitigate this control and increase their autonomy by pursuing prestige, which would result in increasing revenue streams. O'Meara (2007) agrees with Perrow stating, "with prestige comes more resources, which help the institution gain more prestige, which brings more resources and on and on" (p.129).

The pursuit of prestige by higher education institutions has been documented for almost a century (Veblen, 1918; Veblen, 1993). The pursuit of prestige can be identified with the endless pursuit of revenue. Increasingly, public higher education is being described by words like marketization, commodification, privatization, and academic capitalism (Bok, 2003; Pusser, 2002; Slaughter & Leslie, 1997). These labels attempt to capture a shift in the behavior of public higher education. The public good characteristics that defined the social compact, are threatening to be replaced by characteristics of industry (Gumport, 2001; Kezar, 2004). Slaughter and Leslie (1997) note that a profit motive that has crept into the academy. These efforts to secure external funds have now

infiltrated the core educational, research, and service missions of the institution (Rhoades & Slaughter, 2004). All over the country, plans to build research parks are underway, technology transfer offices are being opened, and new patents are being filed, despite evidence that they fail to break even (Carlson et al., 2001). The question remains, however, is it working?

This study asks: How are changes in institutional prestige related to changes in an institution's revenue diversification? The study's conceptual framework suggests that prestige provides institutions with a competitive advantage by differentiating themselves from their peers. The study hypothesized that institutions that increase in prestige experience changes in their funding profiles. Specifically, the study hypothesized that rising institutions increase their proportion of revenue from non-traditional sources at a faster pace than RU1 and RU2 institutions. The study's findings suggest, however, that increasing in prestige does not lead to greater revenue diversification, relative to other institutions'.

In response to the study's research question, the first analysis showed that increasing in prestige accounted for differences in the percent of revenue from non-traditional sources at the beginning of the study, and the rate at which the proportion of revenue from non-traditional sources increased. The model showed that rising institutions' proportion of revenue from non-traditional sources was statistically lower than RU1 institutions at the beginning of the study. The model also showed that, over the 21-year period studied, rising institutions lost ground to RU1 counterparts in the proportion of their revenue from non-traditional sources. Specifically, rising institutions had a statistically significant lower slope than did their new peer institutions.

Additionally, the second analysis showed that rising institutions were no different from RU2 institutions in their proportion of revenue from non-traditional sources. Over the 21 years examined by the study, rising institutions also failed to differentiate themselves from RU2 institutions in the proportion of revenue from non-traditional sources. Increasing in prestige failed to provide rising institutions with a competitive advantage in capturing a greater proportion of their revenue from non-traditional sources relative to the former peers.

In summary, the study's findings suggest that increasing in prestige is not related to an institution's ability to increase the proportion of its revenues from non-traditional sources relative to RU2 institutions. The findings also show that despite increasing in prestige, these newly classified institutions failed to keep pace with RU1 institutions, their aspirational peers. In fact, they actually lost ground in the proportion of their revenues from non-traditional sources. Simply, rising institutions were unable to match the pace that RU1 institutions set at increasing their proportion of revenue from non-traditional sources.

In the sections that follow, the study's findings and their implications for theory, policy, and practice are discussed. Next, the study's limitations are presented. Finally, directions for future research are outlined. The chapter ends with conclusions drawn from the study.

Implications for Theory

In chapter two, multiple theoretical approaches were presented in order to frame the problem and provide the foundation for the study. The findings and conclusions of the

study build on the current literature and offer additional insights into these perspectives. These perspectives are re-introduced and combined with the study's findings and conclusions to provide a better understanding of the relationship between prestige and revenue diversification.

Resource dependency theory shows that institutions do not act in a vacuum, but their survival and the success is dependent on their ability to maintain and acquire resources from an unstable environment. Pfeffer and Salancik (1978) note that an institution's dependency "makes the external constraint and control of organization behavior both possible and inevitable" (p. 43). Hansbrouck (1997) states that Pfeffer and Salancik view organizations as involved in a constant struggle for autonomy. These views were reinforced in the review of the literature. The environment, however, is always changing, and as a result new actors enter and exit. For higher education, two new entries into the environment would have a lasting impact: the amount of new money that entered the environment between 1970 and 2005 (higher education spending grew from 2 percent of GDP to 2.6 percent), and the entry of external validating organizations, such as *U.S. News & World Report*.

Initially, both represented an opportunity for institutions to reduce their dependency on traditional revenue sources by increasing the proportion of their revenue from non-traditional sources. Institutions that can increase their proportion of revenue coming from non-traditional sources increase the likelihood of their survival and success. External validating agencies became key to this process, as their stamp of approval signified legitimacy. The analyses confirm that institutions attempted to increase the proportion of revenue from non-traditional sources. Over the twenty-year period studied,

both traditional and non-traditional revenues increased, however the revenue from non-traditional sources increased at a higher rate and occupied a larger proportion of their revenues. These new revenue sources offered institutions, such as the University of Virginia, a chance to reduce their dependency on traditional revenue sources, such as state appropriations, which declined by 10 percent over the period in constant per student dollars. The University of Virginia (an RU1 institution), which asked to be a chartered institution in 2004 in exchange for more autonomy from the state, increased the proportion of revenues from non-traditional sources from 46 percent in 1987 to 77 percent in 2007.

The theory of strategic balance (Deephouse, 1999) explains how institutions responded to these new actors in the environment. Deephouse's (1999) theory of strategic balance says that organizations benefit from being different because they face less competition, but firms also benefit from being the same because they are seen as being more legitimate. Initially, institutions may have seen the increased revenue sources and validating agencies as an opportunity to differentiate themselves from their competitors, thereby increasing their survival and success. The success of these initial institutions, such as the University of Michigan, in differentiating themselves led to the emergence of a new class of elite public research institutions.

Over time however, as these external validating organizations garnered increased attention, they also became a source of legitimization. The cost of not being seen as the same, and therefore not legitimate, may have forced institutions to pursue prestige in order to survive. The study's findings show that the differences in the rate of growth in the proportion of revenue from non-traditional sources between existing RU2 institutions

and rising institutions was statistically no different than zero. The results suggest that institutions are behaving similarly. It appears that these institutions as a group were attempting to increase their prestige and the proportion of their revenue from non-traditional sources.

The theory of isomorphism suggests the role that legitimacy plays in informing institutional behavior. Isomorphism describes how institutions become homogenous. DiMaggio and Powell (1983) theorized that this occurs by three mechanisms: coercive, mimetic, and normative. External validating agencies are able to apply formal and informal pressures, because the organization is dependent upon their endorsement. Institutions also become more similar due to the ambiguity of their missions. Mission ambiguity has led to the duplication of programs and to reduction in the diversity of institutions (Morphew, 2009). Increased competition has led to institutions' attempting to mimic other organizations in their field that have been deemed successful or legitimate, resulting in isomorphism. Morphew and Baker's (2004) showed that as institutions increase in prestige, their expenditure patterns (priorities) become less like those of the institutions they were trying to mimic. The present analysis hypothesized that the same would be true of their revenue streams. While rising institutions experienced growth in the proportion of revenue from non-traditional sources, they failed to keep pace with RU1 institutions.

Bowen's (1980) theory on the costs of higher education offers insights into the implications of the previous theories on institutional behavior. Bowen suggested that the dominant goal of institutions is prestige, and there is virtually no limit to the amount of money an institution could spend to achieve this goal. The cumulative effect of Bowen's

laws is toward ever-increasing institutional expenditures. These changes in institutional behavior do not occur within a vacuum. The pursuit of prestige leads to waste. Bowen (1980) notes that these ever-increasing expenditures add no value to the core production functions of higher education, and “are basically moves in a zero sum game. They force competitors to make similar expenditures with the result that all the players are worse off while their relative positions remain about unchanged” (p. 23).

The study’s research findings support Bowen’s theory. Rising institutions inability to close the gap with the RU1 institutions in the proportion of revenues coming from non-traditional sources, and their inability to separate themselves from the RU2 counterparts indicates that increasing in prestige was unrelated to an institution’s relative position. The study’s findings suggest that institutions chasing elite institutions are running on a treadmill, except they are not staying in place; they are losing ground over time to the elite institutions in the proportion of revenue from non-traditional sources.

Perrow’s (1961) theory of prestige supplements the previous theories. Perrow noted that highly technical organizations tend to utilize indirect measures of quality, and because the quality of the product cannot be measured, these agencies’ acknowledgement of quality becomes even more important in a highly competitive environment. This is certainly true for higher education institutions, where the quality of the output is almost universally measured by inputs rather than by value added. For institutions these acknowledgements of quality and their associated legitimacy were key to trying to survive in a highly competitive environment. Perrow’s theory would suggest that like, patients at a hospital, the public is unable to judge the quality of benefits they receive from higher education, and instead focuses on extrinsic aspects. As a result, these

extrinsic items become a priority and divert key resources away from higher education's core production function, undergraduate education. Relying on external validating agencies for acknowledgement of the institutions' quality, also leads to institutions' becoming less dependent on controlling organizations as they gain new revenue streams through their new found prestige.

Perrow theorized that prestige would lead to greater resource independence for organizations. This study's results present a different picture. While rising institutions did increase the proportion of revenue from non-traditional sources, they did not do so at a statistically faster rate different rate than RU2 institutions, which did not experience a change in prestige. Perrow also suggested that increases in prestige would negatively impact an organization's core production function. As was previously presented, there is growing antidotal and empirical evidence to suggest that public institutions are sacrificing the undergraduate teaching mission of the institution in an attempt to pursue prestige. For example, Morpew and Baker (2004) showed that institutions that increased in prestige spent less on instructional expenditures and more on administrative costs. Future research is needed to explore Perrow's theory on the impact of prestige on the core production function of public higher education.

Implications for Policy

The study's findings have implications for higher education policy at the state and national level and expand on the growing body of literature that Morpew and Baker (2004) identify as "the organizational behavior that accompanies aspiration" (p. 382). O'Meara (2007) states that research on the impact of prestige on institutional behavior

“has a direct audience amongst” (p. 123) state systems of higher education. Institutional aspirations to increase their prestige relative to their peers has led public research universities to behave more like an industry rather than a social institution, and has fostered a growing disconnection between institutions and their stakeholders. The study’s findings are helpful for understanding how the pursuit of prestige is related to institutional behavior, and may help frame the accountability conversation.

State higher education leaders are responsible for coordinating higher education institutions within the state to meet the diverse state needs. Aspirational behavior by public institutions has led to a decrease in institutional differentiation within states and a shift away from the state priority of undergraduate instruction (Morphew & Baker, 2004; Morphew, 2005). The study’s findings show that pursuit of prestige by institutions is unrelated to the proportion of revenues an institution received from non-traditional sources. Additionally, institutions that increase in prestige fail to achieve their goal of becoming more similar to existing elite institutions, in fact they are falling further behind in the proportion of revenue from non-traditional sources. They also fail to differentiate themselves from their peers in their proportion of non-traditional revenue. The study’s findings support Morphew’s conclusions and suggest that the pursuit of prestige by institutions may be a fruitless pursuit for institutions attempting to diversify their revenue.

A recent analysis by *The Chronicle of Higher Education* (Wilson & Brainard, 2011) provides support for these hypotheses. The analysis showed that of the top 100 universities receiving federal research dollars in 1999, 27 of these institutions doubled their own spending on research over the next decade. Of these 27, almost half fell in the

federal research rankings. Yet, these increases in spending occurred during a period of declining state appropriations and an economic recession. Additionally, these increases in spending occurred while presidents often bemoaned the lack of state support. While it is unclear if these new expenditures generated more revenue than was invested, it is clear that these new expenditures may have been shifted to research at the expense of other programs and priorities, as Morphew and Baker (2004) have illustrated.

These shifts are contributing to the disconnection between the public, state leaders, and public higher education. State policymakers may be able to slow these institutional trends by more specifically defining institutional missions and preventing increases in programming. By specifically defining missions to the diverse needs of the state (for example limiting the number of institutions participating in federal research or offering doctoral degrees), they can limit an institution's attempt to increase non-traditional revenues, thereby increasing their control over the institutions. Focusing on increasing control over institutional missions, may help to end the disconnection between state and institutional priorities and maintain the diversity of higher education that is needed in the state.

Implications for Practice

Institutions are pursuing non-traditional revenues vigorously. There seems to be an unspoken belief that increasing in prestige will lead to increased revenue from non-traditional sources. While research has confirmed that increases in prestige indirectly and positively impact traditional revenue sources (Meredith, 2004; Monks & Ehrenberg, 1999; Griffith & Rask, 2007; & Jin & Whalley, 2007), this study fills a gap in the

existing literature by focusing on the relationship between prestige and the proportion of revenue from non-traditional sources.

First, the study showed that increases in prestige did not equate to closing the gap with RU1 institutions in the proportion of revenues that are received from non-traditional sources. Rising institutions inability to close the gap, acts as a warning for institutional leaders hoping to become like RU1 institutions by increasing in prestige. While the study's results seem logical, after all the elite institutions are not idling in neutral while rising institutions attempt to catch up, institutional administrators all claim the same ambition to be the best. This study has shown, however, that these rising institutions are not simply running on a treadmill (staying in place), but they are still losing ground to the RU1 institutions in the proportion of revenue from non-traditional sources.

The study's second analysis demonstrated that rising institutions, also failed to separate themselves from their former RU2 counterparts. Not only did rising institutions lose ground to RU1 institutions in the proportion of their revenue from non-traditional sources, but they also failed to achieve significantly different growth in the proportion of their revenues from non-traditional sources compared to their former peer institutions. Rising institutions remained relatively in the same place as they did prior to gaining prestige. These findings may suggest that had these institutions remained where they were (had they not increased in prestige), they would not have lost any more ground to RU1 institutions than they did by increasing in prestige.

Despite these findings, the implications for theory suggest that this behavior is unlikely to change. As was discussed in the implications for theory section, these behaviors may be motivated by concerns over legitimization and reputation. As is often

the case, it appears that institutional decisions are based more on perception than reality. Alpert (1985) notes, “although inspired by the worthy motive of defining and achieving “excellence”, the research universities of the nation have been led into a rating game that places far greater rewards on conformity than diversity” (p. 276). The study’s findings raise additional questions about the behavior of these rising institutions, such as: what is the relationship between the pursuit of prestige and institutional expenditure patterns? Are they spending more or altering their priorities as Morpew and Baker (2004) have shown? If these institutions are spending more to increase their resource independence, they may actually be in a worse financial situation. Institutional administrators should consider the existing research on the impact of prestige aspirations on institutional behavior. It is clear from the study’s findings, that there are economic ramifications to the pursuit of prestige, and previous research has shown other consequences of participating in what Bowen (1980) refers to as a “zero-sum game” (p. 23).

In summary, research has shown that there are important consequences to the organizational behavior that accompanies aspiration. This study’s findings imply that prestige is unrelated to an institution’s ability to increase the proportion of revenue coming from non-traditional sources compared to RU2 institutions. Secondly, rising institutions are not able to close the gap with RU1 institutions in the proportion of revenue from non-traditional sources. In fact, they lose ground, suggesting that these rising institutions are more like their original RU2 peers. The study suggests that while a new name (RU1) may appear on the campus letterhead as a result of their increase in prestige, all that has really changed is the packaging.

Limitations of the Study

This study has several limitations that should be considered. First, the second research analysis was based on a relatively small sample size ($N = 56$). The study, however, covered a period of 21 years resulting in 1176 observations, and contained the entire population of research universities. Another limitation of the sample is that it was confined to institutions classified as research universities by Carnegie. While the study was focused on this specific population, expanding the population to include all institution types would add to this study's findings.

Third, the study utilized a single measure of prestige, change in Carnegie classification. The study would be enhanced by considering multiple measures of prestige and comparing the effects. Additionally, the prestige measure utilized in the study had to be projected into the future in order to allow for a longitudinal analysis. The same methodology that Carnegie had previously used to assign classifications, however, was used to determine the new cutoff score.

Finally, the study does not examine the change in the various types of non-traditional revenue streams. It would be informative to break down the non-traditional revenue streams and examine how each one has changed over time. While the study showed that all prestige groups increased in their proportion of revenue from non-traditional sources, and that this growth did not occur due to declines in traditional revenue streams; it would be helpful to understand how these non-traditional revenue streams are contributing to the growth in non-traditional revenues across prestige groups.

Directions for Future Research

This study's findings contribute to the ongoing dialogue concerning the relationship between prestige and institutional behavior. The research conducted offers a wealth of opportunity for future research focused on the relationship between the pursuit of prestige and institutional behavior. The study itself could be strengthened in several ways. One, the population has been confined to institutions classified as research universities by Carnegie. Mission creep, however, is hardly limited to research universities. A review of the 1994 Carnegie classifications shows that 78 Bachelor institutions in 1987 became Master's institutions in 1994. The findings of this study should be replicated and expanded to other institutional populations to see if they hold true.

Secondly, alternative definitions of prestige might be used. The key predictor of interest utilized in the study was change in Carnegie classification, while a valid representation of prestige (Morphew & Baker, 2004), other studies should implore other measures of the construct to confirm this study's findings. Future studies would also benefit from including multiple predictors of prestige in a single study to compare effects.

Third, the study's findings naturally lead to another question: What is the relationship between prestige and institutional expenditures. Now that this study's findings have shown that institutions that increase in prestige are no better off than their former peers, (RU2s) concerning the rate at which their proportion of non-traditional revenues grow, it is only logical to ask if rising institutions spent more to achieve their status. If so, could rising institutions actually be worse off financially?

Fourth, Institutional leaders are constantly trying to find additional revenue sources to remain financially solvent and competitive. This study lays a foundation for future research on the relationship between prestige and non-traditional revenue generation. While the analyses from the study confirm that increasing in prestige does not lead to a greater proportion of revenue from non-traditional sources than the rising institution's previous classification group or the new classification group, more studies are needed to understand the problem more fully and to inform practice.

Fifth, it would be informative to break down the non-traditional revenue streams and show how each one has changed over time. While, rising institutions and RU2 institutions showed no statistical difference in the growth of their proportion of revenue from non-traditional sources, it is conceivable that individual streams did differ. If differences to exist; this would have implications for institutional leaders.

Finally, a review of the existing research and the study's guiding framework suggest several gaps in the literature on how prestige is related to institutional behavior. For example Perrow's (1961) theory of prestige suggests that as institutions pursue prestige they sacrifice their core production - undergraduate quality, from a value-added perspective. Based on the anecdotal evidence previously discussed in chapters 1 and 2, Perrow's theory should be explored.

Previous research has also shown that increasing in prestige has implications for the institution's student population. Institutions are all competing for the same students, and their populations are becoming increasingly homogenous. These trends are occurring as a majority of state populations are becoming more diverse, suggesting that institutions are less representative of their state's constituents. Are these institutions rising at the expense

of access? Research is needed to examine the relationship between these behaviors and student diversity.

The literature also suggests that the pursuit of prestige by public institutions (the pursuit of prestige) may be in conflict with state needs and priorities. As state needs for institutional diversity grow and intersect with institutional needs of being the same, how are these roles negotiated? What is the relationship between the behavior of striving institutions and their historical tripartite mission, specifically teaching and service? In summary, the changes in institutional behavior that accompany the pursuit of prestige have numerous consequences that are of concern for practitioners, institutional leaders, and state and national policymakers. The research on these behavior is growing, however, numerous gaps still exist that need to be examined.

Conclusion

The pursuit of prestige by higher education institutions has been documented for almost a century (Veblen, 1918; Veblen, 1993). Public institutions are altering their behavior in an attempt to increase their prestige (Bowen, 1980; Slaughter & Leslie, 1997; Anderson, 2001; Pusser, 2002; Bok, 2003; Morphey & Baker, 2004; Weerts & Ronca, 2006; O'Meara, 2007). Increasingly, public higher education is being described by words like marketization, commodification, privatization, and academic capitalism (Bok, 2003; Pusser, 2002; Slaughter & Leslie, 1997). These labels attempt to capture a shift in the behavior of public higher education. The public good characteristics that defined the social compact, are threatening to be replaced by characteristics of industry (Gumport, 2001; Kezar, 2004). An assumption fostering this aspiring behavior by institutions is the

belief that increasing in prestige will lead to increased revenue diversification by decreasing their proportion of revenues coming from traditional revenue sources. The question remains, however, is it working?

The study's findings show that increasing in prestige is unrelated to an institutions ability to increase the proportion of its revenues from non-traditional sources relative to its peers. The findings also show that despite increasing in prestige, these newly classified institutions failed to keep pace with RU1 institutions in their proportion of revenue from non-traditional sources. Stated simply, institutions attempting to increase their prestige are not simply running on a treadmill (staying in place), rather they are still losing ground to the elite institutions in the proportion of their revenue from non-traditional sources. At best, the study's findings support Bowen's (1980) theory that institutional pursuit of prestige results in a "zero-sum game" (p. 23) when it comes to attempting to diversify their revenue.

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Appendix A: Differences in Carnegie Classification, 1987 and 1994

Research Universities		
	1987	1994
Research Universities I	These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research. They receive annually at least \$33.5 million in federal support and award 50 Ph.D. degrees each year.	These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research. They receive annually at least \$40 million or more in federal support and award 50 or more doctoral degrees each year.
Research Universities II	These institutions offer a full range of baccalaureate programs, are connected to graduate education through the doctorate degree, and give a high priority to research. They receive annually between \$12.5 million and \$33.5 million in federal support for research and development and award at least 50 Ph.D. degrees each year.	These institutions offer a full range of baccalaureate programs, are connected to graduate education through the doctorate degree, and give a high priority to research. They award 50 or more doctoral degrees each year. In addition, they receive annually between \$15.5 million and \$40 million in federal support.

Source: The Carnegie Foundation for the Advancement of Teaching, 2009.

Appendix B:
IRB “Exempt Form Review” Authorization

Thomas,

The IRB received your application #1008E87212. Upon review of your application, the IRB determined these activities do not meet the regulatory definition of research with human subjects and do not fall under the IRB's purview. The publically available data is not about a living individual but about a university.

Although the activities described in your application are considered research, researchers will not obtain information about living individuals [45 CFR 46.102(f)]. Because you will obtain information about the organizations at which the research will be conducted, these activities do not meet the threshold of research with human subjects.

Please do not hesitate to contact the IRB office at 612-626-5654 if you have any questions. Thank you for allowing the IRB to make the determination about whether or not review is required. Thank you for the clear description of the project and we wish you great success.

Cynthia McGill
Assistant Director
UMN IRB