LIMITATIONS ON THE ROLE OF STAKEHOLDERS AND THE DIVERSE EFFECTS OF MARKET CONDITIONS: COLLEGE AND UNIVERSITY FINANCES, 1980-2010

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

In this dissertation I analyze the financial behaviors of public and private nonprofit higher education organizations in the U.S. from 1980 to 2010. The three analyses examine organizational change in the financial behaviors of these institutions and the effects of two sources of organizational interdependencies, stakeholder influence and competition, on college and university spending. I use a variety of quantitative methodological approaches to present evidence that highlights the need to integrate internal aspects of organizations including mission, internal decision making structures, and cross-subsidization practices into existing open system explanations of organizational behavior and change. Furthermore, empirical investigations of competition in two markets reveals the importance of understanding the market and resource context when evaluating the effects of market conditions, like competition, on organizational behaviors. The results from the analysis of organizational change demonstrate discontinuities in how two dimensions of financial behaviors--revenue and spending profiles--change over time, highlighting the loose coupling between these two dimensions and a discontinuity in how they change over time. The analysis of the economic influence of stakeholder groups reveals that their influence, while significant, weakens substantially between 1986 and 2010. The results also point out limitations of resource dependency and stakeholder theories of organizational behavior. These theories have limited explanatory power in the context of multi-revenue and multiproduct organizations, like colleges and universities, where cross-subsidization is utilized; unless a stakeholder is able to constrain how the funds are used within the higher education organizations. Results from Chapter 4 support my argument that competition alters the incentive structures that guide resource allocation decisions within higher education organizations. This analysis also showcases how the effects of competition and market conditions vary across sectors and markets,

indicating a need for additional research on competition in multi-revenue and multiproduct organizations like colleges and universities.

CHAPTER 1: INTRODUCTION

In this dissertation I focus on a series of issues that are central to organizational sociology. The overarching question that frames this research is "where does the money come from and where does it go?". In other words where do organizations, specifically multi-revenue/multiproduct organizations, get their money and how do they spend it? Multi-revenue organizations draw revenues from a number of different sources. Nonprofit social service organizations, for example, rely on government contracts, fee-for-service income, and donations. Multiproduct organizations on the other hand offer a number of goods, activities or services. For example, public universities teach; engage in research; engage in auxiliary enterprises such as student housing, entertainment venues, and health care; and provide a variety of additional services to students and faculty and are therefore multiproduct organizations (Cohn, Rhine, and Santos 1989; Lacy 2010; Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008).

The question of where organizations get money and how they spend it is extremely important, and particularly complicated, in the context of multi-revenue and multiproduct organizations like colleges, universities, and many nonprofits. There are two reasons for this. Frist, revenue streams each come with different sets of constraints and different consequences for organizational goals, revenue volatility, processes, and structures (Froelich 1999). Multi-revenue organizations have multiple sets of constrains and consequences, and are therefore tasked with balancing these potentially conflicting sets of constraints. Multi-revenue organizations also have to deal with the potential consequences that changes the relative composition of their revenue profile have for their behavioral constraints. For example, if a key resource provider dramatically reduces its contributions to an organization, this fundamentally alters the relative composition of

the revenue profile. This in turn alters the nature of the behavioral constraints the organization faces, the economic viability of the organization, and potentially the mission of the organization.

Second, understanding how multiproduct organizations spend their resources can provide substantial insight into how these organizations prioritize the various activities and services that they provide. Looking at the spending behaviors of these institutions can help researchers to understand how organizations enact their missions given the constraints on their behaviors. Behavioral constraints, whether from the resource dependencies of these organizations, environmental conditions, or other sources, are extremely important in the context of multi-revenue/multiproduct organizations because of the potential for conflicting sets of constraints. Therefore it is important to understand not only how these organizations spend their money but also what factors affect how they are spending their money and the ways in which those effects differ across different groups of organizations and over time.

In order to understand where multi-revenue/multiproduct organizations get their money and how they spend it, I evaluate the financial behaviors of public and private nonprofit colleges and universities[1] in the U.S. from 1980 to 2010. I focus on three key aspects of the financial behaviors of these organizations to advance our understanding of multi-revenue and multiproduct organizations and address a number of gaps in the current understanding of organizational behaviors and how they change over time. First, I assess how revenue and spending patterns of these institutions change over time and the extent to which these two dimensions of financial behavior correspond to each other. Second, I evaluate how the economic influence of four stakeholder groups changes over time and the relationship between the economic influence of these stakeholders and university spending behaviors from 1986 to 2010. Third, I evaluate competition for two resources, state higher education and federal research and development

[1] Henceforth in this dissertation universities will refer to colleges and universities.

(R&D) funding, and assess the relationship between competition for these resources and university spending in 2009 and 2010.

The next section provides a brief summary of the context of U.S. higher education and the utility of studying the revenue sources and spending patterns of multi-revenue/multiproduct organizations in this context. This is followed by brief summaries of each of the three empirical chapters of this dissertation.

The Case of U.S. Higher Education

The case of U.S. higher education is well suited for examining these three aspects of the financial behaviors in multi-revenue/multiproduct organizations for four reasons. First, the environment of the U.S. higher education industry has changed dramatically in the past 40 years, making this an ideal industry within which to examine organizational change. There have been substantial declines in state funding for public higher education beginning in the 1970s (Ehrenberg 2006; Rizzo 2006). Due to this decline public universities have been forced to rely on alternative revenue streams. For example, one of the most common responses have been the increased reliance of public universities on tuition income and the subsequent increases in both in-state and out-of-state tuition (Brown and Clark 2006; Chapter 2 ; Chapter 3 ; Kissler and Switkes 2006; Turner 2006; Weisbrod, Ballou, and Asch 2008). Throughout this period there have also been notable fluctuations in donations to higher education institutions and endowments, particularly private nonprofit universities, which have caused instability in the revenues of these institutions (Kaplan 2013).

Additionally, changes in the allocation of financial aid at the state and federal levels has affected both public and private nonprofit universities (Doyle 2006; Doyle 2010a; Long 2004; McPherson and Schapiro 1998; McPherson, Schapiro, and Winston 1993). The changes brought

about by the 1972 Reauthorization of the Higher Education Act put money in the hands of students rather than schools and created a voucher type system for higher education that was seen by many as benefiting private universities (Baum 1995; Hannah 1996). State governments also began to increase financial aid offerings in the 1990s with programs such as the Georgia HOPE scholarship, Tennessee's Education Lottery Scholarship, and New Mexico's Lottery Success Scholarship (Doyle 2010b). There has also been a shift in the use of institutional aid away from need-based aid towards merit-based aid that has been shown to have significant consequences for student access (McPherson and Schapiro 1998).

These changes have contributed to changes in the legitimating ideas of higher education (Gumport 2000). Many people, including state lawmakers, university administrators, students and researchers, have questioned the idea of higher education as a "public good," particularly in times of economic hardship when states face tough decisions about how to allocate a smaller pool of resources.

The nature of university research and knowledge production has also changed since the 1970s and 1980s (Geiger 2004a; Slaughter and Rhoades 2004; Slaughter and Leslie 1997). Legislative changes and institutional forces increased the patenting practices of universities, which stood to reap financial benefits from federally funded research (Owen-Smith 2003; Popp Berman 2008). Changing technology, norms, and laws also changed how universities view research and knowledge production, i.e. as a potential revenue source (Gumport and Snydman 2006; Popp Berman 2012; Powell and Owen-Smith 1998; Slaughter and Rhoades 2004).

There have also been substantial increases in the levels of competition that these universities face for resources (Geiger 2004a; Kaplan 2009). For example, competition for students has increased due to the influx of for-profit institutions (Bennett, Lucchesi, and Vedder 2010). As universities have diversified their activities in response to declining state support,

competition in the markets for other resource markets has increased as more schools compete for these alterative resources, for example the market for federal research and development funding (Chapters 2 and 4). There is also increased competition for state higher education funding due to the shrinking size of this resource pool (Chapter 4).

Second, as mentioned above, higher education organizations are both multiproduct and multi-revenue organizations (Cohn, Rhine, and Santos 1989; Lacy 2010; Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008). This is clearly shown by the revenue and spending profiles of these universities that are estimated in Chapter 2. These two characteristics in combination with the central importance of organizational mission in these organizations (Weisbrod, Ballou, and Asch 2008) provide an opportunity to evaluate the potential role of organizational mission, and to assess the role of the related practice of cross-subsidization. Cross-subsidization is the process by which organizations use revenue from profit generating activities to subsidize non-profit generating mission based activities (James 1983; James 1998; Weisbrod 1998). The results presented here, particularly in Chapters 2 and 3, speak to the importance of mission and cross-subsidization for these institutions. Understanding the nature and extent of the use of practices like cross-subsidization provides a window into the importance that multiproduct organizations place on the different services that they provide. To put it another way, it provides a window into the way that they enact their mission. This can then form the foundation for a comparison between the stated and enacted missions of these institutions and allow researchers to investigate the possibility of mission drift within this set of organizations. Though this is not evaluated directly in this dissertation it is the subject of ongoing research and does play a central role in understanding the implications for the findings here.

The third reason that U.S. higher education is well suited for examining these issues is that higher education is a mixed sector industry; it includes public, nonprofit and for-profit

organizations. The provides me with the opportunity to evaluate sector differences in the effects of stakeholder influence and competition (Chapters 3 and 4) while also evaluating the utility of the economic influence of stakeholders as an explanation for the differences in the behaviors of public and private nonprofit universities (Chapter 3). The higher education industry is also an ideal industry for examining changing or blurring sector boundaries. Public universities are in many ways more like nonprofits with state contracts than many public organizations. These organizations have also seen steady declines in state financial support which in combination with the emergence of hybrid organizational forms has led many researchers to assert that sector boundaries are blurring and that public universities are privatizing (Gumport and Snydman 2006; Morphew and Eckel 2009; Weisbrod, Ballou, and Asch 2008).

Finally, the organizations within the higher education industry, particularly the public and private nonprofit universities, are extremely interdependent (Geiger 2004a; Slaughter and Rhoades 2004). These organizations share stakeholders (e.g. students, state governments), governing boards (e.g. two universities in the same system), trustees (Slaughter and Mathies forthcoming; Slaughter, Thomas, Johnson, and Barringer forthcoming), research grants (e.g. an NSF grant with Co-PIs at different universities), libraries (e.g. Interlibrary loan), students (e.g. transfers, concurrent enrollment), and donors. The extent of these interconnections makes this an interesting context for studying stakeholder influence and competition, the two organizational interdependencies of interest in this dissertation (Chapters 3 and 4).

Outline of Chapters

In this dissertation I provide answers for three sets of research questions. In the first chapter I focus on organizational change in the financial behaviors of public universities from 1986 to 2010. In the second chapter I evaluate the sector differences in the economic influence of

stakeholders and university spending and then evaluate the changing relationship between stakeholder influence and university spending from 1986 to 2010. In the final empirical chapter I evaluate the nature of competition for state higher education and federal R&D funding and the effect of these market conditions on university spending patterns. I briefly describe each chapter in turn.

Chapter 2: The Financial Profiles of Public Colleges and Universities

How do organizations change over time, in what ways, and what are the implications of those changes for other organizational behaviors? These questions that, despite extensive research, have yet to be fully answered, particularly in the context of higher education organizations. Previous research has demonstrated that a number of factors lead to or prevent organizational change including: organizational capacities (Barringer 2012b; Wilsker and Young 2010; Young, Wilsker, and Grinsfelder 2010), organizational structure (Blau 1955; Weber 1946), exogenous shocks or crisis situations (Crozier 1964), path dependency (March and Simon 1958), the institutionalization of norms (Brint and Karabel 1991; DiMaggio and Powell 1983), changing resource dependencies (Chapter 3 ; Froelich 1999; Pfeffer and Salancik 2003), competition and other niche conditions (Baum and Singh 1996; Carroll and Swaminathan 2000), and inertia (Galaskiewicz and Bielefeld 1998; Hannan and Freeman 1977). In the context of higher education organizations, researchers have also examined some of the factors associated with organizational change noted above and also the nature and dimensions of these changes.

However, the emphasis in this literature has been on either assessing the extent to which certain factors lead to or prevent organizational change or on understanding variation across universities and within universities over time and using this variation to predict how organizations would change under certain conditions. There has been limited emphasis on understanding the different ways in which organizations change their behaviors over time.

My interest in this chapter is on understanding the different ways in which higher education organizations within the same field change and adapt in a time when the environment surrounding them changes substantially. I use multilevel latent class analysis (MLCA) to analyze two dimensions of the financial behaviors of public four-year universities from 1986-2010, their revenue and spending profiles, to advance our knowledge of the different ways in which U.S. higher education organizations in the U.S. change, or remain the same. The focus for this analysis is on understanding the substantive changes that universities make in terms of their financial behaviors and how the changes in the revenue and spending profiles correspond to each other.

Profiles here refer to the specific mix of revenue or spending streams a university relies and the level at which they use the various funding/spending streams. In other words the profiles convey what the pieces of the pie are and how big each piece is. Examining the financial profiles as a whole is useful in the context of multi-revenue/multiproduct firms, such as higher education organizations, because the financial streams of these organizations operate in combination (Young 2007). Therefore, given the focus on understanding the different ways in which these institutions change over time this approach allows me to map out the different ways organizations change in a more holistic manner. This is accomplished empirically by using MLCA models to generate latent clusters or groups of universities that are characterized by particular revenue or spending profiles that are representative of the universities within each cluster.

Results from this analysis demonstrate that there is significant diversity in the revenue and spending profiles that public universities utilize. The best fitting consistent models indicate that there are four revenue profiles and three spending profiles for public universities during this period. Public universities substantially alter their revenue profiles between 1986 and 2010 leading to substantial movement between the four revenue profiles between the beginning and end of the period. However, public universities do not substantially alter their spending profiles

over time. The overwhelming majority of university spending profiles remain very stable for the entire period.

I argue that the loose coupling between university revenue and spending profiles, along with this discontinuity, reveals a limitation on the ability of external groups to affect university behaviors. Though the majority of university fundamentally altered their revenue profiles, generally due to changes in environmental conditions, most notably changes in state support; the mission, cross-subsidization, and internal decision making processes served as a buffer between the external environment and the spending profiles of these universities.

In this analysis I also enumerated a number of field-level trends that emerged as a consequence of these university-level changes, or lack thereof. First, there is limited evidence suggesting that a homogenization of either revenue or spending profiles is occurring. Because public universities are not altering their spending profiles over time, the relative prominence of each of the three spending profiles remains basically unchanged for the entire period. Furthermore, though there are substantial changes in the relative prominence of the four revenue profiles, there is roughly the same amount of revenue profile diversity present in 2010 as there was in 1986. Second, public universities are becoming more self-sufficient (i.e. more reliant on earned sources of income) during this period. This suggests that privatization is occurring within the field as a whole. However, different groups of schools are privatizing at different rates, and even those schools that are relying more on earned income still rely on state and federal governments for a substantial portion of their revenues. Third, despite the increased reliance on earned income and the differing rates of privatization these institutions have no changed their spending behaviors. In other words they have not substantively changed the prioritization of the different services that they provide during this period. This indicates that despite the fact that

these institutions are privatizing they are not fundamentally altering their enacted missions during this period.

This chapter makes a number of substantial contributions. First, I explicate the different ways in which public universities change their financial behaviors. In so doing I establish the diversity in the revenue and spending profiles of these institutions highlighting the need for greater understanding of how these revenue and spending streams work in combination and the subsequent effects of those combinations on other university behaviors such as degree or course offerings, institutional financial aid, and the use of adjunct faculty to name a few. Second, I generate measures of university revenue and spending profiles which is a notable advancement in the context of multi-revenue/multiproduct organizations like universities. Third, I present evidence of the different ways in which public universities change their revenue profiles over time and the fact that these institutions do not significantly alter their spending profiles over the same period. The loose coupling and discontinuity between the revenue and spending profiles of public universities points to the need to evaluate how internal aspects of these complex organizations such as the role of mission and cross-subsidization in the decision making process mediate the effect of the environments and resource dependencies on university spending.

Chapter 3: The Role of Stakeholders in U.S. Higher Education

Public and private nonprofit universities are similar in many ways and different in others. Universities in both sectors do research, teach students, offer financial aid, and seek out private donations and other sources of revenues (McPherson, Schapiro, and Winston 1993; Weisbrod, Ballou, and Asch 2008). However, there are also fundamental differences between public and private universities. Perhaps most significantly, universities in the two sectors face different mandates and levels of oversight due to the different stakeholders to which they are held

accountable and the degree of oversight by those stakeholders (Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008).

Over time as the environment surrounding higher education has changed, many of the distinctions between the two sectors have lessened, and variation within the two sectors has become more striking (Gumport and Snydman 2006; Weisbrod, Ballou, and Asch 2008). This is particularly the case in the context of university finances, where public universities have suffered declines in state revenues and have in turn been forced to increase the share of their revenues that come from tuition, private contributions, and other revenue sources that have historically been key income streams for private universities (Blasdell, McPherson, and Schapiro 1993; Chapter 2 ; Ehrenberg 2006).

These changes, and others, point to the two facets of the higher education industry that are of interest for this analysis. First, this makes the traditional public-private distinction more fluid than it has been in the past, as both types of institutions are reliant on and accountable to their evolving stakeholders. Second, as the funding bases of these institutions have changed the relative power of the various stakeholder groups that these organizations are accountable to has also changed. To the extent that these stakeholders are able to exert influence on universities this should have substantial impacts on university behaviors. This may explain differences in behavior more than the dichotomous distinction between public and private organizations.

I argue that the degree to which universities are dependent on their different stakeholder groups, that is the economic influence of these groups, significantly influences the behaviors of these institutions. Furthermore, differences in the economic influence of key stakeholder groups can contribute to our understanding of sector differences in higher education, specifically the variation within the sectors and changes in sector differences over time.

To assess this argument I undertake three analyses in Chapter 3. First, I use descriptive statistics and graphs to evaluate how the economic influence of four stakeholder groups changed from 1980 to 2010 and how this differed between public and private nonprofit universities. Second, I also evaluate how the spending behaviors of public and private nonprofit organizations differed and changed over time. Specifically I look at the spending patterns of these schools using six spending streams from 1980 to 2010. Finally I evaluate the relationship between the economic influence of stakeholders and university spending, as well as how this relationship changed over time from 1986 to 2010.

Results from the descriptive analysis indicate that the economic influence of two of the four stakeholder groups (state governments and private contributions) converges across sectors but remains statistically significantly different over time. The economic influence of the other two stakeholder groups either maintains a basically constant difference across sectors over time (student influence) or diverges slightly (federal government influence). The descriptive analysis of the spending behaviors of public and private nonprofit universities reveals that public and private universities are significantly different in their average spending levels in all six spending categories. Furthermore the over time trends indicate that the sectors are diverging in terms of their spending behaviors and the variation within the sectors is increasing substantially over time.

The multilevel regression models reveal three things about the relationship between the economic influence of stakeholders and university spending. First, the economic influence of stakeholders is significantly related to the spending behaviors of these institutions, albeit in unexpected ways. Second, the effect of the economic influence of stakeholders on university spending weakened significantly over time. Third, stakeholder influence helps us understand differences between sectors, within sectors, and especially variation over time. However, the

significant differences between the two sectors remained even after accounting for the differences in stakeholder influence and allowing over time variation in these effects.

This analysis makes a number of empirical and theoretical contributions. First, this analysis maps out the divergence in public and private university spending and the convergence or constant sector differences in the economic influence of four of the stakeholders of these institutions. This descriptive analysis contributes to, and updates, a rather small number of studies that examine trends in university finances over time (Blasdell, McPherson, and Schapiro 1993; Toutkoushian 2001; Weisbrod, Ballou, and Asch 2008). Second, I evaluate the relationship between one form of stakeholder influence, economic, and one aspect of university behavior, spending. This analysis reveals that stakeholders have limited and weakening economic influence over university spending. Third, in this chapter I propose and find support for the argument that the economic influence of stakeholder groups contributes to our understanding of sector differences through its ability to incorporate variation within the sectors and between the sectors over time. However, the analysis also indicates that sector differences remain even after accounting for stakeholder influence. This points to limitations in stakeholder influence and resource dependency explanations of sector differences. Finally, I present evidence that suggests that the theory of resource dependency has limited utility in the context of understanding behaviors of multi-revenue/multiproduct organizations like universities that practice cross-subsidization. I argue that this is because these organizations use internal processes and structures, like cross-subsidization, to insulate this aspect of their behavior from the environment.

Chapter 4: Competition and University Spending

Research has shown that competition affects the behavior and industry dynamics of organizations. For example competition affects organizational founding and death rates (Hannan and Freeman 1977; Hannan and Freeman 1989), the diversification or specialization of

organizations (Baum and Singh 1996; Carroll 1985; Carroll and Swaminathan 2000; Dobrev, Kim, and Hannan 2001), organizational growth (Galaskiewicz and Bielefeld 1998), and organizational change (Baum and Singh 1996) to name a few. Competition has also been shown to affect higher education organizations specifically. For example, competition for students has been shown to affect tuition prices and institutional financial aid (Winston 1999; Winston 2004). International competition for prestige and status has been show to affect the behaviors of individual schools as well as the overall stratification of the global higher education industry (Marginson 2006).

However, despite the fact that competition between higher education organizations for resources has been increasing (Geiger 2004a; Kaplan 2009), little is known about how interorganizational competition for resources affects university spending. I address this gap in the literature by arguing that in the context of multi-revenue/multiproduct organizations, such as universities, increases in competition change the incentive structures that guide spending decisions. Namely, increases in competition create incentives to (1) discontinue spending in the area(s) where competition has increased and (2) decrease spending in area(s) where an organization does not hold a competitive advantage or is unlikely to obtain one. Furthermore, the effects of competition on spending should differ for different markets and for universities in different sectors. I assert that the effects of competition on spending should differ in different markets because: (1) the dynamics and conditions of resource markets vary and (2) different resources have different constraints (Froelich 1999) that will influence how competition for these resources affects university behaviors.

I evaluate this argument by using OLS regression analysis to examine how competition for two resources, state higher education and federal R&D funding, affects the spending patterns of public and private nonprofit universities in the U.S. in 2009-2010. Specifically I address two

research questions. First, what is the nature of competition that higher education organizations face and how does it vary across different schools and different markets?[2] Second, how does interorganizational competition for resources affect the spending practices of universities in the U.S.? Little is known about how competition impacts spending behavior, particularly in the context of multiproduct and multi-revenue organizations like universities. Understanding the effect of competition on spending is important because it allows us to understand how competition affects the enacted missions of these institutions. Specifically it allows us to see how it changes the way universities prioritize the various services that they offer. The multi-revenue nature of these organizations allows me to evaluate whether or not the nature and consequences of competition differ in the different resource markets that higher education organizations are engaged in. I argue and demonstrate that competition in different markets will have different consequences for organizations because the nature of the resource and the market conditions vary.

Results from the analysis of the effects of the level of competition for state higher education and federal R&D funding on university spending support the argument that competition alters the incentive structures that guide resource allocation decisions within higher education organizations. Furthermore, while competition for state higher education funding does not significantly affect private university spending, private universities are more susceptible to the effects of competition for federal R&D funding. This analysis also showcases how the effects of competition and market conditions vary across sectors and markets calling attention to the need for additional research on competition in multi-revenue/multiproduct organizations like universities.

[2] By markets here I mean "systems for the allocation of scarce resources" (Geiger 2004a). This is a broader definition of a market than is traditionally used in economics; however it is more representative of the types of markets that higher education organizations find themselves in such as those for students, faculty and key resources.

My findings in the fourth chapter point to the complicated effects of competition and other market conditions on university behaviors while making a number of contributions to our understanding of organizational competition. First, I evaluate the nature of competition in two of the markets that higher education organizations compete in for resources: state higher education funding and federal R&D funding. This descriptive analysis reveals the high levels of stratification in the market for federal R&D funding; the differences in the levels and scope of competition in the two markets, and provides insight into levels of competition that higher education organizations face which has yet to be examined in the literature. Second, I present evidence that the level of competition that universities face for these two resources is significantly related to university spending. This provides evidence that competition affects the incentive structures that universities use to allocate resources. It also highlights the need for further investigations into the effects of competition and market conditions on university behaviors in these resources markets and others. Third, I also present evidence that these relationships vary depending on the sector of the organization and the market in which organizations are competing. This highlights another aspect of organizational behaviors in which sector differences are relevant for understanding these behaviors. Furthermore it highlights the complexity of the role of competition in affecting multi-revenue/multiproduct organizations where organizations are competing in a number of markets for a variety of resources that each has different conditions and constraints.

CHAPTER 2: THE FINANCIAL PROFILES OF PUBLIC HIGHER EDUCATION: DIVERSITY, CHANGE, AND DISCONTINUITY

Abstract: How do organizations change and what are the implications of those changes for other organizational behaviors? This is a question that, despite extensive research, has yet to be fully answered, particularly in the context of higher education organizations. I analyze two dimensions of the financial behaviors of public four-year colleges and universities from 1986-2010, university revenue and spending profiles, to advance our knowledge about how higher education organizations in the U.S. change, or remain the same. The focus is this analysis is on understanding the different ways in which colleges and universities change their financial behaviors and how the changes in the revenue and spending profiles correspond to each other. I use multilevel latent class analysis to examine the financial profiles of these institutions, how they change over time and implications of these changes for the field of public higher education. Results indicate that there are four revenue profiles and three spending profiles for public universities during this period. The revenue profiles of public colleges and universities undergo substantial changes during this period; however spending profiles remain very stable with only a few universities altering their spending profile over time. I argue that the loose coupling and discontinuity between the two financial behaviors reveals a limitation on the role of the environment in affect organizational behavior. Although the environment affects university revenue profiles, it does not substantively affect university spending profiles.

Introduction

How do organizations change and what are the implications of those changes for other organizational behaviors? This is a question that, despite extensive research, has yet to be fully answered, particularly in the context of higher education organizations. Research on organizations generally has shown that there are a myriad of things that cause organizations to change or stay the same including: organizational capacities (Barringer 2012b; Wilsker and Young 2010; Young, Wilsker, and Grinsfelder 2010), organizational structure (Blau 1955; Weber 1946), exogenous shocks or crisis situations (Crozier 1964), path dependency (March and Simon 1958), the institutionalization of norms (Brint and Karabel 1991; DiMaggio and Powell 1983), changing resource dependencies (Chapter 3 ; Froelich 1999; Pfeffer and Salancik 2003), competition (Baum and Singh 1996; Carroll and Swaminathan 2000), and inertia (Hannan and Freeman 1977).

In the context of higher education organizations researchers have also examined some of the "causes" of organizational change noted above and also the ways in which they do change. For example, Kraatz and Zajac (1996), in their research on private liberal arts colleges, found that both global and local environmental changes were strong predictors of change in college curriculum between 1971 and 1986. Furthermore they also found that these schools were more likely to differentiate themselves from other organizations in the field as opposed to mimicking their prestigious peers. In later research the same authors also found that organizations with substantial valuable resources were less likely to engage in "adaptive strategic change" (Kraatz and Zajac 2001).

However, the emphasis in this literature has been on understanding variation across universities and within universities over time with little emphasis on understanding the different ways in which organizations change over time. The majority of these studies emphasize the determination of the effect of a single factor, or set of factors, on the likelihood of change or on a particular behavior that is being evaluated.[3] This approach makes it difficult to empirically evaluate the different ways that organizations, or sets of organizations, change or adapt.

My interest in this chapter is on understanding the different ways in which higher education organizations within the same field change and adapt in a time when the environment surrounding these organizations changed substantially in a number of ways. To this end I use multilevel latent class analysis (MLCA) to evaluate changes in two dimensions of public university financial behaviors from 1986 to 2010. The two dimensions of interest for this analysis are university revenue and spending profiles.

[3] There are of course exceptions to this. A number of qualitative or historical studies of organizations have laid out the mechanisms and processes by which organizations change and adapt or don't e.g. Blau (1955), Carroll and Swaminathan (2000), Fligstein (1990), Wilde (2007)..

Profiles here refer to the specific mix of revenue or spending streams a university relies on or utilizes and the level at which they use the various funding/spending streams. The profiles convey what the pieces of the pie are and how much of the pie belongs to each piece. Research has repeatedly shown that public universities have altered their revenue and expenditure streams over time (Blasdell, McPherson, and Schapiro 1993; Toutkoushian 2001). However, this research has focused on individual financial streams and does not examine the financial profiles as a whole. Therefore, this analysis, by examining change in profiles, provides a more detailed understanding of the different ways in which universities change their financial behaviors over time. This is because universities are multi-revenue/multiproduct firms therefore their financial streams operate in combination (Young 2007).

I focus on both the university revenue and spending profiles for two reasons. First, many of the changing environmental conditions in these institutions are financial in nature. For example, state appropriations have substantially declined since the 1970s (Rizzo 2006), competition for federal research and development and state higher education funding has increased (Chapter 4), and changes in the nature of federal financial aid have resulted in more market like relationships with undergraduate students (McPherson and Schapiro 1998). Second, looking at the two dimensions of financial behaviors, revenue and spending profiles allows me to evaluate the extent to which these dimensions change together over time or operate separately from each other in the context of these organizations.

Two research questions frame this chapter. First, what are the different ways in which public universities alter their revenue and spending profiles during this period of environmental change? We know that these institutions have altered their dependence on state funding and tuition income and have also changed the spending on particular services (e.g. research and instruction) during this period (Chapter 3 ; Weisbrod, Ballou, and Asch 2008). However we do

not know how these changes have translated to changes in the revenue or spending profiles of these institutions. For example, we do not know how the declines in state funding affected the relative prominence of other funding streams and if they did so in the same way for all public universities. Knowing the different ways in which universities have changed their revenue and spending profiles, as opposed to individual funding/spending streams, gives us a more holistic understanding of how universities change their financial behaviors over time. This is important for policy makers as they assess the potential consequences of changes to higher education funding or federal financial aid policies. It is also important for university administrators who can use this information to assess possible alternatives to their current profiles and, though it is beyond the scope of this analysis, to evaluate the possible benefits or consequences of particular profiles.

Because MLCA allows me to examine organizational change by looking at how universities change their profiles over time I am not only able to assess university-level behaviors but also the field-level trends that result from the university-level changes. This is a substantial conceptual and empirical contribution because our understanding of the field of higher education in the U.S. remains underdeveloped (Gumport 2012). Here I will descriptively address issues of privatization and homogenization within the field of public higher education. All of these trends are extremely important for university administrators and higher education policy makers because they are consequential for the constituents of these organization as well as larger societal issues such as inequality and the nature of “public” universities.

The second question focuses on the relationship between the revenue and expenditure profiles: how do the university revenue profiles correspond to university spending profiles? I am interested in whether and how the two different behaviors are connected within these. Generally speaking if a university alters its reliance on particular revenue streams then we would expect

their spending patterns to also change (Chapter 3 ; Froelich 1999; Pfeffer and Salancik 2003). Research to date has shown that public universities change their reliance on particular revenue streams and also change their spending behaviors (Blasdell, McPherson, and Schapiro 1993; McPherson and Schapiro 1993; Toutkoushian 2001; Weisbrod, Ballou, and Asch 2008), but a link between the two has yet to be fully examined. Understanding the extent to which changes in one aspect of university financial behavior are tied to another and the nature of the tie(s) sheds light on the costs and benefits of relying on particular funding streams and the potential consequences for the key constituencies of these institutions.

This chapter proceeds by first outlining the literature on organizational change. Following this I describe the specific context of public higher education and my expectations for the changes in university revenue and spending profiles given this context. I then outline the data, measures, and methods I use to evaluate the research questions. Following this I describe the results in three stages: (1) the description of the revenue profiles, (2) the description of the spending profiles, and (3) the correspondence between the two. I then discuss the implications of the university-level changes for the field as a whole and the results for policy makers, university administrators, and researchers. I conclude with the limitations of this analysis and directions for future research.

Conceptual Framework

Organizational change has long fascinated researchers of organizations. Researchers have investigated the nature of organizational change; factors that increase an organization's ability to change, and those factors that prevent organizations from changing their behavior(s). Many of these researchers, especially in recent years, have focused on the role of the organizational environment in shaping organizational change. In the context of higher education there have been a number of changes to the political and financial environments of these organizations (Ehrenberg

2002; Ehrenberg 2006; Morphew and Eckel 2009; Slaughter and Leslie 1997; Weisbrod, Ballou, and Asch 2008) not to mention changes in the technology used in these institutions and knowledge production processes (Geiger 2004a; Gumport and Snydman 2006; Slaughter and Rhoades 2004). Given the nature of these environmental changes the general expectation is that universities need to change and adapt their behavior(s) in some way to meet the new constraints placed on them by their changing environments.

Many researchers have argued that organizations do change and focus on those things that structure the nature of that change. Peter M. Blau (1955), incorporating social development processes, asserts that bureaucratic organizational structures continuously create conditions conducive to organizational change as they grow. James D. Thompson (2005) bridges rational and open systems approaches to organizations. He asserts that organizations change in response to changes in the environment but that this happens at the periphery of the organization. The technical core of the organization is insulated from the environment and is governed by a more rational systems approach. Resource dependency theory, which is an open systems perspective, asserts that organizations change and adapt to their environments, specifically they alter their behavior in response to changes in the resource dependencies that tie the organization to its environment (Pfeffer and Salancik 2003). For example, Tolbert (1985) demonstrates that administrative differentiation is a result, in part, of a higher education institution's need to ensure stable resource flows. Those in the neoinstitutionalism tradition assert that organizations change to gain or maintain their legitimacy (DiMaggio and Powell 1983; Tolbert and Zucker 1983). Powell (1991) takes this further to assert that path dependent patterns of development affect organizational change at the level of organizations but also at the aggregate level of the field or industry. In their study of community colleges Brint and Karabel (1991), assert that market forces and managerial capacities are the most important factors that affect organizational change.

Galaskiewicz and Bielefeld (1998), in their study of nonprofit organizations, evaluated a number of theories of organizational change including adaptation theory, selection theory, and structural embeddedness theory. They found that niche conditions, i.e. density, concentration, and legitimacy were significantly associated with the growth and decline in commercial income and employees in nonprofit organizations. They also find support for adaptation theory, indicating that management initiatives do alter organizational behaviors. Other factors that have been shown to promote organizational change and influence the pattern and direction of organizational change include: turbulence within an organizational field, new organizations within a field, the institutionalization of norms, external events, existing capacities or services, and new key actors (Aldrich and Ruef 2006; Fligstein 1991; Wilsker and Young 2010; Young, Wilsker, and Grinsfelder 2010).

There are also a number of theories that assert that organizations do not change or only do so in extreme circumstances. March and Simon (1958) argue that organizations only change when the current course of action is unsatisfactory. Crozier (1964) asserts that change only happens in crisis situations. Population ecologists generally assert that organizations suffer from inertia and therefore do not fundamentally alter their behaviors; when the environment changes they simply die if they no longer fit with their environment (Hannan and Freeman 1977; Hannan and Freeman 1989). More recent research relaxes the idea of organizational inertia. For example, research on day care centers and the European automobile industry indicates that the level of competition affects an organization's likelihood of altering the organizational niche and subsequently their ability to survive (Baum and Singh 1996; Dobrev, Kim, and Hannan 2001).

In the context of higher education organizations there is evidence of organizational change but also of organizational inertia. Research has shown that university behaviors have changed markedly since the 1970s as these institutions have adapted to declines in key revenue

streams (Chapter 3 ; Rizzo 2006); changes in the allocation of financial aid at the state and federal levels (Doyle 2006; Doyle 2010a; Long 2004; McPherson and Schapiro 1998; McPherson, Schapiro, and Winston 1993); changes in the laws and norms governing university research (Owen-Smith 2003; Popp Berman 2008; Popp Berman 2012; Powell and Owen-Smith 1998); changes in the legitimating ideas of higher education (Gumport 2000); and increased competition due to the influx of for-profit institutions (Bennett, Lucchesi, and Vedder 2010), the diversification of university activities, and the same number (or a greater number) of schools competing for a shrinking pool of resources (Chapter 4). However there is also evidence that universities are resistant to change. For example, larger universities, in terms of their resources or wealth, have been shown to be resistant to change (Kraatz and Zajac 2001).

Since the focus of this analysis is on organizational finances I will also focus on changes or inertia in this context here as well. Research has demonstrated that changes in federal and institutional financial aid affect tuition policies and revenues at public universities (Ehrenberg 2002; Ehrenberg 2006; McPherson and Schapiro 1993; McPherson, Schapiro, and Winston 1993). Robert Toutkoushian (2001) uses a descriptive approach to show that private nonprofit and public universities are increasing their reliance on tuition while also decreasing their relative spending on instruction but not on the instructional spending per student. Research has also shown that the university spending (per full-time equivalent student) and university resource dependencies have also changed substantially over time (Chapter 3). Specifically, average spending per FTE student on instruction, student services, academic support, institutional support, and research has increased between 1980 and 2010. At the same time variation has also increased across and within sectors (public and private nonprofit) between 1980 and 2010. University resource dependencies also changed between 1980 and 2010. University dependence on students, measured as dependence on tuition income, has increased for both public and private institutions

between 1980 and 2010. At the same time state dependence has declined dramatically for public institutions leading to a convergence in the dependence of public and private universities on state funding. The relationship between stakeholder influence and university spending also weakened significantly over time (Chapter 3). Larry L. Leslie and colleagues (2012) examined how variation in revenues affected expenditures in 96 public and private nonprofit research universities from 1984 to 2007. The authors found that public university revenues were, in many cases, tightly tied to expenditures in the expected ways where as private universities operated more strategically using revenues from many categories to recruit students and engage in research. These analyses substantially increase our knowledge of university finances, but again the emphasis in these analyses is not in examining inter-university change but rather examining variation across universities over time.

Others have focused on changes in universities within a particular state and how they responded to declines in state funding and the increased reliance on tuition funding. Schools in the University of California system, for example, raised out of state tuition, and cut administrative costs and business operations (Kissler and Switkes 2006). Public universities in North Carolina also increased tuition and slowed the rate of faculty salary increases leading to both a real and relative decline in average faculty salaries (Brown and Clark 2006). Alternatively selective public universities in Virginia have adopted a high tuition high aid policy as part of their proactive approach to change the nature of their relationship with the state government (Turner 2006).

There are four issues that, despite the extensive literature on university finances and organizational change, remain underdeveloped. First, these studies look at individual revenue or expenditure streams without attention to how these streams work together to create the revenue and spending profiles of these institutions. I argue that looking at the revenue and spending profiles is helpful when examining the different ways universities change these behaviors over

time because these are multi-revenue and multiproduct organizations. Doing this allows me to look at the combination of revenue and spending streams to gain a more nuanced understanding of how these behaviors have changed over time.

Second, we know that revenues change and we have evidence that spending changes as well. However to date no one has fully mapped out how changes in one relate to changes in the other. Furthermore research has not focused on the different ways that sets of organizations within a single field adapt in different ways. In effect research has focused on explaining cross-case variation with less attention on change in university behavior and the different ways in which organizations adapt to their environments.

Third, our empirical and conceptual understanding of the field of higher education remains underdeveloped (Gumport 2012). In the context of this analysis this means that we do not have a complete understanding of what the field-level consequences of changing revenue and spending profiles are. For example, we do not know if this leads to privatization, homogenization, or differentiation of universities within this field. Finally, research has shown that a number of factors influence how organizations change. However to date there has not been an examination of the different ways that universities financially adapt in the context of changing organizational environments.

The Case of Public Higher Education

Public universities have been faced with a number of challenging conditions over the past 40 years. These conditions have been shown to affect the financial behaviors of these institutions in a number of ways. Therefore this is an ideal context for examining changing revenue and spending profiles of multi-revenue and multiproduct organizations and their correspondence over time.

The most frequently lamented is the declining state financial support for these institutions (Chapter 3 ; Ehrenberg 2006; Rizzo 2006) which has forced public universities to seek out alternative revenue sources. A related shift, that is most commonly seen as a response to the decline in state funding, is the increased reliance of public universities on tuition income and the subsequent increases in both in-state and out-of-state tuition (Brown and Clark 2006; Kissler and Switkes 2006; Turner 2006; Weisbrod, Ballou, and Asch 2008). The shift in the nature of federal financial aid in the early 1970s resulted in a voucher system for federal financial aid that was seen by many as benefiting private nonprofit universities (Baum 1995; Hannah 1996).

The nature of university research and knowledge production also changed beginning in the 1970s and 1980s (Geiger 2004a; Slaughter and Rhoades 2004; Slaughter and Leslie 1997). Legislative changes and institutional forces increased the patenting practices of universities who stood to reap financial benefits from federal funded research (Popp Berman 2008). Changing technology has changed the nature of university research and knowledge production and the competitive dynamics surrounding research and instruction while opening up new opportunities to reach wider audiences (Gumport and Snydman 2006).

Finally there have also been substantial increases in the levels of competition that public universities face for a number of resources (Geiger 2004a; Kaplan 2009). For example competition for state higher education funding has increased since the early 1980s as the number of schools competing for these funds has increased at the same time that the size of the resource pools in most states are declining (Chapter 4). Public universities, particularly smaller branch campuses are also facing increased competition for students from for-profit universities (Bennett, Lucchesi, and Vedder 2010). Competition for federal research and development funding has also increased since the 1980s as more schools seek out external research funding (Chapter 4).

Based on these rather extensive environmental changes I have developed a number of expectations about how public university revenue and expenditure profiles should change during this period. First, given the extensive research that has documented changes in individual revenue streams I expect the revenue profiles utilized by public universities to change substantially over time. Furthermore, I expect them to change in diverse ways because universities have different initial revenue profiles and different contexts and constraints. Therefore I expect that universities will alter their revenue profiles in different ways depending on their mission, market or field position, and current/past resource dependencies.

Second, I expect public university spending profiles to change because the revenue profiles of these schools change. University revenue profiles represent the resource dependencies of public universities and how they change over time. Because resource dependencies affect organizational behaviors in a number of ways (Chapter 3 ; Froelich 1999; Pfeffer and Salancik 2003) I expect that spending profiles will change as revenue profiles change.

Third, I also expect that changes in revenue profiles should correspond to changes in spending profiles. This expectation is more specific than the above because it focuses not on general trends in revenue and spending profiles but on the specific movements of universities between revenue and spending profiles. I do not expect the correspondence to be exact; there are a number of factors that could mediate the effects of a change in university revenue profiles on university spending profiles. For example, the political influence of stakeholder groups and the internal structure of the university might inhibit change. These institutions are also frequently constrained by their mission which could limit changes in spending. For example, a teaching intensive institution would face substantial scrutiny if it suddenly shifted a large proportion of its funding to research or auxiliary enterprises. However there should still be some correspondence between changes in revenue and spending profiles, even if it is muted.

Finally, I also expect there to be some notable trends at the field-level that are a function of individual university shifts in revenue and spending profiles. I expect public university revenue profiles to be characterized by a greater reliance on earned income sources[4] at the end of the period compared to the beginning because of the pressure to adapt to declines in state funding. I also expect a possible shift towards more spending on students in an attempt to satisfy this group as its influence increased and in an attempt to recruit more support from this group (i.e. more tuition dollars). I also expect to see some substantial diversity within this field as these institutions, though part of the same field, face distinct local environments and constraints that shape their initial behavior and how they are able to adapt over time.

Data

The goals of this analysis are to (1) determine the revenue and spending profiles that public universities utilized between 1986 and 2010, (2) analyze how these profiles change over time as universities alter their behaviors, (3) understand the correspondence between the revenue and spending profiles and how changes in the revenue profiles affect the spending profiles universities utilize. To accomplish these goals I used data on 516 four-year degree-granting public universities in the U.S. from 1986-2010 taken annually for a total of 12,588 university-years. The 516 schools include all public four-year universities granting undergraduate degrees that were classified as a Research, Doctoral, Masters and Baccalaureate institutions in the 2000 Carnegie Classification of Institutions and participated in, or applied for, the federal student financial aid program. This time period allows for the examination of how the field of public higher education has changed as economic and political changes of the 1970s and 1980s took effect in the short and medium terms and through the economic cycles of the 1990s and 2000s.

[4] Earned income is fee-for-service income such as tuition, auxiliary enterprise, and hospital revenues. This is in contrast to government funding or private donations.

The data were drawn from three areas (institutional characteristics, enrollment, and institutional fiscal resources) of the Integrated Postsecondary Education Data System (IPEDS), which is compiled and maintained by the National Center for Education Statistics.

Defining the Revenue and Spending Profiles

In this analysis I utilized revenue and spending profiles, as opposed to individual revenue or expenditure streams, to develop a better understanding of the ways in which university financial behaviors change over time. Revenue profiles, as used here, refer to the *set* of revenue streams utilized by a university at a given time. This incorporates the funding sources universities draw on *and* the proportion of total revenues coming from each source. To estimate these revenue profiles I used the percent of total revenues, net of investment and other revenues that come from six different funding streams.[5] The six funding streams used to define the revenue profiles include: tuition income; state government revenues; private gifts, grants and contracts; federal government revenues; auxiliary revenues; and miscellaneous revenues.[6] The descriptive statistics for these funding streams are shown in Table 1 below for 1986, 1998, and 2010. As the table shows there are substantial changes in public university reliance on a number of the funding streams over time.

"Miscellaneous revenues" refers to the sum total of local government, endowment, independent operations, sales of educational activities, and hospital revenues. These five revenue streams were collapsed into one category of revenues which I call "miscellaneous" for two reasons. First, there was a lack of variation across institutions in the proportion of total funding coming from the funding streams. The majority of the public universities had little or no income

[5] I used total current fund revenues net of investment income and other revenues because of the substantial number of negative values for these income streams in a number of years which made generating proportions problematic. Both investment income and other revenues are specific categories of revenues in the IPEDS data definitions of which are available at: http://nces.ed.gov/ipeds/glossary/.

[6] Definitions for each of the revenue streams can be found in Table A1 in Appendix A.

from these revenue streams. Therefore these revenue streams also individually only contributed a very small amount to total revenues for the majority of the universities. Second, all five of these revenue streams were very highly skewed due to the high occurrence of zero revenues from each of these funding streams. Therefore these variables violated the normality assumption necessary for the estimation of the multilevel latent class analysis models when continuous data is being used. [7]

Table 1: Descriptive Statistics Revenue Streams, Selected Years

Revenue Stream	Year	Mean	Std. Dev.	Minimum	Maximum
Tuition Revenues	*1986*	19.18%	8.97%	4.05%	83.96%
	1998	26.51%	9.61%	4.84%	74.80%
	2010	35.38%	11.20%	6.52%	83.14%
Private Gifts, Grants, and Contracts Revenues	*1986*	1.93%	2.16%	0.00%	15.17%
	1998	3.03%	2.95%	0.00%	18.73%
	2010	3.04%	3.19%	0.00%	25.12%
State Government Revenues	*1986*	51.26%	12.30%	0.00%	82.16%
	1998	42.66%	11.58%	0.00%	87.52%
	2010	30.30%	9.95%	0.00%	60.71%
Federal Government Revenues	*1986*	10.53%	5.83%	0.00%	35.93%
	1998	11.37%	6.76%	1.17%	55.90%
	2010	15.62%	7.23%	0.96%	46.86%
Auxiliary Enterprise Revenues	*1986*	13.42%	7.37%	0.00%	47.34%
	1998	12.27%	7.04%	0.00%	43.42%
	2010	11.88%	7.37%	0.00%	45.89%
Miscellaneous Revenues	*1986*	11.84%	7.15%	0.00%	51.44%
	1998	15.18%	7.52%	4.19%	62.89%
	2010	12.02%	9.12%	0.00%	67.29%

Three of the six revenue streams used to define the revenue profiles were heavily skewed and therefore it was necessary to transform them in order to meet the normality assumptions

[7] The distributions of these revenue streams and skewness statistics are available upon request from the author.

inherent in a MLCA analysis using continuous data. Tuition income, auxiliary revenues, and state government revenues[8] were all approximately normally distributed based on skewness statistics and an examination of the histograms for each funding stream. Private gifts, grant and contracts; federal government revenues[9]; and miscellaneous revenues were all skewed, but not irreparably so. I used a log transformation for miscellaneous revenues which corrected the non-normality according to the histogram and skewness statistics. For private gifts, grants and contracts and federal government revenues I used a square root to transform the two variables so they were approximately normally distributed.

Spending profiles, like revenue profiles, refer to the *set* of university spending streams at a given point in time. This incorporates the spending streams a university uses *and* the proportion of total expenditures that each spending stream contributes to the whole. To estimate the spending profiles I used the percent of total expenditures that were spent in eight areas: instruction; research; student services; academic support; institutional support services; operation and maintenance; auxiliary enterprises; and miscellaneous expenditures.[10] Miscellaneous expenditures refers to the sum total of public service; scholarship and fellowship; hospital; and independent operations expenditures. These four expenditure streams were collapsed into one category of expenditures which I call "miscellaneous" for the same reasons I generated the miscellaneous revenues category. These reasons include: the lack of variation, highly skewed

[8] State government revenues are composed of both state appropriations and state grants and contracts. The overwhelming majority of state revenues for public institutions are from state appropriations as opposed to state grants and contracts. For example, in 1986 the average proportions of total revenues coming from state revenues, state appropriations and state grants and contracts for all public universities were: 51.26%, 49.75% and 1.52% respectively. In 2010 these numbers were 30.30%, 26.50%, and 3.81% respectively.
[9] Federal government revenues, like state government revenues, consist of both federal grants and contracts and federal appropriations. However, in contrast to state government revenues the majority of federal government revenues come from grants and contracts. For example the average proportions of total revenues coming from federal revenues, federal appropriations, and federal grants and contracts for all public universities in 1986 were 10.53%, 0.40%, and 10.13% respectively. In 2010 these proportions were 15.62%, 0.34%, and 15.28% respectively.
[10] The definitions for each of these spending streams can be found in Table A1 in the Appendix.

distributions, and small contributions to total expenditures. Descriptive statistics for each of these spending streams are shown in Table 2 below in 1986, 1998, and 2010.In contrast to university revenues there are smaller changes in university spending in these eight areas over time.

Table 2: Descriptive Statistics Spending Streams, Selected Years

Spending Stream	Year	Mean	Std. Dev.	Minimum	Maximum
Instructional Spending	*1986*	36.42%	7.95%	0.00%	65.14%
	1998	34.42%	7.10%	0.00%	58.75%
	2010	34.61%	7.21%	0.00%	60.24%
Research Spending	*1986*	4.48%	7.15%	0.00%	49.62%
	1998	5.41%	7.68%	0.00%	38.14%
	2010	6.54%	8.98%	0.00%	65.97%
Student Services Spending	*1986*	5.84%	5.04%	0.92%	100.00%
	1998	6.39%	2.90%	0.56%	14.98%
	2010	7.38%	3.56%	0.51%	21.80%
Academic Support Spending	*1986*	7.74%	2.85%	0.00%	25.17%
	1998	8.43%	3.17%	2.35%	30.98%
	2010	8.70%	3.43%	0.09%	39.06%
Institutional Services Spending	*1986*	10.25%	4.71%	0.00%	37.87%
	1998	9.92%	4.50%	1.83%	49.44%
	2010	10.46%	4.54%	0.79%	43.22%
Operation and Maintenance Spending	*1986*	9.39%	3.35%	0.00%	26.02%
	1998	7.47%	2.46%	0.00%	19.94%
	2010	7.09%	2.85%	0.87%	19.08%
Auxiliary Enterprise Spending	*1986*	14.04%	7.45%	0.00%	45.11%
	1998	12.78%	7.16%	0.00%	42.38%
	2010	13.18%	7.66%	0.00%	37.66%
Miscellaneous Spending	*1986*	11.84%	7.15%	0.00%	51.44%
	1998	15.18%	7.52%	4.19%	62.89%
	2010	12.02%	9.12%	0.00%	67.29%

Six of the eight expenditure streams used to define the spending profiles were skewed, though not irrevocably so, and therefore had to be transformed to satisfy the normality assumption before they were included in the model. I used a log transformation to generate

approximately normal distributions for research and student services spending. I utilized the square root transformation for institutional support services, operation and maintenance of plant, academic support, and miscellaneous expenditures to the same effect. Instructional and auxiliary enterprise spending were both approximately normally distributed based on skewness statistics and histograms and therefore were not transformed.

Methods

I used multilevel latent class analysis (MLCA) to estimate the financial profiles of public universities from 1986-2010. This method uses a series of fixed and random effects to capture variation across universities and within universities over time to estimate clusters or groups of organizations that pursue the same financial profile. It then allows universities to move in and out of the different groups or financial profiles over time as their observed behaviors change (Macmillian and Eliason 2003; Vermut 2003). In effect MLCA capitalizes on all of the cases to estimate the clusters of universities and the latent trajectories over time, and then allocates the school-years into the clusters at each point in time. By allowing the profiles to be constant for the period and allowing universities to move in and out of the profiles I can see which profiles become more or less prominent over time. This allows me to examine the trends in both organizational and field-level behaviors

I used MLCA to generate the groups of universities based on their observed behaviors through the estimation of a measurement model. The measurement model used the observed behaviors or characteristics of the universities to specify a number of latent classes within which universities are sorted. Universities were sorted into or assigned to these latent groups based on

how similar or different their observed behaviors are.[11] Universities with very similar behaviors reside in the same latent group while those with different behaviors are in different groups. The statistical model for MLCA model is a variation on a multinomial logistic regression model. The latent class variable is the categorical outcome and the observed behaviors, the time specification and the continuous random effects, predict the likelihood of a particular university being in a particular latent group or cluster at a particular time point.

MLCA is a multilevel modeling technique, therefore the latent clusters estimated can account for the variation in the observed data across organizations *and* over time. This is accomplished through the estimation of two levels of equations, each capturing a different level of variation (within organizations over time and between organizations) and together estimate the likelihood of an individual university residing in a cluster relative to the mean (Eliason, Mortimer, Vuolo, and Tranby 2007; Macmillian and Eliason 2003). This is analogous to the two levels in a hierarchical linear model where one level accounts for the variation across cases and the other level accounts for the variation within cases over time (Singer and Willett 2003).

The series of equations below depict the basic MLCA model specifications used to estimate the revenue and spending profiles. Equations 1 and 2 refer to the revenue profile specification and Equations 3 and 4 refer to the spending profile specification. I chose to split the model specifications into two equations one for the structural portion of the model (Eq. 2) and the other for the measurement portion of the model (Eq. 1) for clarity. I am using the classic latent class model notation in which the equation is expressed in terms of probabilities (Clogg 1995; Macmillian and Eliason 2003) for the measurement model portion of the revenue profile model

[11] This assignment is probabilistic in two ways. First, because MLCA is a variation on a multinomial logistic regression model it is predicting the probability of a university being in a particular group. Second, MLCA models, many other types of latent class analysis assign cases proportionally to the different latent classes. What this means is that a particular university can be 95% in latent class A and 5% in latent class B for example. While this is possible the majority of cases in this analysis are solidly in one class, i.e. they are generally 99 or 100 percent in a single latent class at any particular point in time.

specification. In this equation X refers to the categorical latent revenue profiles as determined by the continuous observed revenue streams ($R_1 \dots R_6$). The x subscripts signify the estimation of a separate conditional mean parameter for each latent profile (X). The structural portion of the revenue profile specification predicts the likelihood of schools being in the different latent revenue profiles $\left(\log\left(\frac{\pi^X}{\pi^{X\prime}}\right)\right)$ based on a fixed effect for the intercept (γ_{00}); a linear specification for time which was centered at 1980 (γ_{10}); a random effect on the intercept or mean structure (η_{0i}); and a random effect on the trajectories of the latent classes over time (η_{1i}). The random effect for the intercept or mean structure allows for random variation at the university-level around each of the mean structures (one for each latent class or profile). The random effect for the time specifications allows for university-level random variation in the effect of time on the likelihood of universities being in a particular latent class or profile.

Revenue Profile Measurement Model:

$$\pi_{ijklmd}^{R_1R_2R_3R_4R_5R_6X} = \pi_{ix}^{R_1|X}\pi_{jx}^{R_2|X}\pi_{kx}^{R_3|X}\pi_{lx}^{R_4|X}\pi_{mx}^{R_5|X}\pi_{dx}^{R_6|X}\pi_{x}^{X} \quad \text{(Eq. 1)}$$

Revenue Profile Structural Model:

$$\log\left(\frac{\pi^X}{\pi^{X\prime}}\right) = \gamma_{00} + \gamma_{10}(time) + \eta_{0i} + \eta_{1i}(time) \quad \text{(Eq. 2)}$$

The equations for the spending profile model specification are shown in equations 3 and 4 below. In the measurement model specification Y refers to the categorical latent spending profiles as determined by the continuous observed spending streams ($S_1 \dots S_8$). The y subscripts signify the estimation of a separate conditional mean parameter for each latent spending profile (Y). The structural portion of the model (Eq. 4) is the same as the structural portion of the revenue profile model specification.

Spending Profile Measurement Model:

$$\pi_{dfnijklm}^{S_1S_2S_3S_4S_5S_6S_7S_8Y} = \pi_{dy}^{S_1|Y}\pi_{fy}^{S_2|Y}\pi_{ny}^{S_3|Y}\pi_{iy}^{S_4|Y}\pi_{jy}^{S_5|Y}\pi_{ky}^{S_6|Y}\pi_{ly}^{S_7|Y}\pi_{my}^{S_8|Y}\pi_{y}^{Y} \quad \text{(Eq. 3)}$$

Spending Profile Structural Model:

$$\log\left(\frac{\pi^{Y}}{\pi^{Y\prime}}\right) = \gamma_{00} + \gamma_{10}(time) + \eta_{0i} + \eta_{1i}(time) \quad \text{(Eq. 4)}$$

A series of models was estimated using each set of equations where different numbers of latent classes or profiles were specified for the revenue and spending profiles separately. For example, when determining the best fitting model for the spending profiles, I estimated models with one latent class all the way up to seven latent classes. I then used a number of characteristics of the models to determine the best fitting consistent model for the data (Eliason, Mortimer, Vuolo, and Tranby 2007; Macmillian and Eliason 2003; Raftery 1995; Vermut 2003). For each model I compared model fit statistics (primarily the BIC statistics); the proportion of cases in each profile; the consistency of the parameter and conditional mean estimates; and the log likelihood and trajectory output consistency (when running the same model with the same number of latent classes more than once to evaluate model stability). Using these factors I determined that the best fitting consistent model for the revenue profiles had four latent profiles and the best fitting consistent model for the spending profiles had three latent spending profiles. The revenue and spending profiles I estimated are described in the analysis section below. The specific steps I took in this process and the rationale behind them is explained in detail in Appendix B.

MLCA is a significant advancement over standard techniques in three ways. First, MLCA allows researchers to model variation across organizations and over time unlike the standard methods of grouping or clustering cases, such as cluster analysis or multidimensional scaling, which are unable to account for both levels of variation (Eliason, Mortimer, Vuolo, and Tranby 2007; Macmillian and Eliason 2003; Vermut 2003). This provides a more comprehensive picture of how the revenue profiles of universities and the industry as a whole changes over time. Second, MLCA uses empirical data to break up the field of public universities into clusters of

organizations that behave in similar ways. Segmenting the field in this way allows me to examine the changes in each cluster over time to describe trends in the field of public higher education such as the privatization, fragmentation, or homogenization of the field of public higher education in the U.S. Third, MLCA allows researchers to analyze the entire set of university revenue or spending streams simultaneously through the estimation of university revenue and spending profiles. This is an advancement over current methods because it allows researchers to see the whole picture rather than having to look at individual pieces, which according to Young (2007) is helpful for understanding the finances of institutions that rely on multiple revenue streams and provide a number of services such as higher education. Finally MLCA also allows researchers to evaluate the significance of each of the observed variables in the definition of the profiles which other clustering methods, such as cluster analysis, are unable to do. This allows researchers to evaluate the model specification. This also allows researchers to see if observed variables are contributing unique information to the definition of the clusters or if a single variable, or small set of variables, are the primary drivers of the latent class specifications.

Analysis and Results

The results from the MLCA analysis both confirm and challenge the expectations described above. For the purposes of clarity I outline the results for the revenue profiles and the spending profiles in turn before discussing the relationship between the two and the implications of that relationship. I discuss the implications of these organizational-level changes for the field of public higher education as a whole in the discussion and conclusion section.

The Revenues Profiles of Colleges and Universities

I determined that there are four latent revenue profiles that characterize public university revenues between 1986 and 2010: *state dependent, tuition+state, state enterprise, and diversified*

revenue profiles. Figure 1 displays the four latent revenue profiles each of which was named based on the revenue profile characteristics displayed in Figure 1. Each of the four profiles maintains the same characteristics for the entire period and universities are able to move in and out of the four revenue profiles as their observed behaviors change. This specification (with four latent classes) was determined based on (1) the consistency of the model parameters, conditional means, log likelihood statistics, and profile characteristics; (2) model fit statistics; and (3) the proportion of cases in each profile.[12] These four latent revenue profiles were defined using the six observed revenue streams outlined in the data section above. Table 3 below displays the regression parameters for the structural portion of the model, along with the standard errors in parentheses, and the conditional means for the measurement portion of the model.

[12] A more detailed discussion of the determination of the model specification, including log likelihood and BIC model fit statistics is included in Appendix B.

Table 3: Model Parameters for Revenue Profile Specification

	State Dependent Profile	Tuition+ State Profile	State Enterprise Profile	Diversified Profile
Regression Parameters				
Time(Linear)	-0.766***	0.7858***	-0.6582***	0.6384***
	(0.1589)	(0.067)	(0.0913)	(0.1184)
Random Trajectory	0.4455***	-0.1685***	0.6048***	-0.8818***
	(0.059)	(0.0443)	(0.0653)	(0.0682)
Intercept	6.8496***	-2.0216***	-0.8605	-3.9676***
	(1.1164)	(0.6009)	(0.9576)	(1.1685)
Random Intercept	21.2213***	0.884	-22.6724***	0.5672
	(2.279)	(0.7871)	(2.224)	(0.7094)
Conditional Means				
Tuition Revenues	0.2287***	0.4135***	0.2438***	0.1918***
	(0.0165)	(0.0176)	(0.0101)	(0.0121)
Auxiliary Revenues	0.0845***	0.1107***	0.1978***	0.1079***
	(0.0121)	(0.0115)	(0.0128)	(0.0053)
State Government Revenues	0.5395***	0.337***	0.428***	0.3354***
	(0.0111)	(0.0259)	(0.0153)	(0.0114)
Private Gifts, Grants and Contracts (square root)	0.1147***	0.1095***	0.1262***	0.1825***
	(0.0058)	(0.0061)	(0.0069)	(0.0098)
Federal Government Revenues (square root)	0.3228***	0.3024***	0.2894***	0.4401***
	(0.0101)	(0.0069)	(0.0147)	(0.0099)
Miscellaneous Revenues (logged)	-4.9741***	-4.7664***	-4.8152***	-3.1357***
	(0.1716)	(0.1288)	(0.1562)	(0.2192)

***p<0.001, ** p<0.01, *p<0.05

All six observed revenue streams were statically significant for all four of the revenue profiles as indicated by the highly significant conditional means in Table 3. This indicates that all six variables were contributing significant information to the estimation of all four of the revenue profiles, i.e., that the revenue profiles are a function of all six revenue streams and are not being driven by differences in a single revenues stream. The main effect for time and the random trajectory effect, the coefficients and standard errors for which are also listed in Table 3, were also statistically significant for all four of the latent classes. This indicates two things. First, the

profiles vary substantially over time in terms of their prominence in the field. Second, there is statistically significant random variation in the effect of time on the likelihood of being in a particular revenue profile. Table 3 also lists the coefficients and standard errors for the main and random intercept effects. The random intercept effect allows for random university-level variation around the mean structures of each latent profile. The coefficients for these effects were not statistically significant for the *tuition+state profile* or the *diversified profile*. This indicates that the variation around the mean structures specified in the model for these two revenue profiles is not statistically significant, i.e. not different from zero. Therefore the mean structure specified for the *tuition+state* and *diversified revenue profile* are strongly representative of all of the schools in the profiles.

The *state dependent profile,* in the upper left corner of Figure 1, is, as the name would suggest, the revenue profile that is most dependent on state funding (54% of total revenues). Tuition (23%), federal government (11%), and auxiliary enterprise (8%) revenues are the other key pieces of the pie. The *state dependent profile* is composed primarily of master's institutions but also includes substantial levels of both baccalaureate and doctoral/research institutions. Using the 2010 Basic Carnegie Classification, 60.08% of the schools in the profile in 1986 were master's level institutions, 14.81% were baccalaureate institutions, and 25.1% were research/doctoral universities.[13] The types of schools in the *state dependent profile* did change slightly between 1986 and 2010. The proportion of masters and baccalaureate institutions increased (to 64.00% and 18.67% respectively) and the proportion of research/doctoral universities declined (to 17.33%). Some examples of schools that reside in this profile for the

[13] There are eight categories of schools in the 2010 Basic Carnegie Classification that are relevant for this group of schools. I collapsed very high research, high research, and doctoral/research universities into the category of research/doctoral. I collapsed the three categories of master's institutions (large programs, medium programs, and smaller programs) into a single category. The three categories of baccalaureate institutions (arts and sciences, diverse fields, and associates colleges) were also collapsed into a single category.

entire period include: Alabama State University, a number of the California State University campuses (e.g. Bakersfield, Fresno, Long Beach, and Chico), the University at Buffalo, Georgia State University, and Eastern New Mexico University.[14]

[14] A full list of the schools in each profile is available upon request from the author.

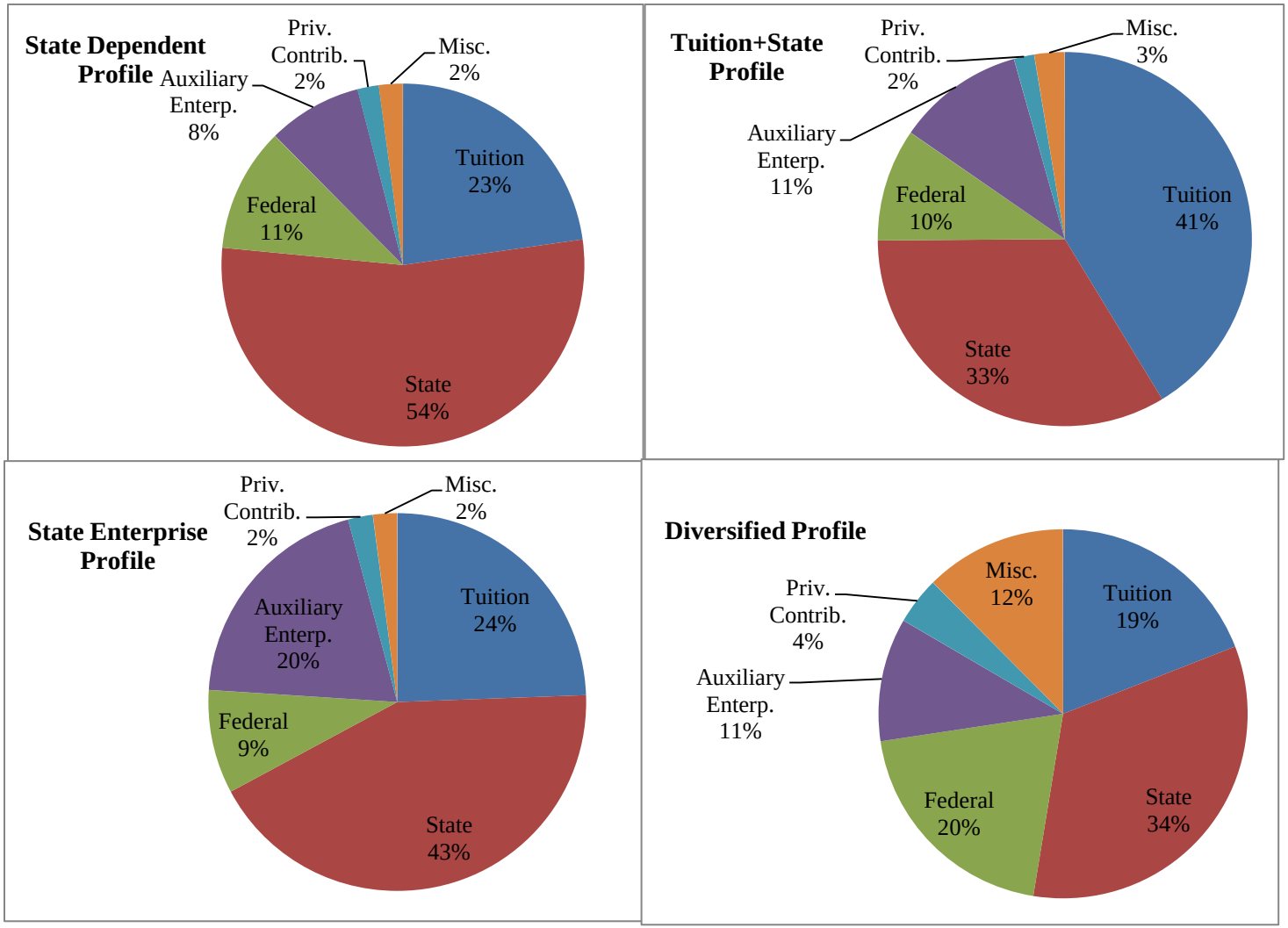

Figure 1: Revenue Profiles of Public Universities, 1986-2010

The *state dependent profile* showed a dramatic decline between 1986 and 2010 falling from 49.40% of public universities in 1986 to only 14.79% of schools in 2010 (Figure 2). This decline was the result of schools moving out of this profile and into the *diversified, tuition+state, or state enterprise profiles*. Those schools that moved from the *state dependent profile* to the *diversified profile* (29 schools) relied less of state revenues (54% to 34% respectively) and marginally less on tuition (23% to 19%) and more on federal government (11% to 20%), miscellaneous (2% to 12%), and private contributor income (2% to 4%). These schools included: University of California-Riverside, University of Florida, Texas A&M University, University of Alaska-Fairbanks, and the University of Louisville. The 137 schools that moved from the *state dependent profile* to the *tuition+state profile* also decreased their reliance on state government revenues (from 54% to 33% respectively), substantially increased their reliance on tuition (from 23% to 41%), and only experienced marginal changes in federal government and auxiliary enterprise revenues (11% to 10% and 8% to 11% respectively). Some of the schools that made this revenue profile shift include: University of Colorado at Denver, a number of the Indiana University branch campuses, University of Massachusetts-Boston, University of Houston-Main Campus, and the University of Akron main campus. The 13 schools that moved from the *state dependent profile* to the *state enterprise profile* decreased their reliance on state government revenues (from 54% to 43% respectively) and increased their reliance on auxiliary enterprise expenditures (from 8% to 20%). Some of the schools that made this revenue profile shift are: Arkansas Technical University, Morgan State University, Francis Marion University, and Ramapo College of New Jersey.

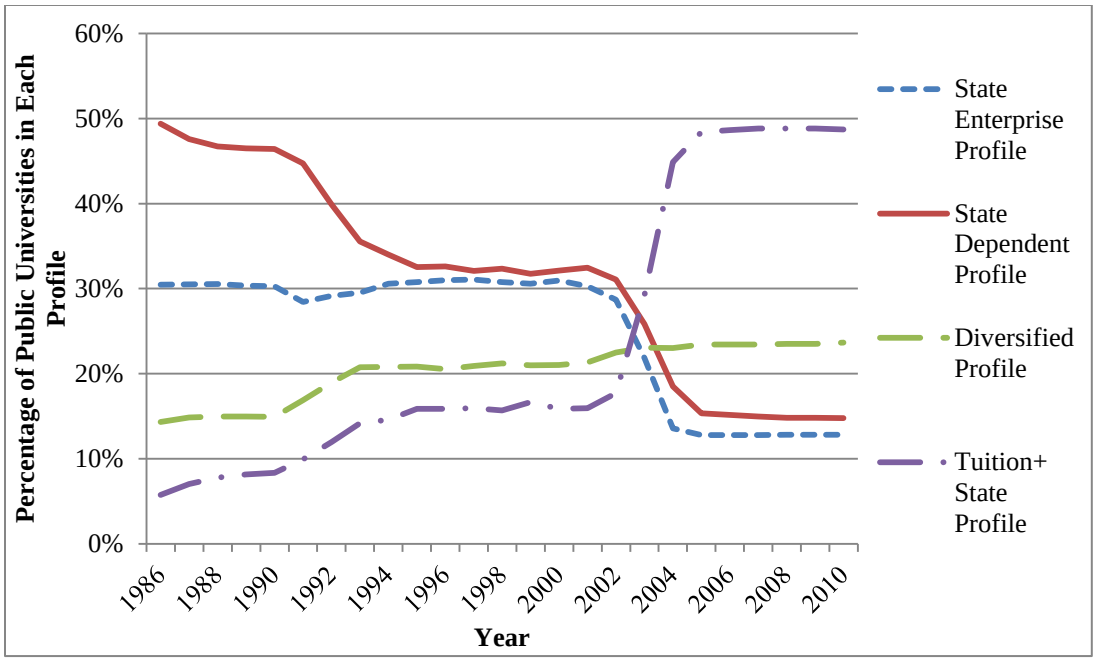

Figure 2: Changing Prevalence of Public University Revenue Profiles, 1986-2010

The *tuition+state profile*, the upper right of Figure 1, substantially increased in prominence between 1986 and 2010. It grew from 5.78% to 48.72% of public universities between 1986 and 2010 (Figure 2). This profile, as the name suggests, was characterized by heavy dependence on both tuition and state government revenues (41% and 33% respectively). Federal government and auxiliary enterprise revenues were the other key components of this revenue profile (10% and 11% respectively). Unlike the *state dependence profile* the type of schools that are in *tuition+state profile* changed substantially over time. In 1986 26.92% of the schools were research/doctoral, 30.77% were master's institutions, and 42.31% were baccalaureate institutions. By 2010 this cluster was composed primarily of master's institutions (61.13%) with research/doctoral institutions and baccalaureate institutions only counting for 21.86% and 16.60% of schools respectively. The University of Delaware, University of New

Hampshire, University of Colorado at Colorado Springs, and Lyndon State College are all schools that reside in this profile for the entire period.

The increase in the prominence of the *tuition+state profile* over time was driven by shifts of schools from the *state dependent profile* (137 schools) and the *state enterprise profile* (86 schools) into this profile. The nature of the shift from the *state dependent profile* into the *tuition+state profile* and some schools that make this shift were discussed above. Schools that move into *the tuition+state profile* from the *state enterprise profile* decreased their reliance on state government (43% in *state enterprise profile* to 33% in *tuition+state profile*) and auxiliary enterprise revenues (20% to 11% respectively) and increased their reliance on tuition income (24% to 41%). Schools that made this shift include: Arizona State University, Indiana University-Bloomington, University of North Carolina at Charlotte, University of North Texas, and Western Washington University.

The *state enterprise profile* (in the lower left of Figure 1), in contrast to the *tuition+state profile*, declined in prominence from 30.48% of public universities in 1986 to 12.82% in 2010 (Figure 2). The *state enterprise profile* was named based on the fact that it is still greatly reliant on state funding (43% of total revenues) and because of the large contribution from auxiliary enterprise revenues (20%). The type of schools in this cluster did not change much between 1986 and 2010, but there was a slight increase in the proportion of baccalaureate and master's institutions in the profile over time. In 1986 24.34% of the schools in this profile were research/doctoral institutions, 59.21% were master's institutions, and 16.45% were baccalaureate institutions. In 2010 18.46% of these schools in profile were research/doctoral institutions, 61.54% were master's institutions, and 20.0% were baccalaureate institutions. Schools that remain in the *state enterprise profile* for the entire period included: the University of Connecticut,

Oklahoma State University, Georgia Southern University, Indiana State University, and Southern Oregon University.

The majority of schools that begin in the *state enterprise profile* but later moved to a different profile went to the t*uition+state profile* (86 schools). This shift was described above. However there are also some schools that move from the *state enterprise profile* to the *diversified profile*. The 15 schools that made this shift decreased their reliance on state funding (from 43% to 34%), tuition income (24% to 19%), and auxiliary enterprise revenues (20% to 11%) but increased their reliance on miscellaneous revenues (2% to 12%), private contributions (2% to 4%) and federal government revenues (9% to 20%). Schools that made this shift included: University of Oklahoma, University of Montana, University of Southern Mississippi, University of Kansas, and South Carolina State University.

The final revenue profile, the *diversified revenue profile,* is shown in the lower right of Figure 1. This revenue profile was the most diverse of the four, it relied less on any single revenue stream, hence the name. This profile had the lowest dependence on tuition (19%), the second lowest on state government revenues (34%), and the highest dependence on federal (20%), and miscellaneous revenues (12%)[15], and private contributions (4%). The schools in this profile were predominantly research/doctoral institutions (83.33% in 1986 and 75.83% in 2010), only a small portion were master's institutions (13.89% in 1986 and 15.83% in 2010) or baccalaureate institutions (2.78% in 1986 and 7.50% in 2010). Schools that were in this cluster for the entire period included: the University of Arizona, University of Illinois-Chicago, University of Minnesota-Twin Cities, University of California –Berkeley, Michigan State University, University of North Carolina-Chapel Hill, and the University of Virginia.

[15] The largest miscellaneous revenue stream for the schools in this cluster on average was hospital revenues (7.65%).

The *diversified profile* showed the smallest change in prominence over time, an increase from 14.34% of public universities in 1986 to 23.67% in 2010 (Figure 2). While this profile was the smallest of the four in 1986 both the *state dependent* and *state enterprise profiles* were less prominent in the field by 2010. The increase in the prominence of the *diversified revenue profile* was driven by schools moving into this profile from the *state dependent* (29 schools) and *state enterprise revenue profiles* (15 schools). Both of these shifts were discussed above.

Overall there was a substantial shift of schools out of the *state dependent* and *state enterprise profiles* and a shift into the *tuition+state* and *diversified revenue profiles* between 1986 and 2010. This is most clearly seen in Figure 2 above and in Table 4 below. Table 4 is a mobility Table where the sending institutions are the rows and the receiving institutions are the columns. The cells are counts that show the number of schools that were in a profile in 1986 that moved to a profile in 2010. For example, 137 schools were in the *state dependent profile* in 1986 but moved to the *tuition+state profile* by 2010. The counts on the diagonal are the number of universities that stayed in the profile for the entire period. For example, 33 schools were in the *tuition+state profile* for the entire period.

This table provides a useful summary of how public universities change their revenue profiles over time. There are also a number of additional points that are worth mentioning. First, the *state dependent profile* "sent" the most schools (179) to other profiles between 1986 and 2010. Second, the *tuition+state profile* "received" the most schools (223) between 1986 and 2010 and also had the lowest number of "stayers" for the whole period (33). Both trends correspond to the shifts seen in **Figure** 2 above. Third, though the *diversified profile* "received" at least one school from each of the other three profiles it did not "send" any schools to other profiles. In effect those schools that were in the diversified profile in 1986 remained in that profile for the entire period. A similar trend was apparent for the *tuition+state profile* which only "sent" one

school (to the *diversified profile*). This indicates a sort of stability for the schools that are in these two profiles. Essentially once a school was in either the *tuition+state profile* (with one exception) or the *diversified profile* their revenue profiles did not change. This indicates that these revenue profiles may provide a level of stability that the *state dependent* and *state enterprise profile* are unable to.

Table **4: University Mobility Across Revenue Profiles, 1986-2010**

	State Dependent Profile	**Tuition+ State Profile**	**State Enterprise Profile**	**Diversified Profile**
State Dependent Profile	**76**	137	13	29
Tuition+State Profile	0	**33**	0	1
State Enterprise Profile	0	86	**52**	15
Diversified Profile	0	0	0	**74**

The Spending Profiles of Colleges and Universities

In contrast to the four revenue profiles described above there are only three latent spending profiles for public universities from 1986 to 2010: the *multiproduct, teaching intensive,* and *teaching plus spending profiles.* Figure 3 displays the three latent spending profiles each of which was named based on the profile characteristics displayed in Figure 3. I determined this number of latent classes using the same methods that I employed for the revenue profiles.[16] The three latent spending profiles were defined using the eight observed spending streams outlined in the data section above. Table 5 below displays the regression parameters for the structural portion

[16] These are elaborated in greater detail in Appendix B.

of the model, along with the standard errors in parentheses, the conditional means, and the corresponding standard errors for the measurement portion of the model.

Table 5: Model Parameters for Spending Profile Specification

	Multiproduct Profile	Teaching Intensive Profile	Teaching Plus Profile
Regression Parameters			
Time(Linear)	-0.1426***	-0.0351	0.1777***
	(0.0388)	(0.0401)	(0.0238)
Random Trajectory	0.3879***	-0.4074***	0.0195
	(0.0394)	(0.023)	(0.0245)
Intercept	-4.6027***	0.4184	4.1843***
	(0.9702)	(0.6716)	(0.621)
Random Intercept	-10.4398***	11.7855***	-1.3457*
	(0.7875)	(0.6472)	(0.5757)
Conditional Means			
Instruction Spending	0.2615***	0.3915***	0.3508***
	(0.0094)	(0.0059)	(0.0035)
Research Spending (logged)	-1.8222***	-6.649***	-3.5542***
	(0.0831)	(0.1725)	(0.1188)
Student Services Spending (logged)	-3.7688***	-2.5345***	-2.8599***
	(0.0559)	(0.0251)	(0.0333)
Institutional Support Spending(square root)	0.2239***	0.3562***	0.3047***
	(0.0046)	(0.0046)	(0.0032)
Operation and Maintenance Spending (square root)	0.232***	0.3***	0.2824***
	(0.0041)	(0.0033)	(0.0025)
Auxiliary Enterprise Spending	0.1127***	0.0983***	0.1525***
	(0.0067)	(0.0066)	(0.0047)
Academic Support Spending (square root)	0.2548***	0.2886***	0.2871***
	(0.005)	(0.0046)	(0.0028)
Miscellaneous Spending (square root)	0.4649***	0.3205***	0.3313***
	(0.0198)	(0.0054)	(0.004)

***p<0.001, ** p<0.01, *p<0.05

All eight of the observed spending streams were statically significant for all three of the spending profiles based on the highly significant coefficients shown in Table 5. Like the revenue profiles above this indicates that the spending profiles were a function of all eight spending streams and are not being distinguished by differences in a single spending stream. In contrast to the revenue profiles the main effect for time and the random trajectory effect were not statistically significant for all three of the latent spending profiles (see the coefficients in Table 5). The main effect for time was insignificant for the *teaching intensive profile* indicating that time was not a statistically significant predictor of university membership in this spending profile. This is supported by the basically constant prominence of this profile in Figure 4. The random effect for time was not significant for the *teaching plus profile* indicating that there is no statistically significant university-level variation in the effect of time on the likelihood of a university belonging in this profile. The random intercept effects allow for university-level random variation in the mean structures for each spending profile. These coefficients were statistically significant for all three spending profiles indicating that there is statistically significant random university-level variation around the mean structures of all three profiles.

The first of the three latent spending profiles is the *multiproduct profile* shown in the upper left of Figure 3. This profile is did not have a single dominant spending category; instead schools in this profile spent roughly the same relative amounts on instruction, research, and miscellaneous expenditures (26%, 19%, and 24% respectively). In effect these schools didn't just teach, or just teach and do research; they did a little bit of everything, hence the name. Miscellaneous expenditures for the schools in this profile were primarily hospital expenditures or public service expenditures (12.09% and 7.96% respectively). The schools in this spending profile were almost exclusively research/doctoral institutions based on the 2010 Basic Carnegie Classification regardless of the year (94.2% of the schools in this cluster for the entire period).

Schools in this profile included: University of Alabama at Birmingham, University of Georgia, Ohio State University-Main Campus, University of Michigan-Ann Arbor, and the University of Hawaii at Manoa.

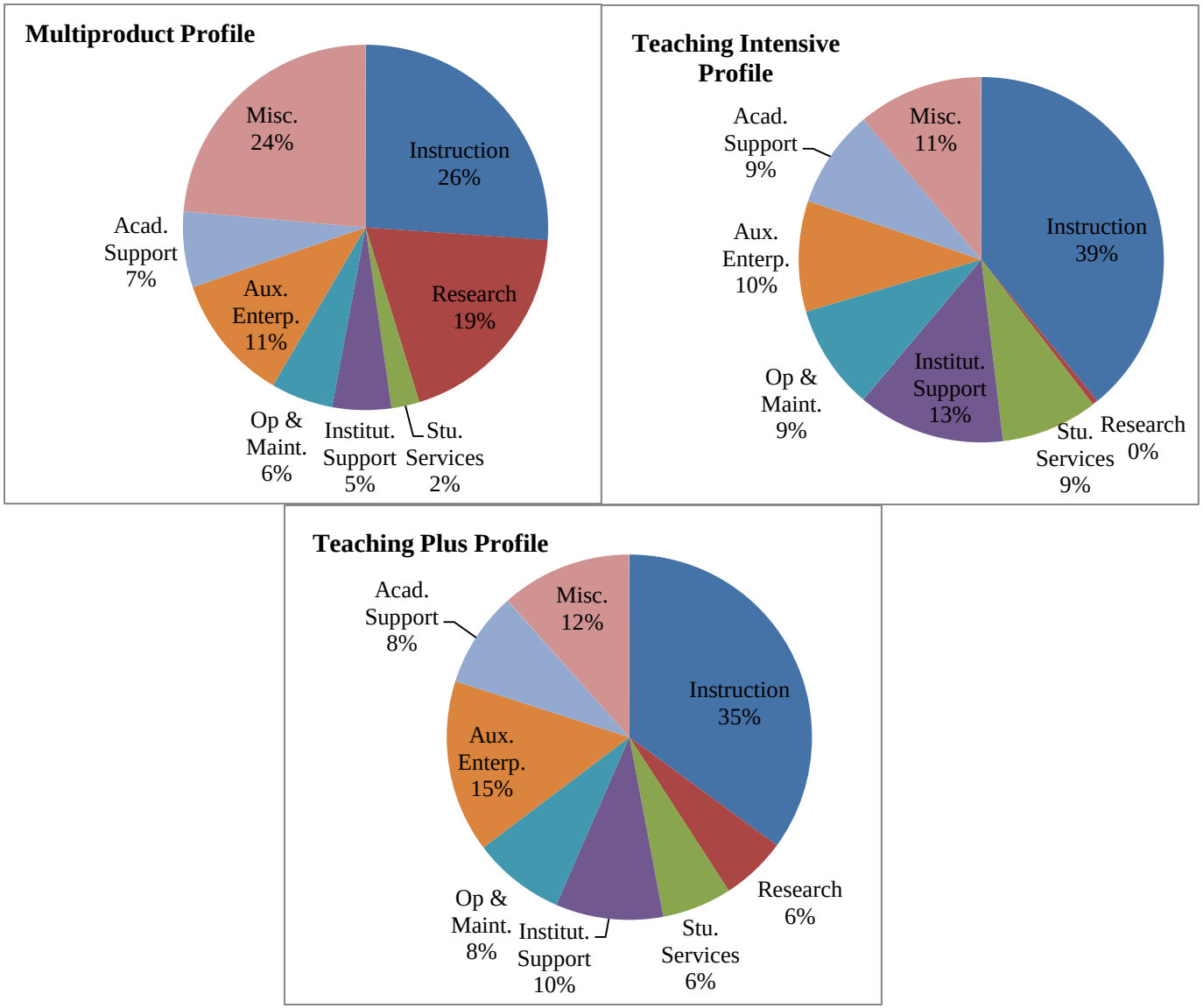

Figure 3: Spending Profiles of Public Universities, 1986-2010

Unlike the revenue profiles outlined above, the spending profiles of public universities did not change in prominence over time. The *multiproduct profile* was the least prominent of the three spending profiles including only approximately 13% of public universities for the entire period. There was some movement of schools from this spending profile and into the *teaching plus profile* (7 schools) and some movement into this cluster from the *teaching plus profile* (1 school). Schools that moved from this profile to the *teaching plus* profile increased their instructional (from 26% of total expenditures to 35%) and auxiliary enterprise spending (11% to 15%) and decreased their spending on research (19% to 6%) and miscellaneous expenses (24% to 12%). Schools that made this transition included: the University of North Dakota, University of Wyoming, University of Cincinnati and the University of Pittsburg. The University of Maryland College Park, on the other hand, made the reverse move (from the *teaching plus profile* into the *multiproduct profile*)

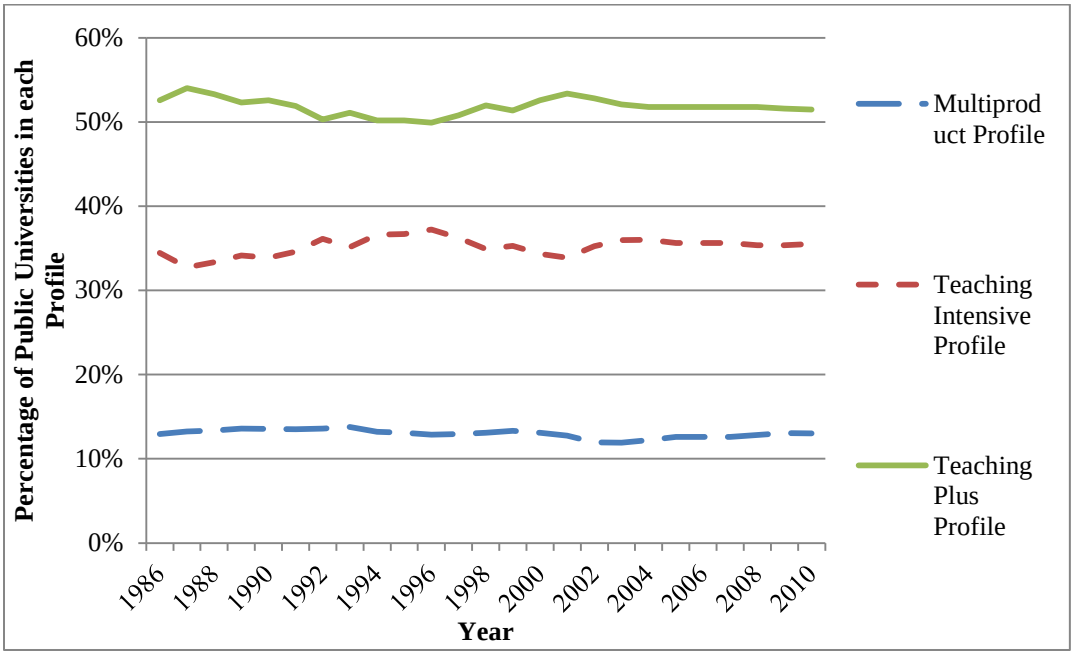

Figure 4: Changing Prevalence of Public University Spending Profiles, 1986-2010

The *teaching intensive profile*, the upper right of Figure 3, includes the schools that placed the greatest emphasis on instruction. The schools in this profile spent on average 39% of their total revenues on instruction. This profile was composed primarily of master's level institutions (71.49% of all schools for the whole period) with a substantial amount of baccalaureate schools as well (27.47%). Schools in this profile included: a number of the California State University campuses, University of Maine at Augusta, Augusta State University, SUNY College at Old Westbury, and the University of Texas at Tyler.

The *teaching intensive profile* increased marginally in prominence over time from 34.5% of public universities in 1986 to 35.5% in 2010 (Figure 4). The changing prominence over time was due to the fact that a number of schools moved back and forth between the *teaching intensive profile* and the *teaching plus profile* over the period. For example, Indiana University at South Bend, Dickinson State University, and Florida Gulf Coast University all move back and forth between the two profiles between 1986 and 2010.

The final spending profile is the *teaching plus profile* which included a mix of doctoral and research universities (39.86% of schools for the whole period), master's institutions (49.05%), and baccalaureate schools (10.71%). The schools in this profile heavily emphasized instruction (35%) but also spent money on research (6%), auxiliary enterprise revenues (15%) which differentiates this profile from the *teaching intensive profile*. This profile was the most prominent in the field accounting for 52.6% of schools in 1986 and 51.5% of schools in 2010. Some schools in this profile included: Florida State University, Indiana State University, University of Massachusetts at Amherst, University of Missouri-Kansas City, University of South Carolina –Columbia, and Texas Tech University.

One of the overriding characteristics of public university spending profiles was the lack of university mobility between the three profiles. This is most clearly seen in Figure 4 above and

in the mobility table (Table 6) below. In Table 6, like Table 4, the "sending" institutions are the rows and the "receiving" institutions are the columns. The cells contain the number of schools that were in a profile in 1986 that moved to a profile in 2010. For example, 1 school in the *teaching intensive profile* in 1986 moved to the *multiproduct* profile by 2010. The diagonal cells contain the number of universities that stayed in the profile for the entire period. For example, 237 schools were in the *teaching plus profile* for the entire period.

There are three trends of interest in Table 6. First, the majority of the schools ended the period in the same spending profile that they started in. Second, the *multiproduct spending profile* is the most stable of the three; it only "sent" 11 schools to other profiles between 1986 and 2010 in contrast to 20 for *teaching intensive profile* and 30 for the *teaching plus profile*. Second, the *teaching plus profile* was the most fluid, it "sent" 30 schools to other profiles during this time period. Finally, the *teaching plus profile* was also the popular in the sense that it "received" the most schools (30 schools) from other spending profiles.

Table 6: University Mobility Across Spending Profiles, 1986-2010

	Multiproduct Profile	**Teaching Intensive Profile**	**Teaching Plus Profile**
Multiproduct Profile	**58**	0	11
Teaching Intensive Profile	1	**160**	19
Teaching Plus Profile	7	23	**237**

Revenue and Spending Profile Correspondence

Now that the revenue and spending profiles have been outlined I turn to the relationships between revenue and spending profiles. Table 7 below outlines the correspondence between the

revenue and spending profiles; specifically the percentage of the cases from each revenue profile that were in each of the three spending profiles. The percentages are the percent of all school-years in each revenue profile for the entire period. For example, 2.29% of all of the cases in the *state dependent revenue profile* (in the entire period) are in the *multiproduct spending profile*, 52.56% are in the *teaching intensive profile*, and 45.15% are in the *teaching plus profile*.

All of the revenue profiles are loosely coupled with all of the spending streams. There are no strong ties between revenue profiles and spending profiles. This suggests one of two things, either (1) revenue profiles are not strong predictors of spending profiles or (2) there are substantial mediating factors in the relationship between the revenue and spending profiles that dilute the strength of these ties. I will walk through the basic correspondence between the revenue and spending profiles before turning to the larger trends.

Table 7: Correspondence between Revenue and Spending Profiles, 1986-2010 (Percent of Revenue Profile Cases in each Spending Profile)

	Multiproduct Spending Profile	**Teaching Intensive Spending Profile**	**Teaching Plus Spending Profile**
State Dependent Revenue Profile	2.29%	52.56%	45.15%
State Enterprise Revenue Profile	3.30%	22.55%	74.15%
Tuition+ State Revenue Profile	0.92%	49.98%	49.10%
Diversified Revenue Profile	55.26%	7.07%	37.67%

The *state dependent profile*, as noted above, corresponded most closely to the two spending profiles that emphasized teaching, the *teaching intensive* and *teaching plus spending profiles.* There were only ten schools that were in the *state dependent profile* that also were in the *multiproduct spending profile.* Six of these cases are interesting because they are large public research universities and therefore I would have expected them to not be in the *state dependent*

profile: University of Florida (1986-1991, altered revenue profile), University of Georgia (whole period), University of Hawaii-Manoa (1986-1992, altered revenue profile), University of Louisville (1986-1991, altered revenue profile), University of Maryland-Baltimore (1986-1991, altered revenue profile), and Texas A&M University (1986-1992, altered revenue profile).[17] However their membership in *the multiproduct spending* profile is consistent with the mission of these institutions in the sense that they are tasked with teaching and research, and generally also engage in a number of other activities as well. For example, all six of these schools have a school or college of medicine and a hospital.

These six schools, with the exception of the University of Georgia, all altered their revenue profile during this period but remained in the *multiproduct spending profile* for the entire period. This is somewhat counterintuitive because we generally expect changes in revenues to alter the goods and services an organization provides. The constant spending profile despite the change in the revenue profiles seem to suggest that these organizations may have changed their revenue profiles based on the particular mix of services that they provided. If this is the case it would support existing research in higher education and nonprofits which argues that the services provided by organizations attract different funders that want to fund the particular mix of activities and services that an organization is providing (Barringer 2012b; Wilsker and Young 2010; Young, Wilsker, and Grinsfelder 2010).

The *tuition+state revenue profile* was almost exclusively tied to the *teaching intensive* and *teaching plus spending profiles.* Only four schools in this revenue profile resided in the *multiproduct spending profile* and only one for the whole period: the University of New Hampshire (whole period), CUNY Hunter College (1996 only, altered revenue and spending

[17] The remaining schools are: East Carolina University (1986-1993, altered revenue profile), East Central University (1992-2010, altered spending profile), Southeast Oklahoma State University (1989-1993, altered both spending and revenue profiles), and Thomas Edison State College (1987 only, altered both spending and revenue profiles).

profiles), University of Toledo (2008-2010, moved into this spending profile from the *teaching plus spending profile*), and Clemson University (2004-2010, altered revenue profile). This suggests that, as we would expect, those schools that relied most heavily on tuition income are those that emphasized teaching.

The *state enterprise revenue profile* was the most tightly tied to any single spending profile, 74.15% of the cases in this profile were in the *teaching plus spending profile*. The majority of the remaining school-years were in the *teaching intensive spending profile* (22.55%), while only eight of the schools were in the *multiproduct spending profile.*[18] This suggests that some aspect of the *state enterprise revenue profile* inhibited the ability of schools in this profile from pursuing alterative spending profiles. For example, it could be the case that auxiliary enterprise revenues are rather constrained in the sense that all or most of the revenues from these activities must be spent on this activity. A descriptive comparison of the level of auxiliary enterprise revenues and auxiliary enterprise expenditures in the matching revenue and spending profiles lends some initial support to this idea.

The *diversified revenue profile* was primarily tied to the *multiproduct spending profile* (55.26% of school-years). However, of the four revenue profiles, it was also the most evenly tied to all three spending profiles; 37.67% of school-years were in the *teaching plus spending profile,* and 7.07% (11 schools) were in the *teaching intensive profile*. The strong tie between the *diversified revenue profile* and the *multiproduct spending profile* was expected, as was the fact that the second strongest tie was with the *teaching plus profile.* However the fact that this one was the least tightly coupled to any particular spending profile was somewhat unexpected. This

[18] The eight schools in the *state enterprise revenue profile* and *multiproduct spending profile* are: University of Alabama (1988-2001), University of Connecticut (2009-2010), Louisiana State University and Agricultural & Mechanical College (1986-2000), University of Southern Mississippi (1993-2000), East Carolina University (1994-2010), Oklahoma State University (whole period), University of Oklahoma-Main Campus (1986-1990), and Clemson University (1986-2003).

suggests that perhaps these institutions have greater discretion over how they allocate the diverse set of resources that they receive than schools in the other three revenue profiles. Further research would be necessary to determine if this is in fact the case or if there is another explanation for this loose coupling.

Despite the varying degrees of coupling between the revenue and spending, there is a major discontinuity between the two sets of. While there was substantial mobility in the revenue profiles that public universities pursued (Figure 2 and Table 4) there was almost no mobility in the spending profiles they utilized (Figure 4 and Table 6). While 54.46% of public universities altered their revenue profile (281 schools) between 1986 and 2010 only 11.82% of public universities (61 schools) altered their spending profile.

There was also discontinuity in terms of the schools that moved. Only 59.72% of public universities (43 schools) that altered their spending profiles also altered their revenue profiles. This is even more striking in the context of the revenue profile movers, the 43 schools that altered both their revenue and spending profiles accounted for only 15.19% of the public universities that altered their revenue profiles. Furthermore the majority of the schools that altered their revenue profile only did so once, whereas the majority of the schools that altered their spending profiles did so more than once because they were moving back and forth between the spending profiles.

Discussion and Conclusion

The results above confirm and challenge the expectations that I laid out above. First, universities did substantially alter their revenue profiles between 1986 and 2010. The majority of public universities (55%) altered their revenue profiles at least once during this period. Furthermore, different universities changed their profiles in different ways. Two profiles, the *tuition+state and diversified profiles,* grew substantially in prominence during this period.

Schools shifted into three of the four profiles throughout the period, the only profile that did not "receive" any schools was the *state dependent profile.* This confirms the expectation that revenue profiles change over time and that different universities change their revenue profiles in different ways.

Second, there were no substantial changes in the spending profiles of public universities. The majority of schools were in the same spending profile in 2010 that they were in 1986. This contradicts the expectation that these would change as university revenue profiles changed. Resource dependency theory argues that external organizations or groups, i.e. stakeholders, that a university is dependent on should exert influence on their behavior to the extent that the university is dependent on the stakeholders and the stakeholder is able to make its preferences known and hold the university accountable (Chapter 3 ; Pfeffer and Salancik 2003).

The third, closely related, finding is the discontinuity between the changes in revenue profiles and spending profiles. Though the revenue profiles changed substantially over time, corresponding changes in the spending profiles of public universities were not evident. This contradicts the expectation that changes in revenue profiles are related to changes in spending profiles. Furthermore all four revenue profiles are loosely coupled with all three spending profiles.

These findings suggest that while revenues are substantially influenced by the environment that the organization is situated in, their spending profiles are not. This finding, along with additional research presented here (Chapter 3), suggests that higher education organizations have erected a buffer between the environment and university spending. Therefore the resource dependencies of these organizations have limited influence on their spending behaviors. This buffer, I argue, is a function of the internal decision making, cross-subsidization, and the role of mission. For example, the centrality of mission for these organizations could be

constraining their spending profiles. The practice of cross-subsidization, which allows organizations to use profit generating activities to subsidize their unprofitable mission activities (James 1998; Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod 1998; Weisbrod, Ballou, and Asch 2008), is a mode of resource allocation that is consistent with the importance of mission and would allow universities to sustain their spending profile despite changes to their revenue profiles. Despite the importance of cross-subsidization for higher education organizations, and nonprofits generally, empirical examinations of the extent and nature of cross-subsidization in higher education organizations has been limited. Regretfully an in-depth examination of this practice is beyond the scope of the current analysis. Ongoing research however has established that this process does occur in public and private nonprofit higher education organizations and changes significantly over time (Barringer 2012a).

Fourth, because universities did not change their spending profiles over time, it is unclear at this level of spending aggregation whether or not public universities are shifting resources towards students in those cases where this group is becoming a more dominant stakeholder group. Therefore it is unclear if the expectation that public universities will shift resources to students over time as their relative dependence on this group increases. Fully evaluating this expectation is beyond the scope of this analysis due to the nature of the data used in this analysis. Specifically because the categories are predefined by IPEDS it is not possible to create a reasonably precise measure of university spending on students.

Field-level Trends

The profiles and their changing prominence over time reveal a number of field-level trends that have potentially far-reaching implications for public higher education. First, there is limited evidence suggesting that a homogenization of revenue profiles is occurring. Roughly the same percentage of schools are pursuing the most dominant profile in 1986 (*state dependent*

profile 49.4%) as are pursing the most dominant profile in 2010 (*tuition+state profile* 48.7%). There are also the same number of revenue profiles in 2010 as there were in 1986, in other words none of them dropped down to 0% of public universities. The same amount of revenue profile diversity was present in 2010 as was present in 1986. This confirms the expectation that there should be substantial diversity within the field of public higher education.

Second, universities are also becoming more self-sufficient or more reliant on earned sources of income during this period. This confirms the expectation that public universities would increase their reliance on earned income during this period. The *tuition+state profile,* which dramatically increases in prominence over the period, has the highest level of earned income[19] at 55% of total revenues. The *state dependent profile*, which had the lowest level of earned income (33%), declines dramatically over time (Figures 1 and 2). This suggests that privatization is occurring within the field as a whole, however different groups of schools are privatizing at different rates and even those schools that are relying more on earned income still rely on the state and federal governments for a substantial portion of their revenues.

Third, despite the privatization that is occurring, to varying degrees, in these institutions for the most part they continue to pursue their enacted missions in 2010 as they did in 1986. This is the case regardless of the degree of privatization. This could be seen as support for the trend of privatization, if these schools are changing their resource dependencies, but are still engaging in the same spending behaviors this could assuage some concerns about privatization causing mission drift. However, the spending and revenue profiles of these institutions may not be telling the whole story. For example, they do not evaluate spending per student, nor do they express differences or changes in absolute levels of spending. To truly evaluate the extent to which

[19] Earned income here is the sum of tuition, auxiliary enterprise and miscellaneous revenues.

privatization affects the missions of these institutions it is important to evaluate all of these aspects of university spending as well as other indicators of university missions.

Contributions and Policy Implications

This analysis has answered the questions of how revenue and spending profiles of public universities change over time and the correspondence in these two dimensions of university behaviors. These answers have a number of implications for policy makers, university administrators and researchers. For researchers these results challenge our standard interpretation of resource dependency theory and the open systems perspective of organizational research. In effect this suggests the need for scope conditions for this theory in the context of organizations like public universities that are multi-revenue/multiproduct organizations. Specifically that the internal processes of an organization, in this case the role of university mission and cross-subsidization, will mediate the effect(s) or resource dependencies and environmental conditions on some aspects of university behaviors. Resource dependency theory outlines a number of factors that should mediate the effects of dependence on behaviors such as the stakeholder's ability to control the allocation of the resources, the extent of the dependence, and the availability of alterative resources for example. However an investigation of the extent to which the internal decision making processes, cross-subsidization practices, and mission constraints on the effect of dependence has yet to be undertaken in the literature and is beyond the scope of the current analysis.

For university administrators, this analysis provides insight into how their spending and revenues profiles compare to other public universities. It also provides a more holistic picture of how the revenue and spending behaviors of public universities change which can help administrators gain insights about their peer institutions and knowledge of other revenue and spending profile options. This analysis also inductively derived groups of universities based on

their behavior and uses movement between those groups to map out the nature of the field of public higher education. This approach could be applied to a variety of other university behaviors that university administers would find useful. For example, universities could be clustered based on their research output. The relationship between these research profiles and university success or economic contribution would be of substantial use to university administrators as well as state governments, research funding agencies, and policy makers.

For policy makers, this analysis has revealed key changes over time in one dimension of university financial behavior, the revenue profiles, and stagnation or inertia in another dimension, the spending profiles. By evaluating the revenue and spending profiles of these institutions I have provided a more holistic understanding about how universities change their revenue and spending streams. This provides policy makers with a more detailed understanding of the nature of changes in university revenue profiles and the different ways in which these institutions are adapting to their changing resource environments. This is necessary to fully understand the implications of past policy changes and also to better anticipate the reactions of universities, and the field as a whole, to potential future policy changes. Furthermore the lack of change in spending profiles highlights an area in which universities have not changed their behavior despite changes in policies, resource conditions, and other environmental forces that affect public universities. This is particularly relevant for policy makers in the context of evaluating the effectiveness of past changes to higher education policies. The multilevel nature of this analysis is also significant for policy makers. Because the analysis not only described the individual university-level changes, but also the field-level trends for public higher education it provides insight into how the different ways in which universities have adapted to past conditions and policies impacts the field of public higher education as a whole.

Limitations

Despite these contributions there are also some notable limitations to this analysis that, in combination with the findings presented here, illuminate directions for future research. First and foremost this analysis focused on 516 public universities from 1986 to 2010. If a different set of institutions were used or a different time period the results will differ. Though a notable limitation, this also points to potentially fruitful analyses of subgroups of institutions, for example research universities or universities within a particular state or region, to develop a more fine-grained understanding of university financial behaviors for that subset of institutions.

Second, this analysis has been primarily descriptive; it does not evaluate causal relationships. The goal was to describe the nature of changing public university revenue and spending profiles over time and evaluate the extent to which the changes in these two dimensions of university financial behavior corresponded. As I argue above this fills notable gaps in the literature. However it does not evaluate specific explanations for organizational change. I have put forth some possible explanations for the nature of university changes illustrated here, but the evaluation of these explanations is beyond the scope of this analysis.

Third, the nature of the data used in the analysis is itself a limitation. Of particular relevance for this analysis is the nature of the revenue and spending categories within the IPEDS data. These categories are very useful for this analysis; however in certain cases the categories are extremely broad which limits the substantive insights that can be gained from the profiles and their changing prominence over time. For example, auxiliary enterprises revenues and expenditures are key categories in the specification of both the revenue and spending profiles. However a wide range of activities are included in this group such as: residence halls, food

services, student health services, athletics (for those schools where this is self-supporting)[20], parking and transportation, college bookstores, and faculty housing. A number of these are keys areas in which universities are expanding; because they are all classified in a single category it prohibits detailed analysis and understanding of this aspect of university finances.

Fourth, though this analysis took an initial step to bridge the micro/macro divide between the behavior of organizations and the implications of these behaviors for an organizational field as a whole it was unable to fully evaluate or map out the field of higher education. By breaking the field of public higher education into clusters, I was able to provide some insight into the field dynamics and organizational-level changes which contributes to a substantial gap within higher education research (Gumport 2012). However further research is necessary to fully bridge the divide between organizational and field-level phenomenon and to fully map out the field of public higher education.

[20] The inclusion of athletics creates an additional problem in that only athletics revenues (or expenditures) for those schools that are self-supporting are included here causing variation in what is included in this category to vary across schools.

CHAPTER 3: LIMITATIONS ON THE ROLE OF STAKEHOLDERS: EXAMINING UNIVERSITY SPENDING AND SECTOR DIFFERENCES IN HIGHER EDUCATION, 1980-2010

Abstract: Colleges and universities have a number of stakeholder groups that exert influence over them, and to which they are accountable, because they rely on a multitude of revenue streams. I assert that the degree to which colleges and universities are dependent on their different stakeholder groups, in other words the economic influence of these groups, significantly affects the behaviors of these institutions. Differences in the economic influence of key stakeholder groups can also contribute to our understanding of sector differences in higher education namely the variation within the sectors and changes in sector differences over time. To assess this argument, I evaluate how the economic influence of stakeholders affects the spending behaviors of four-year public and private nonprofit colleges and universities from 1980-2010. Results indicate that the spending behaviors of public and private nonprofit institutions are diverging over time while the economic influence of two key stakeholder groups converges. Using multilevel regression models I determine that (1) the economic influence of stakeholders is significantly related to the spending behaviors of these institutions, albeit in unexpected ways, (2) the effect of the economic influence of stakeholders on university spending weakened significantly over time, and (3) stakeholder influence helps us understand differences between sectors, within sectors, and variation over time but does not negate the legacy of differences that persist between these two sectors. These findings suggest that the theory of resource dependency has limited utility in the context of understanding behaviors of mission driven multi-revenue/multiproduct organizations like colleges and universities. I argue that this is because these organizations use internal processes, like cross-subsidization, to buffer aspects of their behavior from the environment allowing these organizations to continue pursuing their mission.

Introduction

Public and private nonprofit[21] universities are similar in many ways and different in others. Universities in both sectors do research, teach students, offer financial aid, and seek out private donations and other sources of revenues (McPherson, Schapiro, and Winston 1993; Weisbrod, Ballou, and Asch 2008). However, there are also a number of fundamental differences between public and private universities. For example, public universities receive more state money and are generally larger than private universities; private universities on the other hand rely more on tuition revenues (Ehrenberg 2002; Ehrenberg 2006; Weisbrod, Ballou, and Asch 2008). Perhaps most significantly, universities in the two sectors face different mandates and levels of oversight due to the different stakeholders to which they are held accountable and the

[21] Henceforth private will refer to private nonprofit.

degree of oversight by those stakeholders (Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008).

Over time as the environment surrounding higher education has changed, many distinctions between the two sectors have weakened, and variation within the two sectors has become more striking (Gumport and Snydman 2006; Weisbrod, Ballou, and Asch 2008). Gumport and Snydman (2006) point to the blurring of boundaries in the areas of organizational finance, governance, and mission of higher education organizations. The authors argue that the public/nonprofit/for-profit distinction is becoming less useful for understanding higher education as new hybrid organizational forms emerge specifically citing the commercialization and changing organizational ecology of university research and instruction (Gumport and Snydman 2006). This is particularly the case in the context of university finances where public universities have suffered declines in state revenues and have in turn been forced to increase the share of their revenues that come from tuition, private contributions, and other revenue sources that have historically been key income streams for private universities (Blasdell, McPherson, and Schapiro 1993; Chapter 2 ; Ehrenberg 2006). Others have pointed to the privatization of public universities and the exchange of public policy controls, that have historically governed public institutions, for market based controls as the key regulating mechanisms for these institutions (Dill 1997; Dill 2001; Morphew and Eckel 2009). In effect public universities are becoming more like nonprofits which are regulated by the various stakeholders, e.g. donors, state and federal governments, students, and other financial backers, that exert differing levels of economic or political influence over these institutions (Frumkin 2002). Stanley O. Ikenberry (2009) argues that the missions of public universities have changed as they increasing rely on alternative revenue streams. This in turn has created tension between the public universities, which are trying to adapt to their

changing position and accountability structures, and the states they reside in which have historically been the majority stakeholders of these institutions.

These changes, and others, point to the two facets of the higher education industry that are of interest for this analysis. First, this makes the traditional public-private distinction more fluid than it has been in the past as both institutions are reliant on and accountable to their evolving stakeholders. Second, as the funding bases of these institutions have changed the relative power of the various stakeholder groups that these organizations are accountable to has also changed. To the extent that these stakeholders are able to exert influence on universities, this should have substantial impacts on university behaviors.

In light of these issues my goal in this chapter is to evaluate three questions that will shed light on the extent to which stakeholders exert influence over these institutions and the implications of that influence for the changing distinctions between public and private universities. The first question is: how have stakeholders of public and private universities changed over time? Given the growing interest in the consequences of privatization (Morphew and Eckel 2009; Priest and St. John 2006) this is of particular interest for public universities, which have increased their average number of primary stakeholders as state funding has declined.[22] The second question is: how have the behaviors of public and private universities changed over time and what are the implications for sector differences? Answering this question allows for the evaluation of (1) how public and private universities change over time and (2) if their behaviors are becoming more or less similar as university stakeholders change. In effect this evaluates whether or not the behaviors of public and private universities are changing or if it is only their stakeholders that are changing. The last question is: what is the relationship between stakeholder influence and university behaviors and can this relationship shed light on sector

[22] Author's calculations, see Figures 5, 7, and 8.

differences in university behaviors? I argue that the differences in the stakeholders the universities are dependent on, and accountable to, can provide a more useful distinction for understanding differences in organizational behaviors in the two sectors than the dichotomous sector distinction. Furthermore, utilizing stakeholder influence to talk about sector differences is a way to recognize and incorporate the variation within the two sectors and the changes in behavior over time.

To answer these questions I analyze changes in public and private university spending behaviors and the relative economic influence of four key stakeholders-- students, state and federal governments, and private contributions--from 1980-2010. I then use multilevel regression models to evaluate the relationship between the economic influence of stakeholder groups and university spending and how this changes over time. University spending is well suited for evaluating these research questions because this is one of the key areas where the sector boundary is blurring (Gumport and Snydman 2006). Furthermore, using university spending as the behavioral outcome of interest allows me to more clearly explicate the mechanism that links stakeholder influence to university behavior.

I elaborate on the arguments made here, the mechanisms through which stakeholders influence organizations, and the implications of this for understand sector differences in the next section. Following this I discuss the data and methods used to evaluate these research questions. I then describe the results for each of the three research questions. The results highlight three things. First, the weakening influence of stakeholder groups over time. Second, the limitations of resource dependency theory for understanding behaviors of multi-revenue/multiproduct organizations like universities. This is because these organizations use internal processes and structures, like cross-subsidization, to buffer aspects of their behavior from the environment and to preserve their mission. Third, the utility of the economic influence of stakeholders for

understanding differences between sectors, variation within sectors, and changes over time. This is followed by a summary and discussion of the results and an outline of directions for future research.

Conceptual Framework

The three research questions above are concerned with the changing stakeholder influence of universities, how that relates to sector differences in university behaviors, and how both change over time. I first argue that the influence of stakeholders, specifically their economic influence, should affect the behavior of universities. I then develop a series of hypotheses for how stakeholder influence should affect university spending. Following this, I outline some existing explanations for sector differences. I then outline my argument for why the economic influence of university stakeholders provides additional utility due to its ability to account for variation within sectors and over time in addition to allowing the boundary between the sectors to be more fluid.

The Role of Stakeholder Influence

External groups, i.e. stakeholders, exert influence over an organization to the extent that an organization wants what the stakeholder group has. This idea is a basic tenant of resource dependency theory (RDT) which views organizations as entities that are influenced by their social context or environment (Scott and Davis 2007). The emphasis of RDT is therefore on the exchanges and transactions organizations have with their environments; specifically with the other groups and organizations (i.e. their stakeholders) in their environments and how those transactions restrict their independence (Pfeffer 2005; Pfeffer and Salancik 2003).

The focus in this analysis is on how university stakeholder groups have changed over time and the potential consequences of those changes for the behaviors of universities, particularly their spending behaviors. I argue that universities are more or less constrained in their

behaviors based on the group, or groups, that they are dependent on for resources. This argument is consistent with the basic tenants of RDT. If a university is heavily dependent on state funding, for example, and the state has certain constraints on how its contributions can be used, this likely constrains the behavior of the university in question.

The ability of a stakeholder group to exert influence over a university is a function of the nature of the relationship between the two organizations. Jeffrey Pfeffer and Gerald R. Salancik (2003) focus on three aspects of this relationship in particular: (1) the importance of the particular resource that a stakeholder is providing to the organization's ability to function and survive, (2) the extent to which the stakeholder or interest group has discretion over the resource and its use, and (3) the extent of control the stakeholder has over the resource, or put another way the availability of alternative sources of the resource to the organization. I assert that the extent of the influence that a particular stakeholder group is able to exert over a university is a function of two things: (1) the extent to which the use of the funds are restricted or not, which is parallel to Pfeffer and Salancik's second aspect, and (2) the number and combination of other organizations that the university is also dependent on. Furthermore, the stakeholder group's influence is also a function of the ability of the stakeholder group to convey its desires to the university. This is dependent on the organizational structure of the group as well as the goal coherence of this group.

There are a number of ways that an organization can be accountable to or dependent on a particular stakeholder. I focus here on the extent to which an organization is dependent on their various stakeholders for resources. In other words, I am interested in the economic influence the stakeholders have over universities. This is equivalent to the extent to which the organization is dependent on a stakeholder group for economic resources.[23] I limit the analysis here to the

[23] The other primary form of influence that stakeholder groups can exert is political. This form of influence, despite its importance, is beyond the scope of this chapter. However the political influence of stakeholder

economic influence of the stakeholders for two reasons. First, researchers have argued repeatedly that the economic influence of stakeholders, or the extent to which an organization is dependent on a particular organization or group, can cause differences in organizational behavior. For example, Karen A. Froelich (1999) argues that the resource dependencies of nonprofit organizations, in particular their relative reliance on commercial, government, and donor income, has significant consequences on the goal displacement, revenue volatility, organizational process and organizational structure of nonprofit organizations. Second, the mechanism by which stakeholders' economic influence affects organizational behaviors, as opposed to political influence, is relatively straightforward. Stakeholders exert economic influence through the constraints and expectations that are attached to the revenues that they provide to the university. For example, Burton A. Weisbrod and his coauthors argue that the different sources of revenues each imply different constituencies each of which come with "a distinct set of expectations" (Weisbrod, Ballou, and Asch 2008). Therefore, understanding who the constituencies of these organizations are, i.e. their sources of revenues, can help to explain a significant number of the differences in behavior across sectors within higher education (Weisbrod, Ballou, and Asch 2008).

Based on this argument, I developed a proposition and a number of hypotheses about the relationships between the economic influence of stakeholders and university spending behaviors. The key proposition of the chapter lays the foundation for the hypotheses and analysis. Stakeholder groups are able to exert influence over universities to the degree to which they university is dependent on them for resources. As the relative economic influence of stakeholders changes, university behaviors should change as these institutions adapt to new, or changing, constraints. Therefore the economic influence of stakeholder groups should be significantly

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groups and how this influences information gathering and decision making will be examined in future research.

related to university spending and this relationship should change over time as the relative influence of the different stakeholder groups changes.

Proposition 1: The economic influence of stakeholder groups will be significantly related to university spending.

It follows from this general proposition that the economic influence of each stakeholder group should be significantly related to university spending. However, I assert that the nature of this relationship will vary across the four stakeholder groups because each one has a different dependence relationship with the university. Therefore I specify four hypotheses that outline the expected relationships between each stakeholder group and university spending.

The economic influence of students is generally increasing over time as public and private universities increase their reliance on tuition revenues (**Figure**s 6 and 7, and Chapter 2). Resource dependence would assert that increases in student influence should result in increased spending in those areas most relevant or desirable to students such as student services, auxiliary enterprises and instruction to keep these stakeholders happy. However, though students have increased their economic influence they generally do not have a strong voice in the decision making process nor do they retain much control over the resources they provide to the university. Therefore I expect that student influence will be significantly and positively related to instruction, student services, and auxiliary enterprise expenditures but the effects will be relatively small in magnitude.

Hypothesis 1a: Student influence should be positively, but weakly, related with instruction, student services, and auxiliary enterprise spending.

In contrast to student influence, I assert that federal influence has a more focused effect on university spending; specifically that it is positively related to research spending. This is

because of the control that the federal government has over its resources before and after they are given to a university. Federal government revenues, particularly the grants and contracts revenues[24] are generally restricted funds that are provided for research or some other specific purpose.

Hypothesis 1b: Federal government influence should be positively related to research spending and negatively related to all other spending streams.

State governments, in contrast to federal governments, have very little discretion over the majority of resources that they are providing to universities.[25] Therefore I expect that changes in state government influence will affect all of the funding streams but the effects will be relatively small in absolute magnitude because of this lack of a single coherent goal for these resources.

Hypothesis 1c: State government influence should be significantly, but weakly, related to all spending streams.

The final stakeholder group analyzed here is private contributors. I assert that private contributor influence will have a positive effect on all six spending streams because this group has a diverse and non-coordinated set of goals. This is because private contributors include alumni, religious organizations, corporations, foundations, and other individuals and/or groups. Therefore generally this groups has rather disparate goals with each contributor, or set of contributors, pursuing their own goal without any overall group structure. Furthermore I expect these effects to be positive because private contributors are generally higher at private, wealthy schools that tend to also have higher levels of spending.

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[24] Grants and contracts revenues make up over 95% of federal government revenues on average in 2010.
[25] This is because the majority of state government revenues are generally appropriations as opposed to grants and contracts. State appropriations were approximately 82% of state government revenues on average in 2010.

Hypothesis 1d: Private contributor influence should be positively related to all spending streams.

The second hypothesis builds on the fact that the effects of the economic influence of stakeholders should change over time as the relative level of influence these groups also changes. Specifically the second hypothesis asserts that the effects of stakeholder influence should decline over time. This is a function of the number and combination of stakeholders that a university has. The average number of primary stakeholders universities have is increasing over time, particularly for public institutions.[26] This indicates that universities are less dependent on any single stakeholder. Therefore the influence of any single stakeholder should decline over time.

Hypothesis 2: The magnitude of the effects of stakeholder influence on university spending should decline in absolute magnitude between 1986 and 2010.

Understanding Sector Differences

A number of differences in the behaviors of public and private organizations have been documented in the literature. For example research to date has demonstrated significant differences in the revenues and resource dependencies (Frumkin 2002; Young 2007), organizational finances and challenges (Young 2007), legal constraints (Brody 2006), missions, goals and objectives (Weisbrod 1998), vulnerability (Blasdell, McPherson, and Schapiro 1993; Frumkin and Galaskiewicz 2004), and stakeholder accountability (Frumkin 2002; Galaskiewicz, Inouye, Savage, and Molina 2008) of public and private organizations

There are also a number of differences within the context of the higher education industry. Previous research has illuminated numerous differences between public and private universities including: resource dependencies and spending patterns (Blasdell, McPherson, and

[26] See Figures 7 and 8.

Schapiro 1993; Ehrenberg 2002; Ehrenberg 2006; Leslie, Slaughter, Taylor, and Zhang 2012; Toutkoushian 2001), resource allocation (Leslie, Slaughter, Taylor, and Zhang 2012), tuition subsidies (Winston 1999), governance and the role of governing boards (Kaplan 2002; Kaplan 2009), organizational performance (Gibson 2011; Meier and O'Toole 2009), and administrative satisfaction (Volkwein and Parmley 2000). In addition to differences in behaviors there are also different institutional environments for these two groups of institutions (Tolbert 1985) which drive other aspects of organizational behavior. Tolbert (1985) argues that the different institutional environments lead to the different resource dependencies and administrative structures used to manage those dependencies in the two sectors.

There are also a number of key differences in the financial behaviors of universities; however there are also notable similarities as well. In an examination of universities and four-year institutions from the mid-1970s through the mid-1990s Robert Toutkoushian (2001) found that schools in both sectors increase their reliance on gross tuition. However, Toutkoushian also demonstrates that private institutions are more heavily reliant on endowment income, tuition and fees and private gifts, grants and contracts than public universities. Others have illustrated that the key revenue sources for private institutions grew much faster than those for public institutions and argued that this has in turn put public universities in a more precarious position (Blasdell, McPherson, and Schapiro 1993). Regarding university expenditures instruction is the largest category for both sectors but has declined in terms of the percentage of total expenditures for both sectors (Toutkoushian 2001). Furthermore, private schools have been repeatedly shown to spend significantly more per student across most of the expenditure categories than public schools, which is also confirmed in this analysis (Blasdell, McPherson, and Schapiro 1993; Toutkoushian 2001).

Explaining Sector Differences

Despite the evolving nature of the differences between public and private universities, empirical research to date has not reassessed the validity of the public-private dichotomy in U.S. higher education. Extant research has focused primarily on assessing the impacts of the sector differences on university behaviors taking the division itself as a given.[27] In the U.S. higher education industry many of the standard explanations for sector differences that have been proposed in the public administration and nonprofits literatures[28] are not as helpful in understanding sector differences. This is because public higher education institutions are more similar to nonprofits than to many public organizations. Public higher education organizations possess a number of attributes that we generally associate with private organizations. Specifically they have a number of different stakeholders that exert influence over them, they lack clear lines of accountability, they do not distribute profits to stakeholders, and they are non-coercive. All of these characteristics are commonly cited as key features of nonprofit organizations (Frumkin 2002; Galaskiewicz, Inouye, Savage, and Molina 2008).

I argue here that focusing on the differences in the stakeholders to which universities are accountable to, and the relative influence that these stakeholder groups have on the organization, not only helps us understand their behavior but also provides a way to account for sector differences in university behavior. My argument is an extension of the work of Joseph Galaskiewicz and his coauthors (2008) who assert that the key difference between public, private, and nonprofit organizations lies in their referents of accountability. Galaskiewicz and colleagues

[27] For examples see Leslie et al. (2012), Volkwein and Parmley (2000), Toutkoushian (2001), Blasdell et al. (1993), and Gibson (2011).

[28] For example, Perry and Rainey (1988) argue that the differences in ownership, social control and sources of financial capital are what drive the differences in public and private organizations. Others have argued that the differences in the legal and distributional constraints are key factors in determining sector differences. Nutt and Backoff (1993) assert that it is the differences in the degree of "publicness" of organizations in different sectors that explains the variation in organizational behaviors.

assert that government and for-profit organizations each have a single accountability referent, the voters and stockholders respectively. Nonprofit organizations, on the other hand, are accountable to numerous stakeholders and the extent of the organization's accountability to any particular group depends on that group's level of involvement in the organization (Frumkin 2002).

I argue that in the case of higher education both public and private universities are like nonprofits in that they have numerous stakeholders to which they are accountable, and who can therefore exert influence over them. Furthermore, in the context of universities the stakeholders exert influence over the organization and hold them accountable to the extent that they hold economic or political influence over the universities. This extends Galaskiewicz and colleagues' argument by adapting it to the higher education industry and also emphasizing the political and economic influence of stakeholders. Including both forms of influence accounts for situations in which a group might not be directly involved in the day to day workings of the organization, students for example, but still wields substantial influence because of the economic resources they possess which the university relies on to function (Frumkin and Galaskiewicz 2004).

The key benefit of my explanation for sector differences is that it does not necessitate a dichotomous distinction. By incorporating the extent to which universities depend on specific stakeholders, I shed light on differences in behaviors between and within the two sectors. For example, state governments are key stakeholders of public universities. Measuring the extent to which universities are dependent on state funding allows me to measure the relative power and influence of this stakeholder, the extent to which it has changed over time, and the implications of those changes for university behaviors and sector differences within higher education.

Based on this argument I evaluate a final hypothesis that is directly related to sector differences in university spending. I expect, based on the argument above, that the significance of

sector differences in university spending should decline once the economic influences of the different stakeholders are taken into account in the models below.

> *H3: The economic influence of key university stakeholders should partially account for the differences in university behaviors across public and private universities.*

Data

To evaluate the arguments outlined above, I use data on 507 public and 847 private four-year undergraduate degree-granting universities from 1980-2010.[29] The analysis was constrained to only include those institutions that were classified as Doctoral, Research, Masters, or Baccalaureate institutions according to the 2000 Carnegie Classification. This ensured the exclusion of specialized institutions and two-year associates institutions, both of which are fundamentally different from the four-year degree-granting institutions of interest for this analysis. I focus on the time period from 1980-2010 because this ensures the examination of the differences between the spending behaviors of these two sectors over a significant period of time. This also covers a period during which many have argued that public and private universities are converging and distinctions between the sectors (i.e. sources of public support, differences in wealth, etc.) are blurring (Gumport and Snydman 2006; Morphew and Eckel 2009; Weisbrod, Ballou, and Asch 2008).

The data for this analysis comes from the Finance, Institutional Characteristics, and Fall Enrollments components of the Integrated Postsecondary Education Data System (IPEDS).

[29] I exclude private for-profit schools from this analysis because they are fundamentally different from public and private universities in their course/degree offerings, mission, and finances and are therefore not comparable in the context of this analysis (Bailey, Badway, and Gumport 2001; Bennett, Lucchesi, and Vedder 2010).

IPEDS data is ideal for an analysis of this type because data are collected annually[30] for every university that receives or has applied to receive federal financial aid dollars which again ensures the inclusion of the population of four-year undergraduate degree-granting public and private universities during this period.

University Spending Behavior

I use six categories of expenditures to measure the spending behaviors of universities: instruction, research, student services, academic support, institutional support, and auxiliary enterprise expenditures.[31] This is necessary because spending behavior cannot easily be measured by a single dependent variable. I focus on these six because they are key university spending streams and the majority of them are also directly related to the provision on educational services (Toutkoushian 2001). I use inflation adjusted 2010 dollars per full-time equivalent (FTE) student measures for each spending category to control for these differences in enrollments across institutions. Summary statistics for the six spending categories are shown for 1980-2010 in Table 10 and Figure C1. Breakdowns of spending by sector and institutional type are shown in Table C7 and Figures 9-14 below.

Stakeholder Influence

I argue above that the economic influence of four stakeholder groups--students, private contributors, and state and federal governments-- helps us to understand university spending behaviors and sector differences in those behaviors. I focus on these four stakeholder groups, as opposed to others (faculty and administrators for example), because they are the key economic

[30] The IPEDS data has been collected annually since 1986. In 1986, IPEDS replace the HEGIS data which was also collected annually until 1986. I rely on HEGIS data from 1980, 1984, and 1985 in the descriptive portion of the analysis but this is not included in the regression portion of the analysis.
[31] Definitions for each of these expenditure categories can be found in Table C1 of Appendix C.

stakeholders of these institutions (Barringer 2012b; Ehrenberg 2006; Gumport 2000; Weisbrod, Ballou, and Asch 2008).[32]

I use the percentage of total revenues that come from each of these four groups as a measure of the economic influence that each group has over a university. This measure provides a relative measure of the economic influence of each stakeholder group that is comparable across institutions. This also closely parallels Pfeffer and Salancik's measure of importance which, according to Pfeffer and Salancik, determines the nature of the dependency between an organization and its stakeholder(s) (Pfeffer and Salancik 2003). Previous research has also shown that the relative reliance of organizations on different revenues affects organizational behavior, mission and structure (Froelich 1999). In order to calculate these measures I used the raw dollar amount from each category divided by the total current fund revenues net of investment income and other[33] revenues.[34] I use state grants, contracts and appropriations revenues to measure state government influence[35]; federal grants, contracts, and appropriations revenues to measure federal government influence[36]; tuition income[37] to measure student influence; and private gifts, grants,

[32] I also examined local governments as a fifth stakeholder group but there was very little variation across schools because the majority received minimal funding, if any, from local governments. Therefore I did not include this group in the analysis presented here. Basic descriptive statistics for local government influence are included in Table C2 to substantiate this point.

[33] "Other revenues" refers to a specific revenue category in the IPEDS data. The definition can be found here: http://nces.ed.gov/ipeds/glossary/?charindex=O.

[34] Using the total current fund revenues net of other revenues and investment income was necessary because both had negative values for a large number of institutions across multiple years. Since percentage measures were used to capture the relative economic influence of the stakeholder groups having a denominator that included negative values for some revenue streams was problematic. Therefore I calculated total current fund revenues net of the two revenue streams that were systematically negative. I also recoded negative revenue streams values to be missing for a small number of schools for a small number of revenue streams. Specific cases that were recoded are available upon request from the author. These were recoded because having negative values for these revenue streams (e.g. local revenues) was nonsensical and therefore was most likely a coding error

[35] As mentioned above 82% of state government funding are appropriations and 18% are grants and contracts in 2010.

[36] Federal government funding is primarily grants and contracts rather than appropriations. For example only 3% of federal government funding is appropriations whereas 97% are grants and contracts (on average) in 2010.

and contracts revenues to measure private contributor influence. For the second section of the analysis, which evaluates the impact of the economic influence of stakeholder groups on the spending behaviors of universities, I used a one year lag for this variable. As a result the time period for the second section of the analysis is from 1986-2010 to ensure a consistent lag structure. This differs from the first section of the analysis, which covers the period from 1980-2010, because there is no need to lag the variables.[38] Figures 5 and 6 in the analysis section and Tables C2 and C4 in the Appendix C provide summary information for the economic influence of the four stakeholder groups.

Control Variables

I included a number of control variables in the regression portion of the analysis to more accurately estimate the impact of the economic influence of stakeholders on the spending behaviors of universities. First, a dichotomous variable (coded one for public universities) is used to illuminate sector differences in spending and the residual impact of sector on spending behaviors once the relative economic influence of key stakeholder groups is accounted for. Second, previous research has shown that the size of universities significantly impacts aspects of their behavior (Kraatz and Zajac 1996; Kraatz and Zajac 2001; Volkwein and Malik 1997). Therefore I use total current fund revenues net of investment income and other revenues (inflation adjusted) to control for the potential impact of size on the spending behaviors of universities.[39] Third, I use two dichotomous variables to account for differences across institutional types or missions. The first variable included is *doctoral* which is coded one for those schools classified as doctoral or research universities according to the 2010 Basic Carnegie Classification. Research

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[37] Tuition income here is measured as gross tuition as opposed to net tuition. This was done in order to ensure the consistency of this measure over time.

[38] For the regression analysis I also transformed the variables by taking the natural log to minimize the impact of outliers and normalize the distributions of these variables.

[39] This variable was also subjected to a one year lag and was also logged to minimize the effect of outliers.

has shown that these institutions function differently than other types of universities therefore it is necessary to control for this in the specification of university spending intercepts (Cohn, Rhine, and Santos 1989; Leslie, Slaughter, Taylor, and Zhang 2012). The second variable included, *masters,* is coded one for all universities classified as masters institutions in the 2010 Carnegie Classification. Descriptive statistics for the control variables are shown in Table 8 below.

Table 8: Descriptive Statistics for Control Variables

Variable	Year	Mean	Standard Deviation	Minimum	Maximum
Inflation Adjusted Total Current Fund Revenues net Investment and Other Income (1,000's)	*1980*	$85,300	$180,000	$540	$1,640,000
	1990	$127,000	$274,000	$168	$2,620,000
	2000	$174,000	$382,000	$0	$4,110,000
	2010	$248,000	$531,000	$2,520	$5,580,000
Public (507 public and 847private schools)	*2010*	0.374	0.484	0	1
Doctoral/Research (267 doctoral/research universities)	*2010*	0.198	0.398	0	1
Masters (583 masters institutions)	*2010*	0.433	0.496	0	1
Baccalaureate (494 baccalaureate institutions)	*2010*	0.369	0.483	0	1

Methods

The goal of this analysis is three fold. First, I evaluate the variation in the economic influence of four university stakeholder groups across sectors and over time. Second, I evaluate the variation in university spending across sectors and over time. Finally, I use multilevel regression models to estimate the relationship between the economic influence of stakeholder groups and university spending behaviors and how these change over time. These three goals parallel the three research questions outlined above and form the outline for the three stages of the analysis.

The first two goals are descriptive in nature. I want to establish the nature of the variation in the economic influence of university stakeholders and university spending across sectors and

over time. Doing this prior to evaluating the relationship between the two accomplishes two goals. First, it allows me to showcase the significant variation that is present between public and private institutions and the extent to which these differences are becoming more or less distinct over time. Second, by establishing the nature of this variation I am able to develop and evaluate more informed models of the relationship between the two.

I use a combination of descriptive statistics, difference in means t-tests for independent groups with unequal variances, and line graphs to evaluate how the economic influence of key stakeholder groups and university spending patterns differ and change over time. The line graphs and descriptive statistics (i.e. means and standard deviations) establish the basic differences in groups and the trends over time. I use difference in means t-tests to evaluate if the difference in the means for the public and private universities are statistically significant or if the differences are due to random variation (Warner 2008). I am not using this test to assess causality. I only utilize it descriptively to evaluate the significance of the differences in the spending behaviors of these two groups.

There are two sets of groups of interest for this analysis and therefore two levels of comparison that occur. The first is the comparison of the trends, means, and standard deviations between public and private universities. The second is the comparison of the trends, means, and standard deviations between public and private institutions within three categories of the 2010 Basic Carnegie Classification of Institutions: Doctoral and Research Universities, Master's Colleges and Universities, and Baccalaureate Colleges. In effect the same analyses that are initially performed between public and private institutions are then repeated for each of the three institutional types. This allows me to delve more deeply into the differences between public and private universities by evaluating if the public/private distinction is consistent across institutional types.

The Relationship between Stakeholder Influence and University Spending

After I establish the significant differences in public and private university stakeholder influence and university spending, I use multilevel models (MLMs) for longitudinal data, to estimate the relationship between the relative economic influence of the four stakeholder groups and university spending behaviors and how this relationship changed over time. I use nested data to evaluate this question (i.e. multiple observations over time nested within individual universities) therefore it is necessary to use a statistical technique that can account for variation within schools over time and also across schools. The intra-class correlation coefficients (ICCs) for each spending stream, shown in **Table** 8 below, indicate that there is substantial variation between schools which substantiates my decision to use MLMs for this analysis. The ICCs in Table 9 are the proportion of variation that exists between schools (rather than over time) for each of the outcomes of interest (Singer and Willett 2003). These relatively high ICCs, ranging from 0.690 to 0.911, indicate that between 69 and 91 percent of the variation is spending is attributable to differences between schools.

Using MLMs is particularly appropriate in this context for three reasons. First, MLMs allow the specification of a random effect for intercepts and also for the over time trajectories which results in the improved estimation of longitudinal effects (Raudenbush and Bryk 2001; Singer and Willett 2003). Second, I am able to include a separate intercept and trajectory effects for school-level characteristics such as sector and institutional type. These cross-level interaction effects improve model estimation through separate specification of main effects and interactions for school-level characteristics that allow researchers to clearly see how much of the effects are at the starting point and how much is due to variation over time (Raudenbush and Bryk 2001; Singer and Willett 2003). Finally, I am able to separate or decompose the variance components of the outcome as I did here with the ICCs. This allows me to estimate how much of the variation in

the outcome is due to variation across schools and how much is due to variation within schools over time (Raudenbush and Bryk 2001; Singer and Willett 2003).

In order to evaluate the impact of stakeholder influences on spending behaviors, I evaluate a series of MLMs that predict university spending as measured by the six spending categories listed above. These models taken together provide a picture of the relationship between economic influence of stakeholders and university spending behaviors over time. The set of equations below depicts the model that is presented in Table 12 below. This is the equation that predicts instructional spending. There are variations in the fixed effects for the intercept and over time trajectories depending on the specific spending stream outcome. However this set of equations is helpful in understanding the general model specification.

$$Y_{ij} = \beta_0 + \beta_1(time) + \beta_2(time^2) + \beta_3(Econ.Influence) + \beta_4(Total\ Revenues) +$$

$$\beta_5(Econ.Influence * Time) + \beta_6(Total\ Revenues * Time) + \varepsilon_{ij} \quad \text{(Eq. 5)}$$

$$\beta_0 = \gamma_{00} + \gamma_{01}(public) + \gamma_{02}(doctoral) + \eta_{0i} \quad \text{(Eq. 6)}$$

$$\beta_1 = \gamma_{10} + \gamma_{11}(public) + \eta_{1i} \quad \text{(Eq. 7)}$$

For simplicity, I expressed these as the distinct equations for the two levels of the model where Equation 5 captures the variation over time within schools (level 1) and equations 6 and 7 capture non-time-varying differences across schools (level 2). Equation 5 models the linear and quadratic effects of time ($\beta_1\ and\ \beta_2$), the economic influence measures (β_3), and total revenues (β_4) on the spending behavior (Y_{it}). This equation also includes the fixed effect for the intercept and the interactions between the stakeholder influence measures and total revenues and the linear component of time ($\beta_5\ and\ \beta_6$). This equation also takes into account that there will be random error in the spending behaviors of these institutions over time even after these variables are accounted for (ε_{it}). Equation 6 models the non-time varying school-level factors that influence the mean structure of the spending behavior, or in other words the factors that influence the

intercept or starting value in 1986. So in this case, the equation models the impact of public (γ_{01}) and doctoral (γ_{02}) on the starting point of the spending behaviors. This equation also specifies a random error term (η_{1i}) which allows for random variation around the intercepts specified by the equation. Equation 7 models the factors that impact the over time trajectories of the spending behaviors. This specification asserts that the trajectories of spending behaviors vary by sector (γ_{11}). This equation also includes a random error term (η_{1i}) which allows for random variation to occur in the linear trajectories of university spending.

I used model fit statistics to help determine the best fitting specification for the intercept effects, time specification and trajectory effects was for each spending stream. I included both linear and quadratic components with a random effect for the linear component for time for instruction, academics support services, and student services spending based on the line graphs below and the improvements in model fit using the BIC statistics. Research, institutional support, and auxiliary enterprise spending on the other hand, were all specified with only a linear component and a corresponding random effect for time based on the BIC statistics and line graphs. I used the same process, plus an examination of individual p-values, to determine which spending streams should have fixed effects for sector, doctoral/research, masters, and land grant institutions. All of the spending streams are specified with intercept and trajectory effects for sector based on model fit, statistical significance of the variables, and notable differences seen in Table 10 and Figures 9-14 below. Using the same criteria I also determined that all spending streams should have distinct intercepts for doctoral/research institutions based on model fit and statistical significance. Including a distinct intercept for master's institutions was only significant, in terms of model fit and individual p-values, for student services, institutional support, and auxiliary enterprise expenditures which coincided with the trajectories seen in Figures 9-14. I only included a separate intercept effect for land grant institutions for research and auxiliary

enterprise expenditures because these were the only two outcomes for which this contributed significantly to model fit.[40] Table 9 provides a summary of these modeling decisions as well as the ICCs for each spending stream.[41]

Table 9: Basic Specifications for Multilevel Models

Spending Stream	N (School-years)	Number of Schools	ICC	Time Specification	Specified Intercept Effects	Specified Trajectory Effects
Instruction	26,525	1,383	0.811	Quadratic w/ Linear Random Effect	Public, Doctoral/ Research	Public
Research	25,467	1,382	0.911	Linear w/ Random Effect	Public, Doctoral/ Research, Land Grant	Public
Academic Support Services	26,525	1,383	0.648	Quadratic w/ Linear Random Effect	Public, Doctoral/ Research	Public
Student Services	26,520	1,383	0.690	Quadratic w/ Linear Random Effect	Public, Doctoral/ Research, Masters	Public
Institutional Expenditures	26,523	1,383	0.744	Linear w/ Random Effect	Public, Doctoral/ Research, Masters	Public
Auxiliary Expenditures	26,479	1,381	0.817	Linear w/ Random Effect	Public, Doctoral/ Research, Masters, Land Grant	Public

Analysis and Results

The analyses that I present here proceed in three stages. First, I establish that there have been significant changes in the economic influence of four stakeholder groups over time and that these changes vary by sector. Second, I establish that there are differences in the spending behaviors of universities over time, across sectors, and across organizational types. I then use

[40] No trajectory effects for land grant institutions were statistically significant and they did not improve model fit when they were included in the models.
[41] Additional tables and model fit statistics are available from the author upon request.

multilevel models (MLMs) to estimate the relationship between the economic influence of key stakeholder groups and university spending behaviors. I also evaluate the extent to which the economic influence of stakeholder groups provides an explanation for the differences in spending behaviors across sectors, within sectors, and over time that are established in the first stage of the analysis.

Trends in Stakeholder Influence

There was evidence of some convergence in the economic influence of the key stakeholders of these institutions which is consistent with the literature on privatization and blurring sector boundaries (Gumport and Snydman 2006; Morphew and Eckel 2009). However, significant differences still remained in the economic influence of stakeholder groups throughout the period. Figure 5 below shows the trends in the economic influence of students, private contributors, state governments, and the federal government by sector from 1980-2010.[42] There were three key trends apparent here. First, there are parallel increases in the economic influence of student stakeholders in public and private universities from 1980 to 2010; however student influence remained strongest, on average, at private universities. Second, there was a marked decline in the economic influence of state governments for public universities. This led to a convergence in the economic influence of state governments between the two sectors. There was also evidence of a convergence in the economic influence of private contributors, driven by a decline in their influence at private universities, during the second half of the period. Finally, there was evidence of some divergence in the economic influence of the federal government driven by both increases in influence at public universities and decreases in influence at private universities.

[42] These trends are further showcased in the descriptive statistics shown in Table C2.

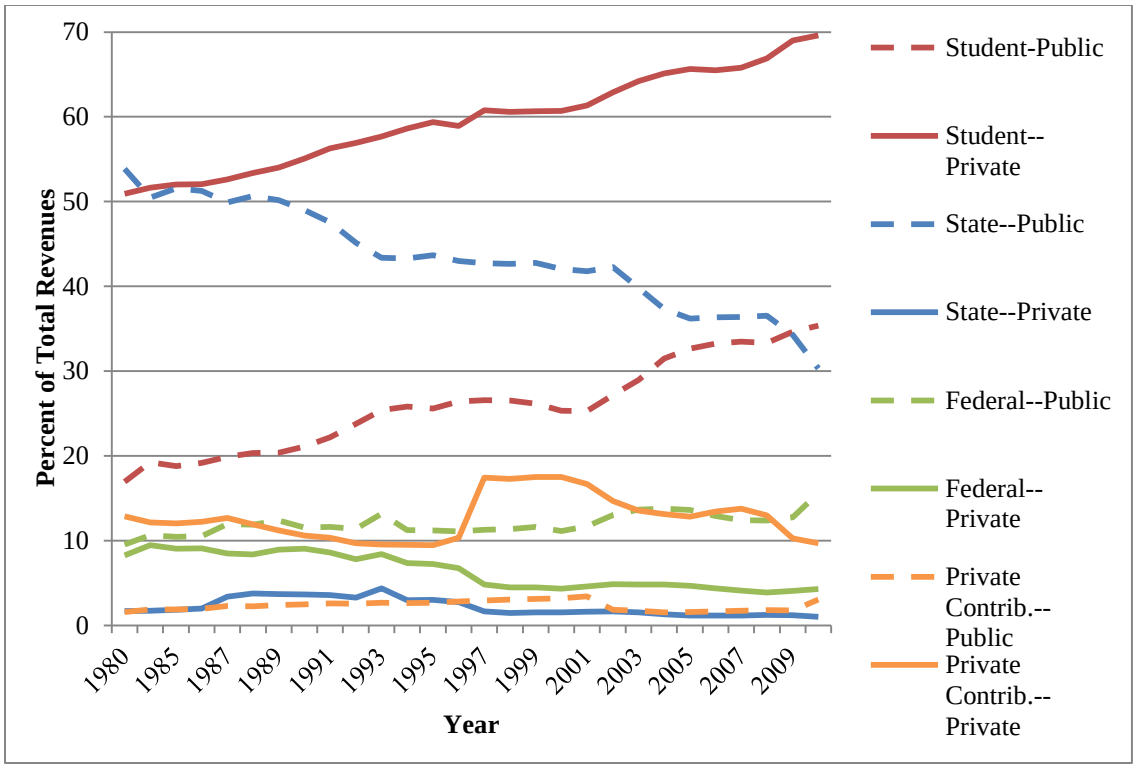

Figure 5: Economic Influence of Key Stakeholders by Sector, 1980-2010

Despite these converging and diverging trends, the differences in the economic influence of these stakeholders between public and private universities remained statistically significant for the entire period (Table C3). Even when this is examined within the three institutional types the sector differences for students, private contributors, and state governments remain statistically significantly different for the entire period (Figure 6 and Tables C4, C5 in Appendix C). The dramatic differences in the economic influence of student, private contributors and state influence are clearly shown by the differences in the initial levels in 1986 and continued differences over time for students and state governments. The initial differences in private contributor influence actually decline over time but remain significant for the entire period. The sector difference in the economic influence of the federal government, though not initially statistically significant,

becomes statistically significant after the early 1990s for all three institutional types (Table C5 in Appendix C). This divergence is clearly shown in Figure 6 below.

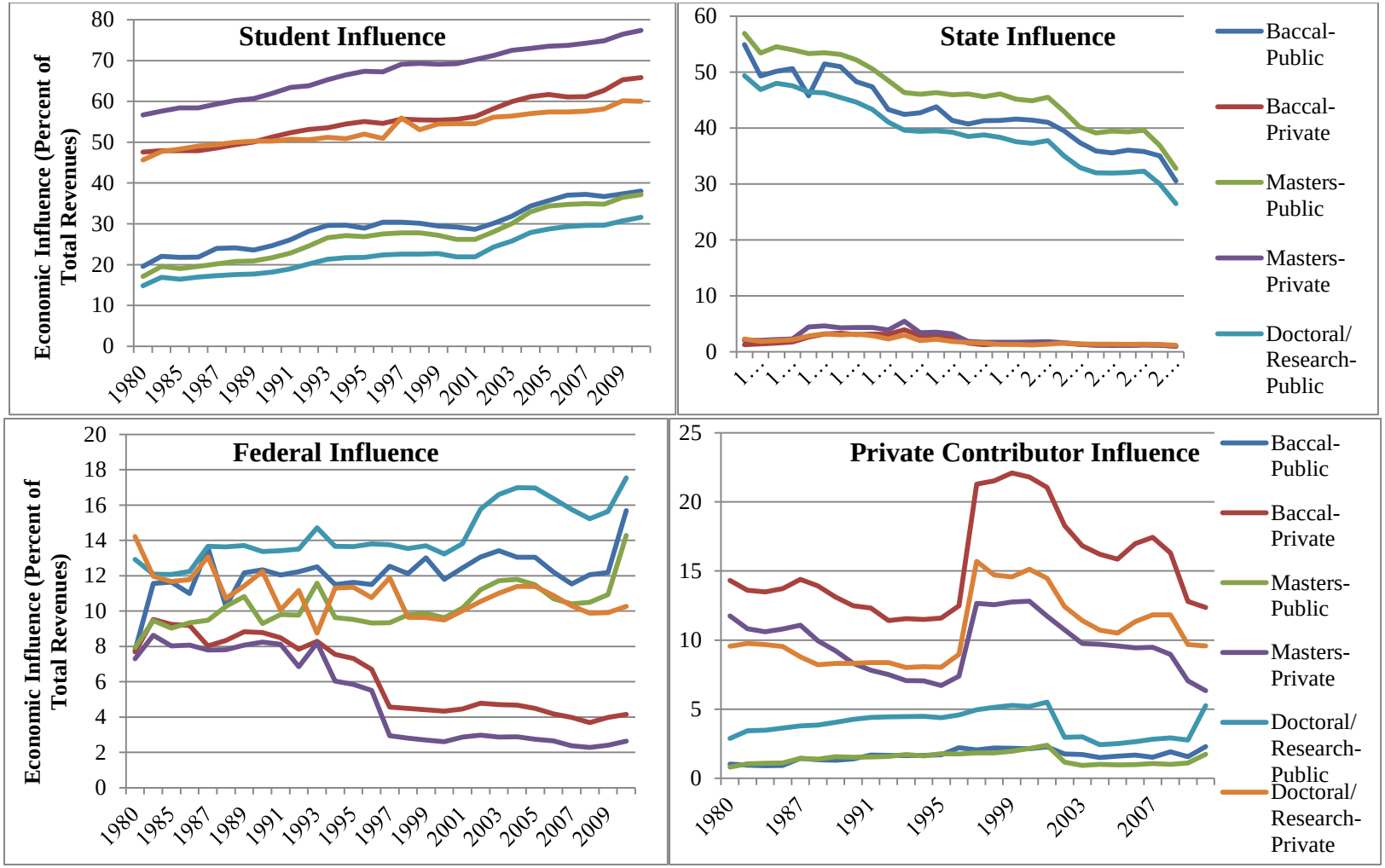

Figure 6: Economic Influence of Stakeholder Groups by Sector and Carnegie Classification, 1980-2010[43]

[43] The increase in private contributions between 1996 and 1997 is due to changes in the accounting standards by which this data was collected.

The key distinction when examining stakeholder influence was consistently sector even when institutional type was taken into account. This is very clear in Figure 6 above. The only exception to this is in terms of the federal government's economic influence where private doctoral/research universities behave more like public universities than private masters or baccalaureate schools (Figure 6). The preeminence of sector is further illustrated by the variation in which group of schools had the highest levels of economic influence for the different stakeholder groups. For example, private master's institutions and public baccalaureate schools were most dependent on the economic influence of students (Figure 6) whereas public doctoral/research universities and private baccalaureate institutions were the most dependency on the economic influence of private contributors (Figure 6).

An important aspect in understanding the nature of the economic influence of stakeholder groups is the number of stakeholder groups that universities are primarily dependent on and the combination of groups that universities are accountable. For example, two schools with the same level of student influence in 2010, such as Florida State University and Oklahoma State University (26.07 percent), had two and one additional primary stakeholders respectively. [44] Florida State had students, state government, and federal government as its primary stakeholder groups. Oklahoma State on the other hand was only primarily accountable to students and the state government. These differences in the number and combination of primary stakeholders are helpful in understanding the nature of the effect of stakeholder influence on university behavior generally, including sector differences. This is because universities with a single stakeholder face a clearer set of constraints than those with two or more stakeholders that have conflicting constraints which the university has to negotiate.

[44] Primary stakeholders are those on which a university is dependent for at least 20 percent of their total revenues.

There are notable differences in the number of primary stakeholders between public and private universities. Figures 7 and 8 below show the frequency of public and private schools, respectively, with no primary stakeholders or one, two, or three primary stakeholders from 1980 to 2010. It was possible for these schools to have four stakeholders, but using the 20 percent threshold no universities were primarily dependent on all four stakeholder groups. The majority of private universities had a single primary stakeholder--students. The majority of public universities on the other hand had two or more primary stakeholders one of which was almost always the state. The other(s) primary stakeholder(s) were generally students or the federal government. The number of public universities with two or more stakeholders was increasing consistently throughout the period as shown in Figure 8. The number of primary stakeholders for private universities, on the other hand, increases through the late 1990s but then begins a slow decline as shown in Figure 7. Overall public universities have a higher number of primary stakeholders on average than private universities. The average number of primary stakeholders in 2010 was 2.02 for public universities and 1.11 for private universities. The difference in the average number of stakeholders is statistically significant for the entire time period. Public universities consistently exhibit a higher number of primary stakeholders than private universities in each year examined here.

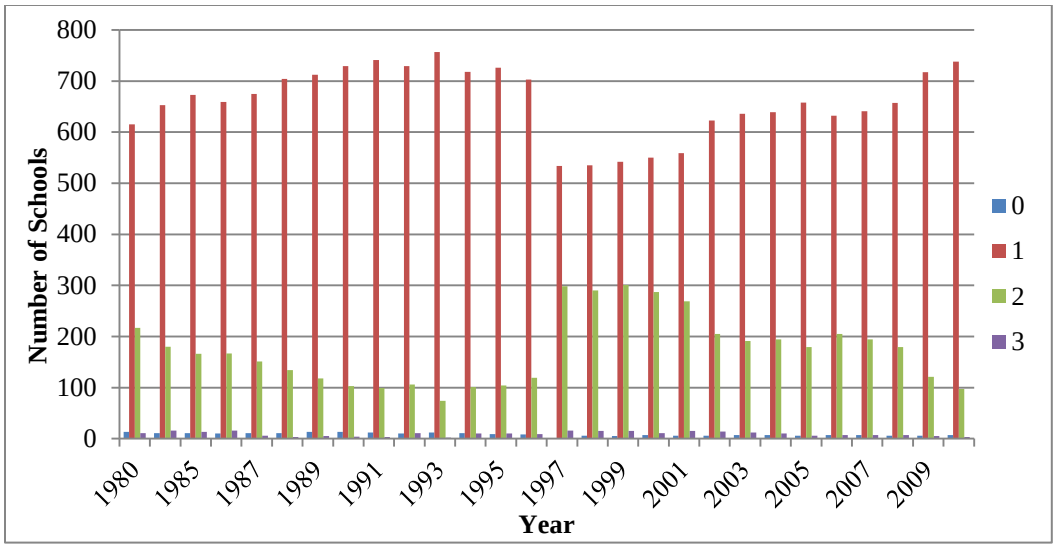

Figure 7: Number of Primary Stakeholders for Private Universities, 1980-2010

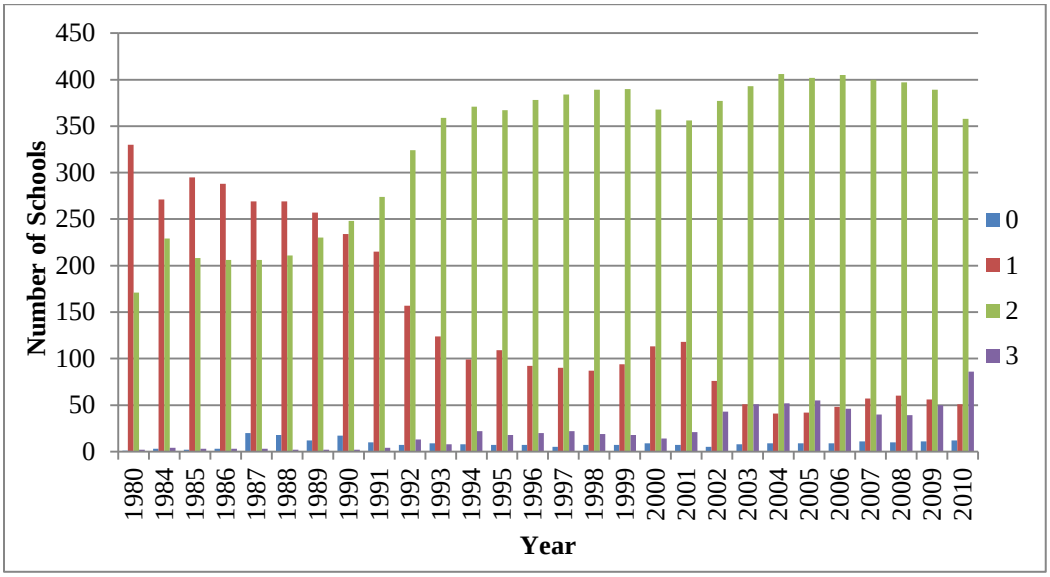

Figure 8: Number of Primary Stakeholders for Public Universities, 1980-2010

Public versus Private Spending Behaviors

There were significant differences in the spending behaviors, measured as 2010 dollars per FTE student, of public and private universities in all six spending streams. This can be clearly seen in Table 10 which displays the means, standard deviations, minimum and maximum values

for public and private universities in 1980, 1990, 2000, and 2010.[45] There are not only differences between the two sectors but also across spending streams and over time as indicated by the relatively large standard deviations and variation in the average spending levels over time

[45] This can also be clearly seen in Figure C1 in Appendix C which depicts average spending in each of the categories from 1980 to 2010 by sector.

Table **10: Evaluating Differences in Spending Between Public and Private Universities**

Spending Stream (Per FTE)	Year	Public Universities Mean	Public Universities Standard Deviation	Public Universities Min.	Public Universities Max.	Private Universities Mean	Private Universities Standard Deviation	Private Universities Minimum	Private Universities Maximum
Instruction Expenditures	*1980*	$5,324	$2,088	$1,844	$19,420	$5,040	$3,518	$195	$37,745
	1990	$6,210	$2,534	$2,641	$20,323	$6,707	$5,211	$13	$62,406
	2000	$7,075	$3,209	$0	$43,060	$9,539	$7,302	$0	$75,543
	2010	$7,652	$3,550	$0	$32,071	$9,642	$8,497	$840	$89,378
Research Expenditures	*1980*	$1,147	$2,902	$0	$41,762	$649	$3,100	$0	$51,206
	1990	$1,608	$3,171	$0	$28,628	$1,667	$5,760	$0	$67,058
	2000	$1,974	$4,461	$0	$65,394	$1,327	$6,708	$0	$119,582
	2010	$2,530	$5,756	$0	$74,454	$1,496	$7,623	$0	$118,897
Academic Support Services Expenditures	*1980*	$1,158	$711	$49	$6,191	$1,037	$973	$0	$10,762
	1990	$1,433	$858	$248	$7,433	$1,530	$1,380	$2	$18,096
	2000	$1,836	$1,095	$0	$9,296	$2,373	$2,700	$0	$46,787
	2010	$2,014	$1,831	$12	$32,710	$2,431	$3,354	$0	$62,616
Student Services Expenditures	*1980*	$769	$410	$27	$2,883	$1,200	$887	$0	$19,512
	1990	$945	$440	$182	$3,165	$1,927	$935	$2	$6,804
	2000	$1,279	$625	$293	$8,209	$3,184	$1,793	$0	$19,672
	2010	$1,477	$645	$411	$4,441	$3,503	$1,767	$128	$21,583
Auxiliary Expenditures	*1980*	$2,072	$1,275	$0	$9,070	$3,193	$2,008	$0	$17,296
	1990	$2,358	$1,410	$0	$11,522	$3,523	$2,255	$0	$16,598
	2000	$2,761	$2,131	$0	$25,808	$3,922	$2,754	$0	$18,417
	2010	$3,011	$2,252	$0	$23,895	$3,945	$2,957	$0	$36,812
Institutional Expenditures	*1980*	$1,339	$742	$209	$5,098	$2,529	$1,733	$0	$21,331
	1990	$1,654	$807	$307	$5,714	$3,542	$2,015	$6	$22,635
	2000	$2,053	$1,170	$0	$10,864	$5,030	$3,507	$0	$47,842
	2010	$2,243	$1,191	$441	$11,846	$4,991	$3,237	$0	$37,470

For the majority of the spending streams, public and private universities exhibited statistically significant differences in spending per FTE student from 1980-2010. Using difference in means t-tests for independent groups with unequal means, I compared public and private universities at each time point on each of the spending categories to evaluate how the differences changed over time.[46] After 1990, public and private universities exhibited statistically significant differences in all spending streams, with the exception of research, for the remainder of the period. This is consistent with the descriptive statistics presented in Table 10 and also with the average spending trend lines in Figure C1 in Appendix C. These significant differences, in combination with the data shown in Table 10 and Figures 9-14 indicate that public and private spending are diverging over time in all six of the spending categories, but are doing so to different degrees. For example research spending does diverge over this period but does not consistently begin to do so until the mid to late 1990s. In contrast, spending levels on instruction were not significantly different for public and private universities in 1980, $5,324 and $5,040 per FTE student respectively, but diverged markedly after 1986 ending at $7,652 and $9,642 per FTE student respectively in 2010. Other revenue streams, such as institutional support, auxiliary enterprises, and student services, were significantly different in 1980 and continued to diverge over the rest of the period thereby increasing the spending disparities between public and private universities.

These differences and trends in public and private university spending call into question the idea of a convergence in the financial behaviors of public and private universities. University spending is instead experiencing a divergence for almost all of the 30 year period I have examined. To further evaluate this divergence I looked at the sector differences within each of the

[46] Table C6 in the appendix provides the mean differences and p-values for the difference in means t-tests for each spending stream/year combination.

institutional types to rule out the possibility that divergence within one institutional type (e.g. doctoral/research universities) was driving the overall divergence.

Using line graphs and t-tests I determined that differences in public and private university spending are still statistically significant within each of these groups for the majority of spending streams and years. Difference in means t-tests for sector differences within each of the three institutional types were statistically significant for all spending streams with the single exception of research spending for baccalaureate universities (Table C8 in Appendix C).

The variation in university spending by sector and institutional type is most clearly seen in Figures 9-14 which display average per FTE student spending levels for public and private Doctoral/ Research, Masters, and Baccalaureate institutions from 1980-2010.[47] A number of trends are apparent across the different spending streams. Trends in instruction and academic support expenditures (Figures 9 and 10) demonstrate the distinctive nature of private doctoral/research universities in contrast to the other groups. In both cases private doctoral/research university spending grows notably faster than spending in the other institutional groups which, though also increasing, are doing so at a slower and relatively consistent rate. Both also highlight the higher spending by private institutions as well as growing variation in spending within and across the sectors.

[47] These differences are further elaborated on in the descriptive statistics in Figure A7 of the Appendix and the difference in means t-test results presented in Table A8 in the Appendix.

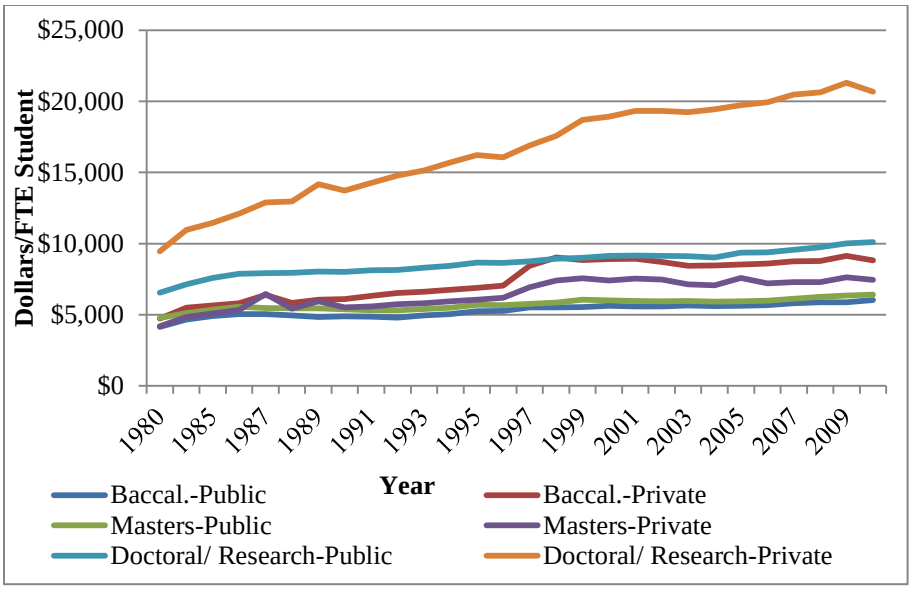

Figure 9: Instructional Spending by Sector and Carnegie Classification, 1980-2010

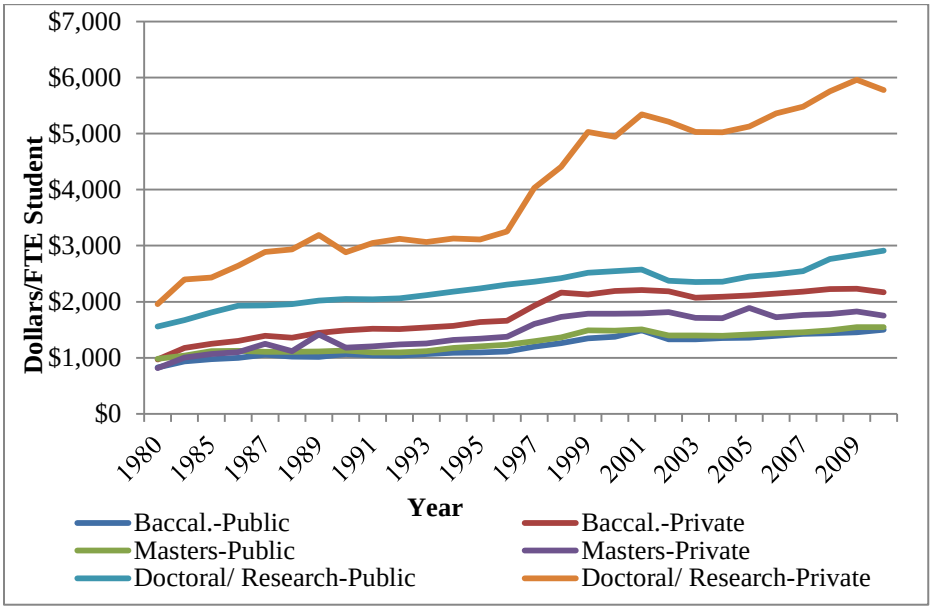

Figure 10: Academic Support Spending by Sector and Carnegie Classification, 1980-2010

In the case of research expenditures (Figure 11) doctoral/research universities exhibit substantial increases in spending over time and public and private doctoral/research universities generally have parallel trajectories though public institutions have a lower initial starting point

and also have lower expenditures over time. There is also some moderate evidence of growing differences across public and private masters and baccalaureate institutions.

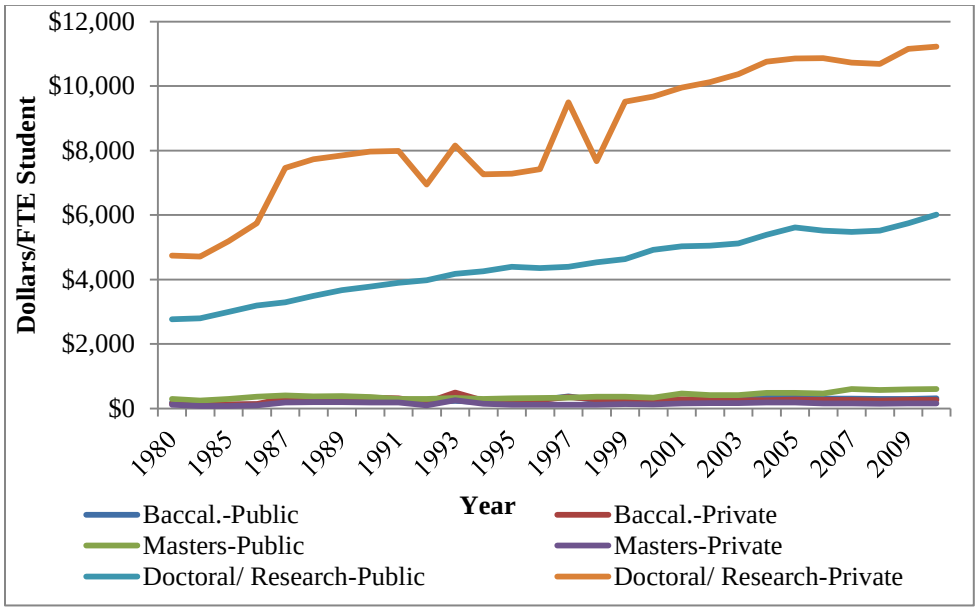

Figure 11: Research Spending by Sector and Carnegie Classification, 1980-2010

The trends in student services and institutional support spending (Figures 12 and 13) highlight the higher levels of spending by private institutions over public schools despite growth in both sectors. There is also increased variation across the three types within both sectors, but increased variation is more dramatic for private institutions.

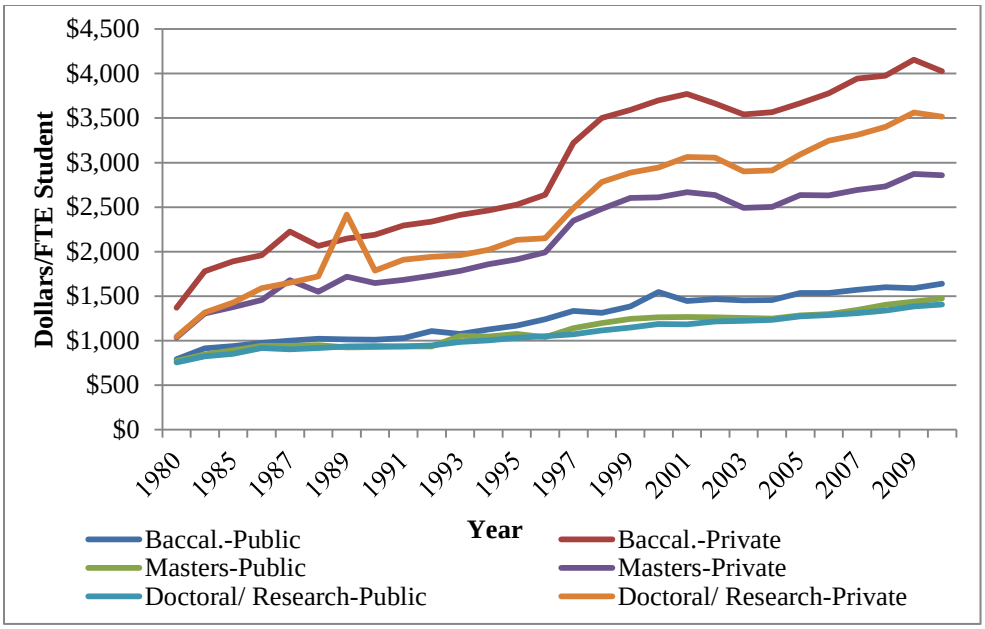

Figure 12: Student Services Spending by Sector and Carnegie Classification, 1980-2010

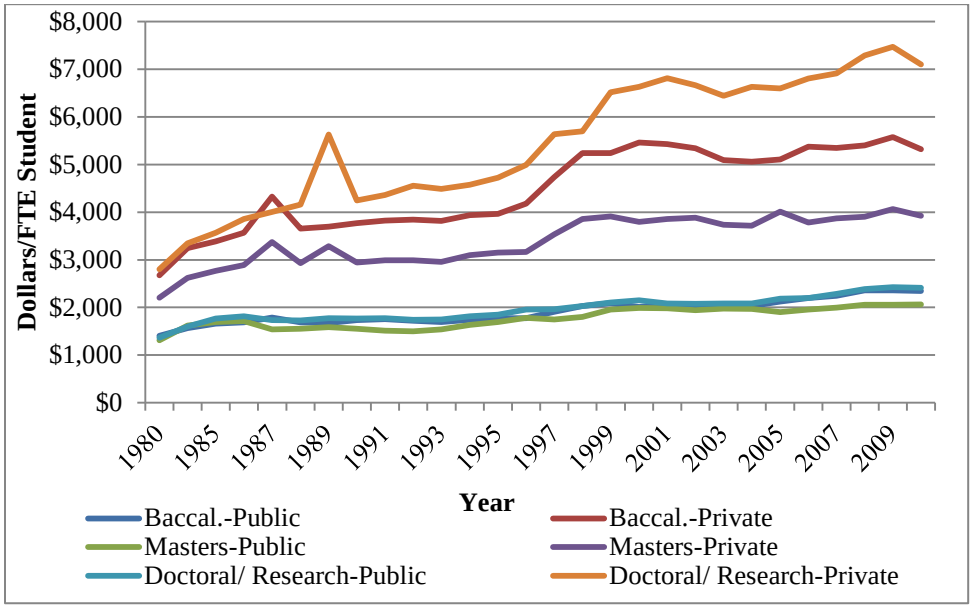

Figure 13: Institutional Support Services Spending by Sector and Carnegie Classification, 1980-2010

Auxiliary enterprise spending (Figure 14) grows at a slower rate over time than the other spending streams. Private universities outspend public universities on auxiliary enterprise

spending, but there is substantial variation across the institutional types within the two sectors that tempers the distinction between the two sectors.

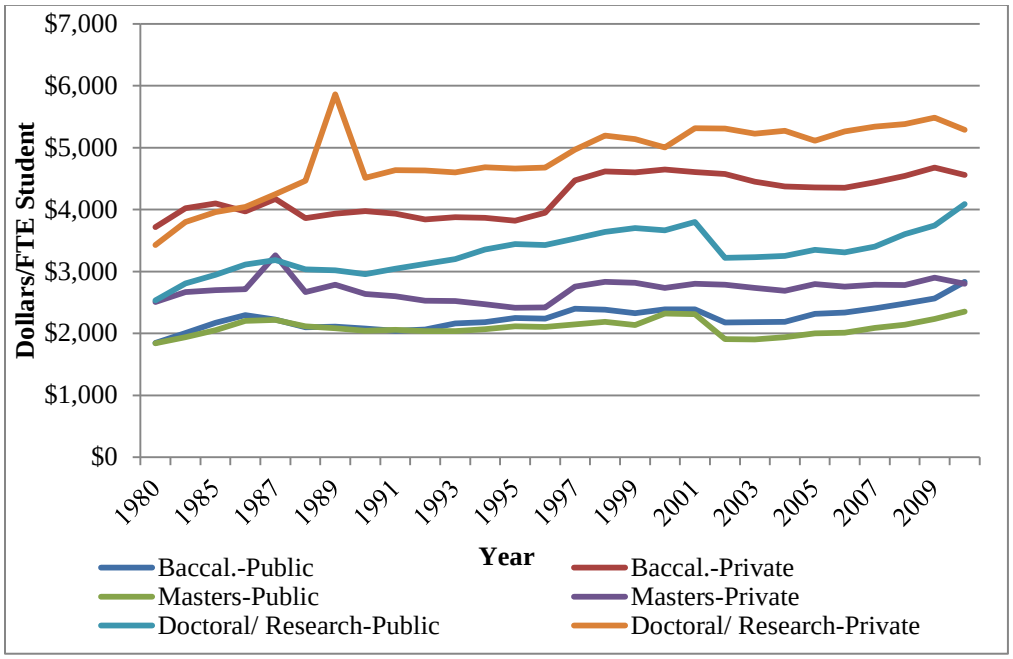

Figure 14: Auxiliary Enterprise Spending by Sector and Carnegie Classification, 1980-2010

The Relationship between Stakeholder Influence and University Spending

The economic influence of the four stakeholder groups is significantly related to university spending based on the results from the multilevel regression models below. Furthermore this relationship changes over time and contributes significantly to understanding sector differences in university spending especially in terms of change over time. I will first walk through the model fit statistics which I used to evaluate how different sets of models, each of which evaluated a different form of the relationship between stakeholder influence and university spending, compared and the implications for understanding these relationships. I then focus on the model that evaluates how stakeholder influence is related to university spending and how this relationships changes over time which evaluates Hypotheses 1, 1a-1d, and 2. Using this model I examine the main effects of each stakeholder group on university spending and how each of those

effects changes over time. I conclude with the discussion of the findings regarding the utility of stakeholder influence as an explanation for stakeholder differences in university spending.

The model fit statistics shown in Table 11 below reveal that the relationships between the economic influence of stakeholder groups and university spending varies by time, in some cases by sector, and most notably across the different spending streams. Given the large sample size that is inherent with the institutions of interest for this time frame I rely heavily on model fit statistics to determine when additional variables were significant. By significant I mean that the variable(s) is/are contributing significant non-redundant information to the model and therefore increasing the fit of the model relative to the model without the variable(s) (Raftery 1995). The first model presented in Table 11, Model 1, establishes a baseline with the inclusion of the intercept and trajectory effects (Table C9 in Appendix C). Model 2 (Table C10 in Appendix C) builds on Model 1 by adding the four variables that measure the economic influence of the four stakeholder groups.[48] As the BIC statistics in Table 11 clearly indicate the inclusion of the stakeholder influence variables substantially improve the model fit (lower BIC statistics indicate and improvement in model fit). This improvement in model fit between Model 1 and Model 2, and the statistical significance of the individual parameters for the stakeholder influence variables (see Table C10 in the Appendix C), provides support for Proposition 1 and initial evidence for Hypotheses 1a through 1d. The economic influence of stakeholders does have a significant effect on with university spending.

[48] Model 2, and all subsequent models, also include the final control variable total revenues which was omitted from the baseline because it is also time varying.

Table 11: Model Fit for Various Multilevel Model Specifications

Model		Instruction	Research	Academic Support	Student Services	Institutional Support	Auxiliary Enterprise
Model 1: *Time, Intercept and Trajectory Effects of Non-Time Varying Controls*	*BIC Statistic*	1,730.14	70,459.57	33,368.04	21,223.99	15,262.70	45,398.32
	Deg. of Freedom	10	10	10	11	10	11
Model 2: *Model 1 with all Stakeholder Influence Measures*	*BIC Statistic*	1,202.05	70,193.31	33,071.40	21,123.17	14,855.67	45,107.58
	Deg. of Freedom	15	15	15	16	15	16
Model 3: *Model 2 with Interactions between Linear Time and Stakeholder Influence Measures*	*BIC Statistic*	1,123.66	70,183.23	33,018.17	21,127.86	14,756.67	45,093.61
	Deg. of Freedom	20	20	20	21	20	21
Model 4: *Model 2 with Interactions between Sector Dummy and Stakeholder Influence Measures*	*BIC Statistic*	1,214.43	70,141.12	33,100.83	21,159.95	14,861.07	45,072.37
	Deg. of Freedom	20	20	20	21	20	21
Model 5: *Model 3 with additional interactions between Sector and Stakeholder Influence Measures*	*BIC Statistic*	1,150.77	70,133.19	33,039.40	21,166.27	14,767.81	45,055.92
	Deg. of Freedom	25	25	25	26	25	26
Model 6: *Model 3 without Trajectory Effects for Sector*	*BIC Statistic*	1,135.25	70,173.47	33,017.72	21,121.85	14,784.52	45,088.74
	Deg. of Freedom	19	19	19	20	19	20
Model 7: *Model 3 without Intercept and Trajectory Effects for Sector*	*BIC Statistic*	1,235.27	70,254.18	33,021.34	21,501.80	15,423.95	45,129.06
	Deg. of Freedom	18	18	18	19	18	19
Model 8: *Model 2 plus Number of Primary Dependencies*	*BIC Statistic*	1,208.49	70,202.91	33,067.90	21,128.01	14,862.78	45,093.54
	Deg. of Freedom	16	16	16	17	16	17

Model 3, which adds interactions between time and the stakeholder influence and total revenues variables, shows an increase in model fit for all of the spending streams with the exception of student services. The model fit for student services shows a slight decline in model fit. However this decline is only 0.938 on average per degree of freedom; therefore there is only weak evidence that these two models are actually different in terms of fit (Raftery 1995). This improvement in model fit, along with the statistical significance of the individual parameters for stakeholder influence and the stakeholder influence interactions with time (Table 12 below), further substantiates Proposition 1. The relationship between the economic influence of stakeholder groups and university spending does change significantly over time. The effects for the individual stakeholder influence/spending stream combinations and how they change over time will be discussed in more detail below.

Models 4 and 5 were used to evaluate whether or not the relationships between stakeholder influence and university spending differ for schools in different sectors. I did this by specifying interactions between the public dummy variable and each of the stakeholder influence measures. The model fit statistics for Model 4 show that the inclusion of the sector/stakeholder influence interactions only significantly improves model fit, relative to Model 2, for research and auxiliary enterprise spending. Table C11, in the Appendix C, shows that other spending streams also showed statistically significant interaction terms. However, only research and auxiliary enterprise spending show an overall improvement in model fit indicating that this only improved the overall fit of the model for those two spending streams, the other spending streams exhibited a decline in model fit, relative to Model 2, once the interactions were included.

This was further confirmed by the comparison of the model fit statistics in Model 5,[49] which included the sector/stakeholder influence interactions along with time/stakeholder

[49] The regression results for Model 5 are presented in Table C12 in Appendix C.

influence interactions.[50] Relative to Model 3, only research and auxiliary enterprise spending showed an improvement in model fit. This confirms the conclusions from Model 4. This indicates that the relationship between the economic influence of stakeholders and university spending does not substantially differ by sector in the context of four of the six spending streams. Regardless of whether the university is public or private stakeholder influence has the same effects on university spending for all of the spending streams analyzed here except auxiliary enterprise and research spending.

I use Model 3 to explicate the substantive implications of the relationships between stakeholder influence and university spending before turning to the utility of the economic influence of stakeholders for explaining sector differences in behavior (Models 6 and 7). I focus on this model for two reasons. First, this model showed a substantial increase in fit for five of the six spending streams and did not reduce the model fit for the sixth spending stream. Second, this model is also substantively interesting in the context of the literature and research questions outlined above because it allows for the evaluation of how the relationships between stakeholder influence and university spending change over time. I am able to see how the effects of stakeholder influence change as state spending declines and public universities have been forced to rely more on tuition income.

Based on the MLM regressions presented in Model 3, I conclude that the relationship between stakeholder influence and university spending is significant, varies over time, and also varies across spending streams which confirms Proposition 1. I will discuss the effects of each stakeholder group in turn after first outlining the key findings from the control variables and intercept effects included in the models.

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[50] As Table C12 in Appendix C shows that no three-way interactions were specified. Therefore this model evaluates if additional information is gained from the inclusion after accounting for the changes in the effects of stakeholder influence over time.

There are five general findings in Table 12 below that are worth noting. First, universities increase their spending over time in all spending streams, except research and auxiliary enterprise expenditures, at rates of between 1.4 and 2.8 percent per year (linear effect of time).[51] Three spending streams, instruction, academic support, and student services, experience a slight tempering of this positive effect based on the significant quadratic effects for time. So despite substantial declines in some of their key funding streams during this period, universities are spending more per FTE student in all categories except research and auxiliary enterprise spending, on average, for the entire period. Second, public universities spend between 16.0 and 45.4 percent less than private universities;[52] in every category expect research spending where public universities spend substantially more and in academic support where the coefficient is nonsignificant.[53] The public*time interactions indicate that the negative effects of public institutions, relative to private, strengthen over time for all categories of spending except research.[54] This indicates that over time, the gap in spending between public and private universities is increasing as private universities increase their spending at a faster rate than public universities.

Third, doctoral and research institutions spend more than other institutions in instruction, research, and academic support but less on student services. Masters institutions spend less on student services, institutional support, and auxiliary enterprise expenditures relative to other types

[51] The exponentiated coefficients for time are equivalent to a percent change (great than 1 is an increase, less than 1 is a decrease) in spending for every one year increase. The coefficients are expressed as log odds in the STATA output because all of the spending streams were logged to minimize the effect of outliers.

[52] The exponentiated coefficients for public, doctoral/research, masters, and land grant all represent the percent change in spending (positive if greater than 1, negative if less than 1) as a result of being a public, doctoral/research, masters or land grant institution respectively relative to those in the reference category due to the fact that the dependent variables were all logged to minimize the impact of outliers.

[53] The main effect for research spending indicates that universities spending 538% more than private universities on research. This extremely large coefficient is a function of the heavily skewed nature of research spending, 41.57% universities analyzed in 2010 had no research spending at all. The majority of these were private universities hence the extremely large positive effect for the public dummy.

[54] The positive effect of public institution on research spending does not change significantly over time.

of institutions. Fourth, land grant institutions spend 234 percent more on research and 45.1 percent more on auxiliary enterprise spending than non-land grant institutions. Of the 71 land grant institutions included in this analysis 56 were public doctoral/research universities and therefore had higher rates of research spending relative to non-land grant institutions. Finally, those schools with higher total current fund revenues exhibit higher levels of spending in all categories. A ten percent increase in total revenues increases spending by between 0.39 percent (institutional support) and 4.33 percent (research).[55] These findings generally confirm the findings from the first portion of this analysis outlined previously.

[55] These percent changes in spending as a result of a 10% increase in total revenues were obtained by raising 1.10 to the coefficients from Table 12. This was necessary because both the independent and dependent variables were logged in this case.

Table 12: Effects of Stakeholder Influence on University Spending with Time Interactions (Model 3)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0169***	0.0334	0.0276***	0.0140*	0.0154**	-0.0148
	(0.00452)	(0.0194)	(0.00863)	(0.00678)	(0.00596)	(0.0110)
Time-Quadratic Effect	-0.0004***	--	-0.000595***	-0.0005***	--	--
	(3.84e-05)	--	(7.27e-05)	(5.76e-05)	--	--
Public	-0.175***	1.853***	0.0131	-0.605***	-0.587***	-0.383***
	(0.0414)	(0.193)	(0.0674)	(0.0578)	(0.0480)	(0.0992)
*Public*Time*	-0.0099***	0.00611	-0.0134**	-0.00650*	-0.0170***	-0.0130*
	(0.00211)	(0.0101)	(0.00429)	(0.00318)	(0.00274)	(0.00564)
Doctoral/ Research Institution	0.282***	3.153***	0.273***	-0.346***	-0.0671	-0.0889
	(0.0338)	(0.165)	(0.0437)	(0.0427)	(0.0368)	(0.0967)
Masters Institution	--	--	--	-0.256***	-0.174***	-0.318***
	--	--	--	(0.0285)	(0.0245)	(0.0669)
Land Grant Institution	--	1.205***	--	--	--	0.372**
	--	(0.273)	--	--	--	(0.138)
Total Current Fund Revenues	0.138***	0.445***	0.175***	0.0417***	0.0404***	0.157***
	(0.00867)	(0.0390)	(0.0136)	(0.0119)	(0.0102)	(0.0211)
*Total Revenues*Time*	-0.000392	0.000448	-0.000943	-0.000120	0.000134	-0.000613
	(0.000261)	(0.00129)	(0.000530)	(0.000396)	(0.000350)	(0.000718)
Student Influence	-0.115***	0.0613	-0.180***	-0.151***	-0.153***	-0.354***
	(0.0163)	(0.0701)	(0.0302)	(0.0245)	(0.0205)	(0.0390)
Student Influence Time*	0.00169	-0.00280	0.00432*	0.00575***	-0.00182	0.00476*
	(0.000931)	(0.00419)	(0.00186)	(0.00140)	(0.00119)	(0.00236)

Federal Government Influence	-0.101***	0.428***	-0.118***	-0.0751***	-0.115***	-0.137***
	(0.00804)	(0.0356)	(0.0152)	(0.0121)	(0.0102)	(0.0187)
Federal Govt. Influ. Time*	0.00514***	-0.0151***	0.00661***	0.00350***	0.00583***	0.00600***
	(0.000498)	(0.00227)	(0.000979)	(0.000749)	(0.000639)	(0.00120)
State Government Influence	-0.0267***	-0.167***	-0.0689***	-0.0283*	-0.0553***	-0.126***
	(0.00741)	(0.0354)	(0.0140)	(0.0112)	(0.00978)	(0.0182)
State Govt. Influ. Time*	0.000561	0.00753**	0.00209*	0.00117	0.00290***	0.00454***
	(0.000512)	(0.00239)	(0.00100)	(0.000767)	(0.000675)	(0.00128)
Private Contributor Influence	0.0433***	0.179***	0.109***	0.0232	0.0740***	0.0619**
	(0.00810)	(0.0368)	(0.0153)	(0.0122)	(0.0107)	(0.0200)
Private Contrib. Influ. Time*	-0.0019***	-0.0073***	-0.00573***	0.000449	-0.00274***	-0.00458***
	(0.000496)	(0.00228)	(0.000961)	(0.000747)	(0.000666)	(0.00126)
Constant	6.774***	-7.130***	4.686***	7.436***	8.091***	6.922***
	(0.168)	(0.728)	(0.271)	(0.230)	(0.196)	(0.397)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

The findings from Model 3 (displayed in Table 12 and Figures 15-22) show that there is a statistically significant relationship between the economic influence of different stakeholder groups and university spending. However they also illustrate that this relationship is complicated.

A relative increase in student influence had significant negative impacts on instruction, academic support, student services, institutional support and auxiliary enterprise spending. Figure 15 below displays the dollar per FTE student change in spending that correspond to the coefficients presented in Table 12 for schools at the 25th, 50th, and 75th percentiles.[56] The effect of research is excluded from Figures 15 and 16 because the student influence did not have a significant effect of research spending. Consistent with the nature of the coefficients, representing a percent change, the magnitude of the dollar/FTE student effects are larger for those schools at the 75th percentile because these schools had higher initial levels of spending. Student influence had the largest effect on auxiliary enterprise spending (both in terms of the percent change and dollar/FTE change), the smallest effect, in terms of the percent change, was for instructional spending. An increase in student influence is related to decreased spending in all of these expenditure categories but it has the smallest impact on instruction. These results offer mixed support for Hypothesis 1a, which states that an increase in student influence should have a positive relationship with instruction, student services, and auxiliary enterprise spending. Student influence is significantly related to these three funding streams, as well as others, which is consistent with Hypothesis 1a, but the relationship is negative, which contradicts the hypothesis. This lack of support could be a function of how spending is measured in this analysis, as dollars

[56] These effects were obtained by raising 1.10 to the coefficients from Table 12. This is because both the independent and dependent variables were logged to minimize the effect of outliers. Because these coefficients are percentages their dollar per FTE student impact will depend on the initial level of university spending. Therefore I multiplied the positive or negative percentage change effects that I obtained with this calculation by the average level of spending in each category at the 25th, 50th, and 75th percentiles of the significant main effects of stakeholder influence variables. Therefore Figures 15-22 display the impacts for schools at the 25th, 50th, and 75th percentiles to provide a range of dollar per FTE student effects to aid in the substantive interpretation of these effects.

per FTE student. It is reasonable to assume a positive correlation between student influence and FTE enrollments. Therefore these findings could be a function of changing enrollments as well as changes in the level of student influence.

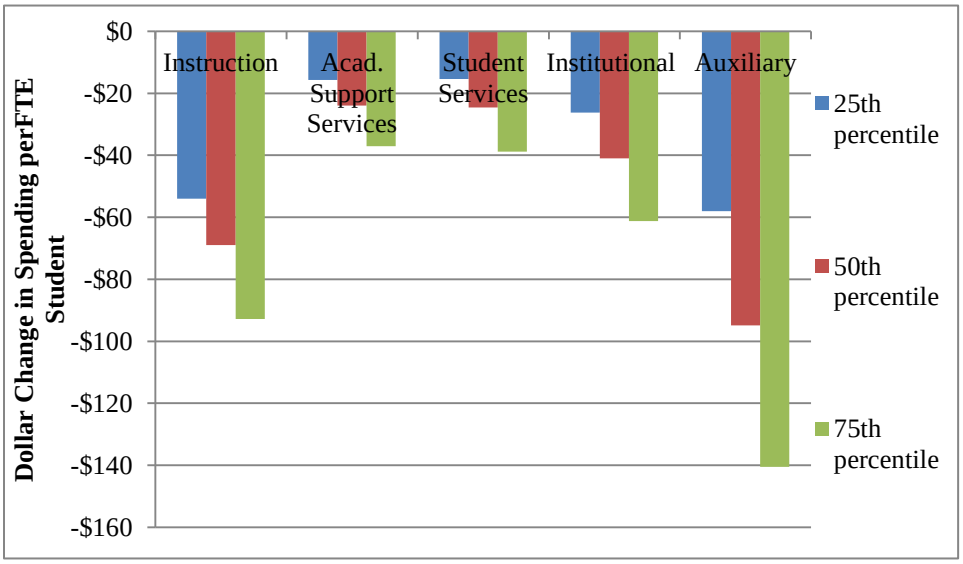

Figure 15: Change in University Spending as a Result of a 10% Increase in Student Influence

The effects of student influence on university spending change significantly over time. Figure 16 is a line graph of the effects of student influence on university spending based on the results in Table 12. These effects include both the main effect and interactions between student influence and time that allow the effect of this variable to change between 1986 and 2010. All of the spending streams that are significantly related to student influence change over time except instruction and institutional support spending. As Figure 16 shows the negative relationships between student influence and spending on academic support, student services, and auxiliary enterprise spending all weaken over time. For example in 1986 a 10% increase in student influence decreased auxiliary enterprise spending by 3.27 percent but in 2010 that same increase only resulted in a 2.07 percent decline in auxiliary enterprise spending. This weakening of the

effects of student influence supports Hypotheses 2 which states that the absolute magnitude of the effects of stakeholder influence should decline over time.

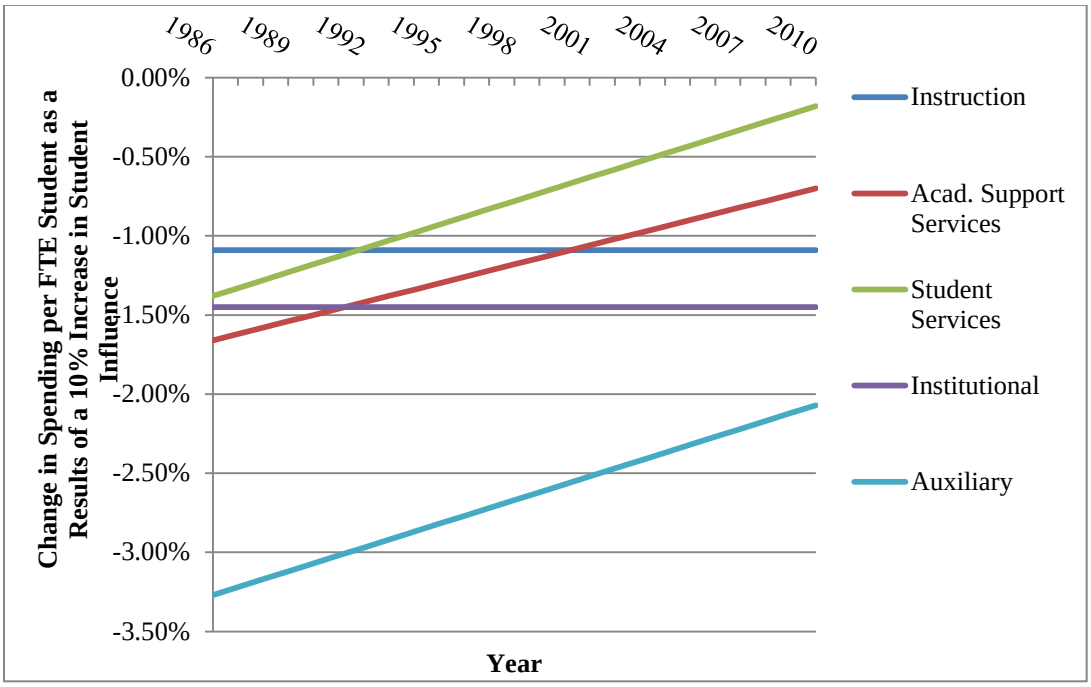

Figure 16: Change in the Effect of Student Influence on University Spending, 1986-2010

Figure 17 shows that an increase in federal government influence is significantly related to changes in all of the spending streams but only has a positive impact on research spending. The positive relationship between federal influence and research spending was the largest effect (in terms of the absolute value of the percent change) while student services was the smallest effect (in terms of the absolute value of the percent change). These results support Hypothesis 1b which states that an increase in the economic influence of the federal government will increase spending on research and decrease spending in all other areas.

Figure 17: Change in University Spending as a Result of a 10% Increase in Federal Government Influence

The effects of federal government influence on university spending all weaken in strength over time further supporting Hypothesis 2 (Figure 18). The positive effect of federal government influence on research spending shows the most dramatic change over the period falling from 4.02% in 1986 to 0.66% in 2010. The negative effects of federal government influence on instruction, academic support, student services, institutional support and auxiliary enterprise spending all become positive at the end of the period (in 2005, 2004, 2009, 2004, and 2007 respectively).However, the effects of federal influence on all of the spending streams are all smaller in absolute magnitude at the end of the period despite the change in direction for all but research spending which remains positive.

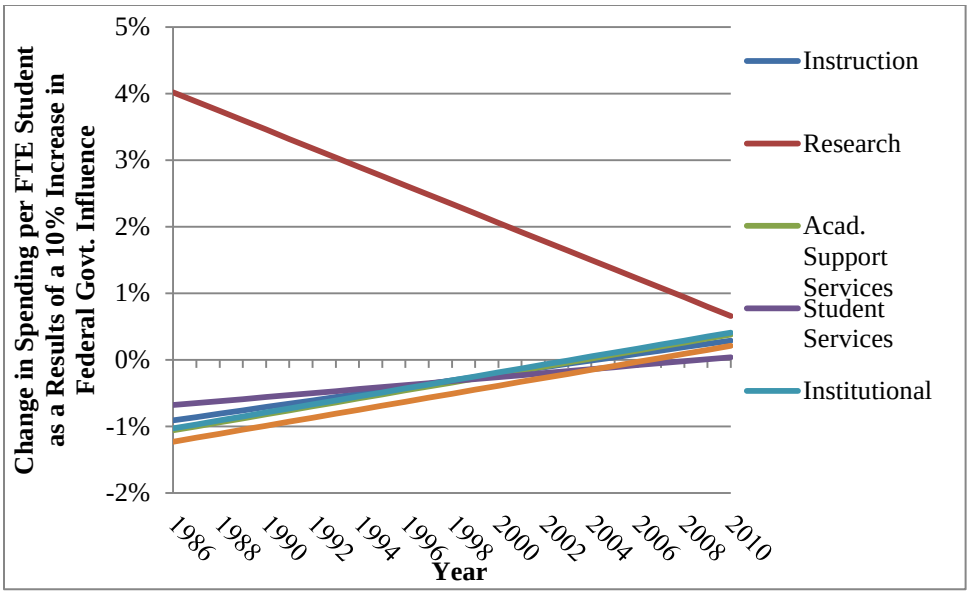

Figure 18: Change in the Effect of Federal Government Influence on University Spending, 1986-2010

A 10 percent increase in the relative influence of state governments results in spending declines of between 2.58% (research) and 0.25% (instruction). Figure 19 shows the dollar/FTE student changes that result from these percent declines. This confirms Hypothesis 1c that states that an increase in state influence will affect all funding streams. The negative effects are a function of the consistent declines in the influence of state governments during this period for public institutions and the very low levels of influence state governments have at private institutions. An increase in state influence is extremely rare for this set of institutions during this time period which leads to these negative effects.

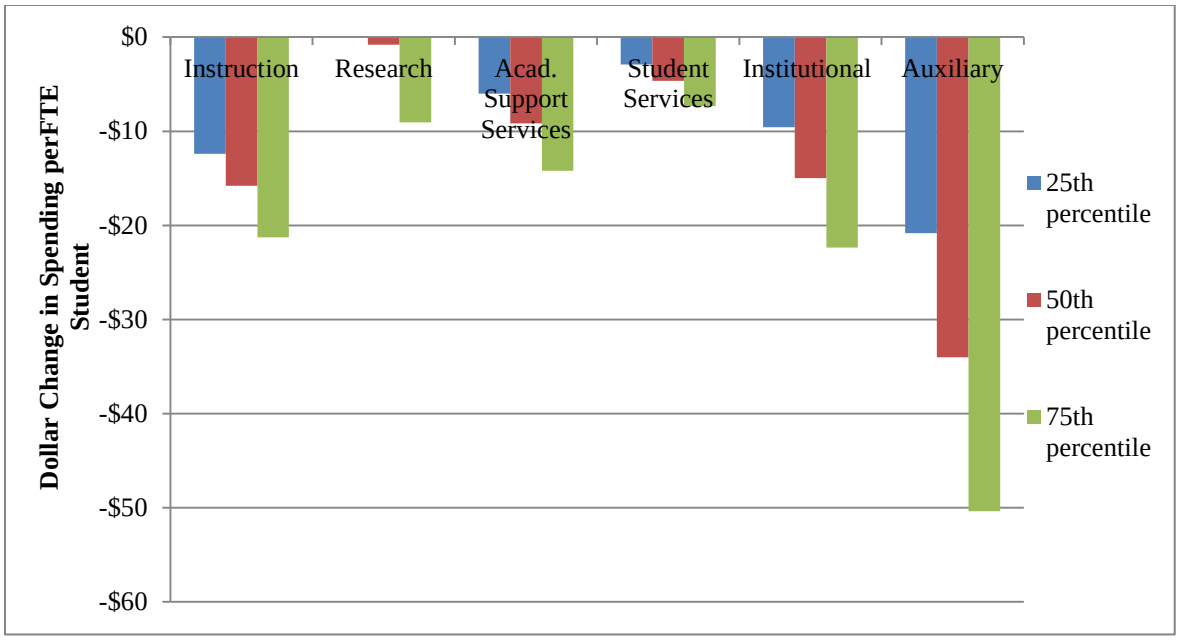

Figure 19: Change in University Spending as a Result of a 10% Increase in State Government Influence

Figure 20 shows the weakening of the negative relationship between state government influence and university spending on research, academic support, institutional support, and auxiliary enterprise expenditures. This provides even more support for Hypothesis 2. The effects of instruction and student services do not significantly change over time and therefore are represented by horizontal lines in Figure 20. The effects for state government influence on research and institutional support spending both become positive during this period. The effect of state government influence on research spending changes from -1.51% in 1986 to 0.17% in 2010 and first becomes positive in 2008. This could reflect the changing mentality on the part of states to view universities as economic development engines. The effect of state government influence on institutional support spending changes from -0.55% in 1986 to 0.22% in 2010 and first becomes positive in 2003.

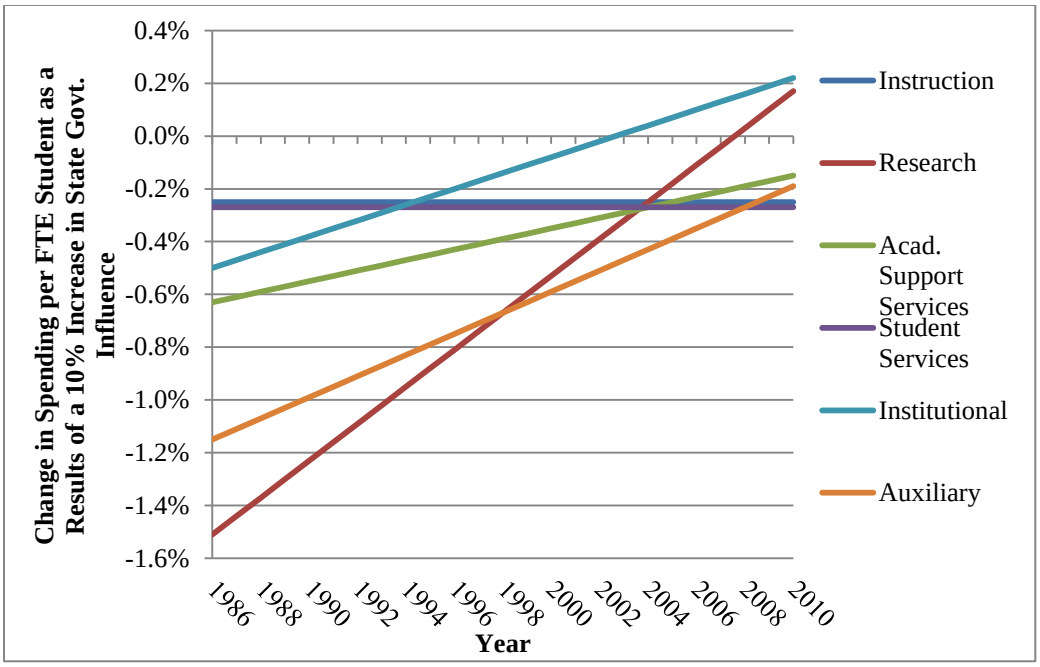

Figure 20: Change in the Effect of State Government Influence on University Spending, 1986-2010

Unlike the effects of the other three stakeholder groups the effect of an increase in private contributor influence has a positive effect on five of the six spending streams. Figure 21 shows the dollar/FTE student changes that correspond to the percent changes shown in Table 12. This provides substantial support for Hypothesis 1d that increases in private contributor influence increase spending across categories.

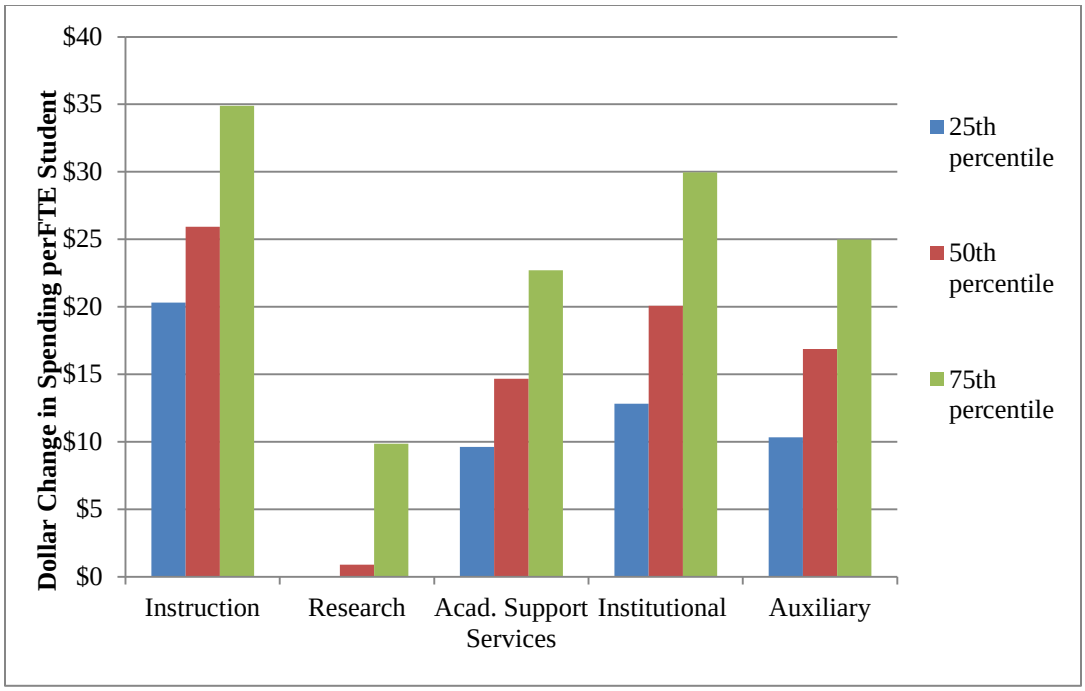

Figure 21: Change in University Spending as a Result of a 10% Increase in Private Contributor Influence

The effects of an increase in private contributor influence all weaken over time with the exception of student services which does not change significantly over time. The weakening of these effects, shown in Figure 22, is consistent with the effects of the other stakeholder groups and further supports Hypothesis 2. The steepest decline was in the effect of research spending which, along with auxiliary enterprise, academic support, instruction, and institutional support spending, became negative towards the end of the period.[57] By 2010 an increase in private contributor influence had a substantially smaller effect on university spending and was also negative for five of the six spending streams.

[57] Instruction, research, academic support, institutional and auxiliary enterprise spending were first negative in 2006, 2010, 2006, 2009, and 2000 respectively.

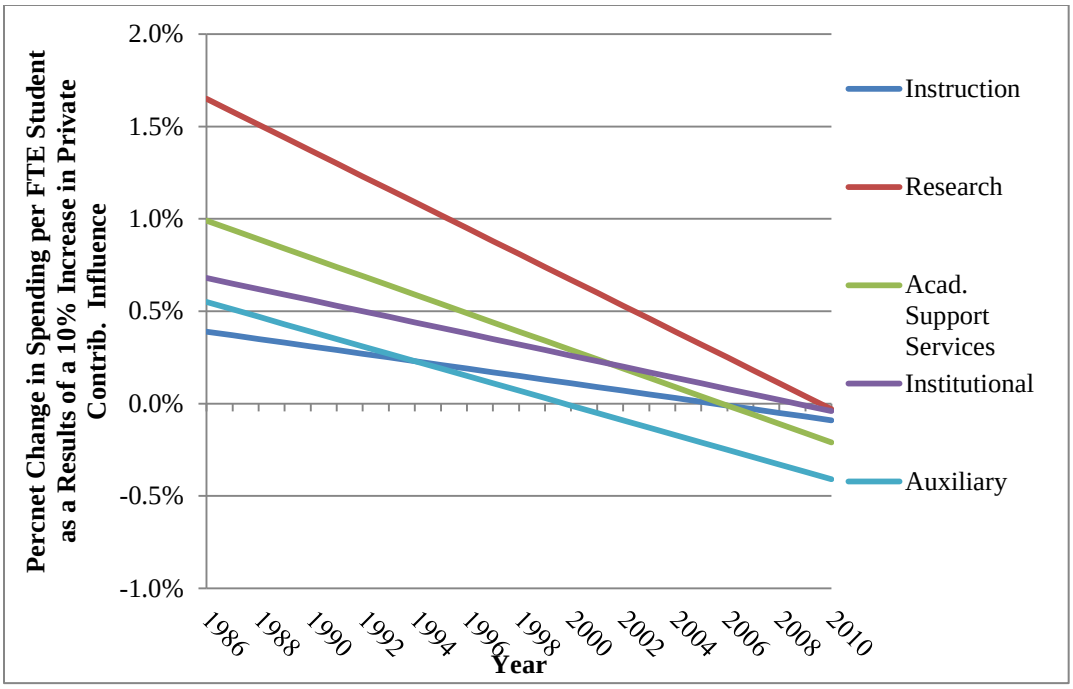

Figure 22: Change in the Effect of Private Contributor Influence on University Spending, 1986-2010

The models and results outlined above substantiate the argument that the economic influence of stakeholder groups is significantly related to university spending and provide varying levels of support for the hypotheses outlined above. The final research question asks if these indicators significantly contribute to understanding sector differences in university spending. I argue above that sector differences are due to differences in the accountability structures of these institutions, particularly who they are accountable to, their stakeholders, and the degree, to which they are accountable to those groups, the economic influence of the stakeholder groups. This argument forms the basis for the third hypothesis.

Evaluating Sector Differences

I found mixed support for this argument and Hypothesis 3. Using model fit statistics I compared Model 3 (Table 12 above) to the same model first without the public*time interactions (Model 6, Table C13 in the Appendix C) and then without the intercept effect for public

institutions (Model 7, Table C14 in the Appendix C). The model fit statistics and degrees of freedom for each of the spending stream outcomes for each of these models are shown in Table 11 above.

The inclusion of stakeholder influence does account for the changes in the effect of sector over time. Model 6 removes the public interaction with time which allows the effect of public institutions, relating to private, to vary over time. As Table 11 shows the BIC statistics are lower for research, academic support (marginally), student services, and auxiliary enterprise expenditures in Model 6 relative to Model 3 indicating that the exclusion of the trajectory effects resulted in a better fitting model for these four spending streams. This indicates that once the stakeholder influence variables and their trajectory effects are included in the models the public trajectory effects are no longer making a substantial contribution to model fit. In effect the changing differences between public and private university spending over time are accounted for by the inclusions of the stakeholder influence and stakeholder influence*time variables when it comes to research, academic support, student services, and auxiliary enterprise spending.

However, the main effect for sector differences remains significant, in terms of p-values and model fit, even after stakeholder influence is accounted for. Model 7 removes both the intercept and trajectory effects for sector from Model 3 (Table C14 in Appendix C). Unlike Model 6, Model 7 shows no increase in model fit relative to Model 3; in fact the model fit is worse without the intercept effects for sector. This indicates that though the stakeholder influence variables do account for the changing effect of sector over time they cannot fully account for the initial differences in spending levels between public and private institutions.

This provides limited support for Hypothesis 3. The economic influence of stakeholders accounts for the changes in the effect of sector on university spending over time, but cannot account for the main effect of sector. This indicates that sector differences in average university

spending behaviors persist even when differences in stakeholder influence across universities are accounted for.

Discussion and Conclusion

The goal of this analysis was threefold. First, I evaluated how the stakeholders of public and private universities changed between 1980 and 2010. Second, I evaluated how the spending behaviors of public and private universities changed over time. Finally I also established the relationship between stakeholder influence and university behaviors and the limited extent to which stakeholder influence can serve as an explanation for differences in university behaviors between sectors, within sectors and over time. I will summarize the results and implications that correspond to each of these goals before turning to the limitations of this analysis and possible directions for future research.

The descriptive analysis of the economic influence of stakeholders reveals a number of trends that are salient to policy makers, researchers, and university leaders that can have significant consequences for universities, their stakeholders, and the industry as a whole. First, the relative influence of university stakeholders is changing over time. This could be problematic for universities as they react to these changes. For example, universities who have groups, like state governments, that have experienced relative declines in their economic influence but remain primary stakeholders could face greater difficulty in maintaining a positive relationship with this group because they are also accountable to other groups, such as students, whose economic influence has increased.

Second, there is some evidence that the economic influence of stakeholders in private and public universities is converging over time, most notably in terms of the influence of state governments and private contributors. This lends support to the arguments in the literature that

there is a blurring of sector boundaries (Gumport and Snydman 2006; Morphew and Eckel 2009). However it does so to a limited degree because the other two stakeholders, students and federal governments, do not show evidence of a convergence over this period. These trends are also relevant to policy makers. For example, as state government influence continuities to decline in public institutions they may face situations where their role in the governance of these institutions is questioned or renegotiated. Third, the differences across sectors supersede differences in institutional types to a greater degree than they do for university spending. This speaks to the ongoing salience of sector differences for these institutions in terms of their revenues and key stakeholders.

The descriptive analysis of university spending also reveals a number of trends that have implications for university researchers, leaders, and policy makers. First, this analysis updates previous research which has shown that private universities generally outspend public universities. Research covering the 1970-1990 has shown that private universities generally spend at higher levels than public institutions (Blasdell, McPherson, and Schapiro 1993; Toutkoushian 2001; Weisbrod, Ballou, and Asch 2008). The results presented here confirm those results but also show that the gap between public and private university spending has increased, at a slightly higher rate, since the late 1990s. The results also point to the faster growth of those groups that had higher initial spending levels in 1980 (e.g., private university student services spending and doctoral/research university research spending). The consequence of these different growth rates is that, while everyone is spending more, the gap between those universities that spend the most and those universities that spend the least is growing wider, sometimes dramatically, from 1980 to 2010.

These trends have significant consequences for universities, the industry as a whole, and the key stakeholders of these institutions. University spending on institutional aid, research,

student services, and faculty salaries has been linked to increases in university status, prestige, and wealth (Brewer, Gates, and Goldman 2002; Geiger 2002). University spending generally, as well as spending in specific areas, such as instruction, research, and student services, has also been tied to universities' abilities to recruit and retain students and faculty (Allen and Shen 1999; Geiger 2002; Winston 1999; Winston 2004). As the variation within and between sectors increases during this period the stratification within the field as a whole will also increase; not just in terms of spending but also in terms of prestige, status, and student quality given the relationship between spending and these factors.

The relationship between the economic influence of the four stakeholder groups and university spending is significant which supports the basic premise of the analysis. However the specific hypotheses that linked each stakeholder group did not receive the same level of support from this analysis. Generally, these results suggest the limited applicability of resource dependency theory to the behaviors of multi-revenue/multiproduct organizations, such as universities. The only situation in which resource dependency predictions about the effects of stakeholders on university spending held was for federal government influence. I argue that this is due to the restricted nature of the funding this group provides to universities. The majority of federal government funding is grants and contracts income and is therefore restricted in how it can be used by the university. That is, the federal government as a stakeholder retains a substantial amount of control over the resource even after the university receives the funds. The other three stakeholder groups, students, state governments, and private contributors, generally have very little control over their resources once they give them to the universities. Universities, because they are multi-revenue/multiproduct organizations that are mission driven, engage in cross-subsidization practices that allow them to use the funding gained from these stakeholders to support their mission activities.

I argue that the practice of cross-subsidization allows universities to create a buffer of sorts between their environments and their spending behaviors. In effect, by engaging in cross-subsidization these organizations are limiting the ability of stakeholders to exert economic influence over the allocation of university resources. This is not to say that stakeholders can't exert any influence within these organizations. Rather, their economic influence has limited effects of university behaviors unless they are somehow able to retain control over their resources after giving them to the university as the federal government is able to do with federal grants and contracts.

The evaluation of the ability of differences in the relative economic influence of stakeholder groups to explain sector differences in behaviors revealed that this cannot in fact fully account for sector differences in university spending. It does account for changes in the effect of sector on university spending over time but it cannot account for the main effect of sector on university spending. I assert that this is due to a legacy effect of sector. Namely private universities have historically had fundamentally different resource dependencies and governance structures. Despite some convergence in the resource dependencies of these institutions the legacies of these historical differences remain.

Limitations

Despite the significance of the findings summarized above and there are a number of limitations to this analysis. First, I only evaluate the economic influence of stakeholder groups; I do not address the political influence of these groups. This limitation is even more striking in light of the results that indicate the declining influence of stakeholders and their limited influence on university spending. As I argue universities could be an ideal context for evaluating the relative effects of economic and political influence of stakeholder groups. This is because as the evidence here and in Chapter 2 demonstrates the internal processes and structures of these

institutions are generating a buffer of sorts between the external environment of these organizations and their spending behaviors. This points to the need to examine the political influence of stakeholders in universities and the extent to which they are involved in the decision making processes that determine how resources are allocated.

Second, I only evaluate four stakeholders here: students, state and federal governments, and private contributors. While justified in the context of evaluating the economic influence of stakeholders these groups are not the only stakeholders of these institutions. For example, faculty, administrators, and trustees or regents are all key stakeholders that can wield substantial political influence within the context of these organizations. However they are not key economic stakeholders because they do contribute substantially to the financial resources of these institutions and therefore were excluded from this analysis.

Third, I only evaluate one set of university behaviors, university spending. It is possible that the economic influence of these four stakeholder groups would have significant impacts on some other aspect of university behavior such as program offerings. Furthermore it is also possible that the nature of the measures of university spending used here obscure the effects of stakeholders. Measuring university spending as dollars per FTE student could potentially be causing some of the negative effects of increases in stakeholder influence, particularly in the case of students. Further research on the relationship between student influence and enrollments and also other possible measures of university spending should be examined to determine if this is the case. Furthermore, as mentioned in Chapter 2 the spending categories in the IPEDS data are rather broad which limits the ability of researchers to draw detailed substantive conclusions about spending in certain areas, such as auxiliary enterprises or student services.

CHAPTER 4: COMPETITION AND UNIVERSITY SPENDING: DIVERSE EFFECTS BY MARKET AND SECTOR

Abstract: Research has shown that competition affects the behavior and industry dynamics of organizations generally and higher education organizations specifically. However, despite the fact that competition between higher education organizations for resources has been increasing, little is known about how interorganizational competition for resources affects college and university financial behaviors. I argue in this chapter that competition for resources affects college and university spending. This is because competition creates incentives for organizations to spend their money in ways to maintain or create a competitive advantage. I evaluate this argument by examining how competition for two resources, state higher education and federal research and development funding, affects the spending patterns of public and private colleges and universities in the U.S. in 2009-2010. Results indicate that competition significantly affects college and university spending; these effects differ by sector, and are also different in the two resource markets. The effects of competition for state higher education funding are more diverse than those for federal R&D funding. Furthermore while competition for state higher education funding does not significantly affect private university spending, private universities are more susceptible to the effects of competition for federal R&D funding.

Introduction

Competition has been shown to impact a number of organizational behaviors and population dynamics. For example, competition affects organizational founding and death rates (Hannan and Freeman 1977; Hannan and Freeman 1989), the diversification or specialization of organizations (Baum and Singh 1996; Carroll 1985; Carroll and Swaminathan 2000; Dobrev, Kim, and Hannan 2001), and organizational change (Baum and Singh 1996). Competition has also been shown to affect higher education organizations in a number of ways. For example, competition for students has been shown to increase tuition prices and institutional financial aid (Winston 1999; Winston 2004). International competition for prestige and status has been show to affect the behaviors of individual schools in a number of ways and also the overall stratification of the global higher education industry (Marginson 2006). However, to my knowledge, no research has been done on how interorganizational competition for resources affects the financial behavior of organizations, specifically university spending or resource allocation practices.

I address this gap in the literature by assessing how interorganizational competition for financial resources affects the spending patterns of public and private universities. Specifically I assert that increases in competition in multiproduct organizations[58], like universities, can create disincentives to (1) continue spending in the area where competition is increasing or (2) increase spending in an area where an organization does not hold a competitive advantage or is unlikely to obtain one. For example, if competition for research funding increases, organizations are more likely to decrease spending on research and increase spending in other areas such as instruction or student services where they have the potential to maintain or gain a competitive advantage. I also assert that changes in competition for different resources will have different effects on university spending because there are different mechanisms and constraints operating in different competitive spaces or markets. For example, responses to competition for federal research and development funding, where the funds are relatively restricted in terms of how they can be spent, are likely to differ from responses to competition for state higher education funding because these fund are generally less restricted.

To evaluate this argument I address two research questions in this chapter. First, what is the nature of competition that higher education organizations face and how does it vary across different schools and different markets? By markets here I mean "systems for the allocation of scarce resources" (Geiger 2004a). This is a broader definition of a market than is traditionally used in economics; however it is more representative of the types of markets that higher education organizations find themselves in such as those for students, faculty, and key resources. Answering this question is increasingly necessary as the higher education industry has seen notable declines in key resources, such as state funding, and substantial volatility in others, over

[58] Multiproduct organizations produce a number of products and services. Higher education organizations, particularly research universities, are viewed as both multi-revenue and multiproduct firms (Cohn, Rhine, and Santos 1989; Lacy 2010; Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008).

the past 40 years (Rizzo 2006; Toutkoushian 2001). There has also been an influx of higher education providers, many of which are for-profit institutions, during the same period (Gumport and Snydman 2006; Weisbrod, Ballou, and Asch 2008). Both of these things led to significant increases in competition for the remaining funding sources available to these institutions (Dill 2001; Gumport and Snydman 2006; Weisbrod, Ballou, and Asch 2008). Researchers have also argued that higher education organizations are becoming more susceptible to market forces, including competition, as government policies for accountability and social demands have changed (Dill 1997; Dill 2001; Slaughter and Rhoades 2004). Therefore, understanding the nature of competition and other market forces and the variation across groups is becoming increasingly crucial, not only to researchers of these institutions, but also managers and policy makers who are trying to anticipate and react to these changing conditions.

Second, how does interorganizational competition for resources affect the spending practices of universities in the U.S.? Little is known about how competition impacts spending behavior, particularly in the context of multiproduct and multi-revenue organizations like universities. The multi-revenue nature of these organizations allows me to evaluate whether or not the nature and consequences of competition differ in the different resource markets that higher education organizations are engaged in. I argue, and demonstrate, that competition in different markets has different consequences for organizations because the nature of the resources and market conditions vary. The evaluation of this argument is a substantial contribution because previous empirical research has focused on a single market (e.g. for consumers) or at a broader industry level and therefore has not evaluated how competition varies across markets. An additional advantage is gained by examining this relationship in the context of higher education in the U.S. because it allows for the evaluation of this relationship in the context of a mixed sector industry (i.e. one that includes public and private institutions). Very little research has been done

on how the effects of competition can vary across sectors despite the fact that there could be substantial differences in the effects of competition in the two sectors. [59] I argue, and demonstrate, that the effects of competition are different for public and private universities. In so doing I extend the current understanding of competition in higher education and our knowledge of the effect of competition on organizations more generally.

To address these questions I analyze competition for state higher education funding (appropriations and grants and contracts) and federal research and development (R&D) funding in 2009. I then evaluate how the conditions in these competitive spaces or markets[60] affect the spending behaviors of four-year public and private universities in 2010. I rely on data from Integrated Postsecondary Education Data System (IPEDS) and the National Science Foundation's Survey of Research and Development Expenditures at Universities and Colleges (SRDE). The Analysis and Results section provides evidence of the significant relationships between the levels of competition in the markets for state higher education and federal R&D funding and university spending. The analysis also demonstrates differences in the effects of competition across the two sectors and between the two markets. I conclude with the implications of these findings as well as directions for future research on competition in higher education. However, before turning to those things, I will first summarize the relevant literature and outline my hypotheses and expectations.

[59] Joel A. C. Baum and Jitendra Singh (1996) control for sector in their analysis of the effect of competition on organizational change. Research on competition for students has demonstrated that public and private schools utilize different strategies when dealing with competition but this research does not establish a statistical relationship with the level of competition schools are facing and the differences in the responses across sectors (Allen and Shen 1999; Winston 1999; Winston 2004; Winston and Zimmerman 2000).
[60] As a reminder, markets in this context are systems for the allocation of scare resources not "a set of arrangements through which buyers and sellers carry out exchange at mutually agreeable terms" (McEachern 2006).

Conceptual Framework

To develop expectations for the role of competition in higher education organizations and how this impacts their behavior, it is necessary to outline the existing research on competition and its impact on organizational behavior. I focus here on research that shows how competition impacts organizational population dynamics, individual organizations generally, and higher education organizations specifically. Following this I outline the basis for my argument that competition for resources should affect university spending, and that these effects should differ across sectors and markets, and outline the specific hypotheses that are evaluated in this analysis.

The Role of Competition

Research has repeatedly shown that competition has significant effects on organizational population dynamics and the behaviors of individual organizations. At the population level research has shown that competition impacts organizational birth/entry rates and death rates within a given population or niche (Baum and Singh 1996; Dobrev, Kim, and Hannan 2001; Hannan, Carroll, Dundon, and Torres 1995; Hannan and Freeman 1989). For example research on automobile manufacturers in Europe indicated that increased competition within countries negatively affected survival rates and differentiation of these organizations (Dobrev, Kim, and Hannan 2001; Hannan, Carroll, Dundon, and Torres 1995). Podolny, Stuart and Hannan (1996) take a more fine grained approach and show that crowding, as well as organizational status, within a given niche (as opposed to an entire industry), influences the ability of the organizations within those niches to survive and flourish. Research has also repeatedly shown that competition in resource dense areas of a market leads to a division of the organizational population into large generalist organizations and smaller or more specialized organizations (Carroll 1985; Dobrev and Carroll 2003). In effect this research shows that competition can cause organizations to differentiate themselves from their competitors in a market which in turn increases their survival

rates (Baum and Singh 1996; Swaminathan and Delacroix 1991). For example Carroll and Swaminathan (2000), in their study of the U.S. brewing industry, demonstrate that increased competition caused concentration or consolidation at the market center which led to growth in both mass-production brewing companies. This in turn led to an opening within the market for specialist brewers at the edge of the market where resources were less concentrated and therefore competition from the mass-production brewers was less likely.

Competition has also been shown to influence a number of organizational behaviors. Barman (2002), using a case study approach, argued and demonstrated that when United Way faced a more competitive market they strategically responded by differentiating itself from its competitors. Research on Australian research universities has shown that market conditions and competitive forces influence the research performance of universities and also the stratification and concentration of the academic research sector in Australia (Beerkens 2012). Research on day care centers and the automobile industry in Europe demonstrates that competition affects an organization's likelihood of altering the organizational niche (defined based on the productive capacities and services offered by these organizations) and subsequently their ability to survive (Baum and Singh 1996; Dobrev, Kim, and Hannan 2001). Galaskiewicz and Bielefeld (1998) examined the effects of niche conditions (i.e. density, concentration, and niche-level legitimacy) on organizational growth. They found that niche legitimacy and concentration had a positive effect on organizational growth (measured in terms of earned income and employees) and density had a nonmonotonic effect on changes in earned income and employees for part of the period.

Research has also illuminated some of the consequences of competition for higher education organizations specifically. Unlike the literature on competition in the context of other industries, this literature focuses more on the effects of competitive (versus less competitive) markets with less emphasis on empirically measuring and evaluating the level of competition a

university faces in its environment and how that impacts its behavior. This research is centered primarily on three themes: competition for students, competition for status or prestige, and the role of government policy in influencing the nature of competitive markets for higher education.

The literature on competition for students points to consequences of competition, different competitive strategies, and also sector differences in competition. Competition between universities for students has been shown to lower tuition prices and increase student subsidies (Allen and Shen 1999; Winston and Zimmerman 2000). Competition for students has also been shown to affect institutional financial aid policies generally leading to more generous financial aid packages to highly sought after students (McPherson, Schapiro, and Winston 1993; Winston 1999; Winston 2004). Competition for students is also leading to heightened stratification between higher education institutions in terms of spending on students and student subsidies (Winston 2004). Roger Geiger (2002) also points out that success in recruiting high ability students results in an advantage in competition for other resources such as donations, faculty, and prestige. This research also focuses on strategies utilized by schools to compete for students. For example Allen and Shen (1999) argue that universities use tuition prices and institutional aid to compete with other schools for students. Research in this area has also shown that there are key differences between public and private universities in how they compete for students using various types of subsidies and non-monetary attributes (Geiger 2002; Winston 2004).

Research on competition at the global and national (U.S. and Australia) levels has frequently focused on competition between universities for position or prestige. Within the U.S. context, competition between schools for status and prestige has been shown to affect many aspects of universities including strategic planning (Brewer, Gates, and Goldman 2002), admissions outcomes (Bowman and Bastedo 2009), and organizational reputation (Bastedo and Bowman 2010). Marketing decisions have also been liked to competition for prestige (Geiger

2004b). Competition for prestige has perpetuated and heightened stratification between universities at the global level (Marginson 2004) and also in the U.S. (Geiger 2002). Simon Marginson (2006), in recent research on positional or status based competition between Australian universities, shows that economic competition is playing an increasing role in the market for prestige or position. Marginson argues that this is due to changes in federal policy that in turn changed the nature of university resources including tuition and government subsidies.

Research on competition in higher education has also focused on the role of state and national policies in affecting the market environment, and competitive conditions, of higher education organizations. Research has shown that states are changing their higher education policies to adopt "quasi-market mechanisms" for the allocation of state and federal funding to higher education organizations (Dill 1997; Dill 2001). This in turn has increased competition within and between university systems in the U.S. and Australia (Dill 2001; Marginson 2006). Bailey, Rom and Taylor (2004) focus on how competition between U.S. states affects policy which in turn affects university behaviors. They argue that competition between U.S. states affects university tuition prices and state funding for higher education. Ben Jongbloed (2004) outlined the many motivations for government intervention in the market for higher education, how changes in government regulations change market conditions and subsequently the level and type of competitive forces universities face.

Despite a rather abundant literature on the impact of competition on organizations generally, and higher education organizations specifically, there are three weaknesses in the literature that I address. First, to my knowledge no one has evaluated how interorganizational competition for resources impacts organizational spending. This is a notable weakness in the literature, particularly in the context of multiproduct mission-based organizations, like universities and many nonprofit organizations, because they offer a mixture of products and

services. Ideally the decisions about which products/services to provide and at what levels are guided by the organizations' mission(s). However, if the organizations are facing substantial competitive pressures they could be forced to choose between providing mission based goods and organizational survival. This is a powerful incentive to alter their behavior in a ways that could increase their chances of survival at the potential expense of their mission. Second, there has been very little investigation of how competition varies by sector. We know that strategies of public and private universities in the market for students differ but no one has looked at how competition affects these organizations differently. Third, because the research on competition focuses on the market for a single resource or on industry level competition, no research has been done to date on how competition in different markets affects organizations differently. Understanding how the effects of competition vary based on the nature of the resource and market conditions is important for understanding the effects of multidimensional competition for resources on multi-revenue organizations such as universities.

Competition and University Spending

In this chapter I investigate the effect of competition on university spending, how this differs by sector and market and thereby shed some additional light on these weaknesses in the literature. I argue that interorganizational competition for resources can change the incentive structures that guide university spending and subsequently alter university spending patterns.

Gabriel Kaplan (2009), in his recent work on governance in public research universities, asserted that competition can alter incentive structures in universities. Kaplan argues that the privatization that is occurring in public research universities results in increased competition for resources. This, in turn, leads to more attention on the part of university leaders to the goods and services they provide. Kaplan asserts that this increased competition created disincentives for universities to invest in unprofitable areas and to "instead focus more resources in those areas that

increase one's competitive advantage in profitable areas" (Kaplan 2009). Kaplan asserts that this disincentive occurs in those settings, like universities, where cross-subsidization is used to shift resources from profit making activities to mission-based areas that do not necessarily generate profits. In effect this creates disincentives to subsidize unprofitable areas and therefore directly affects cross-subsidization and the ability of universities to engage in traditional mission based activities. He cites the growth of profit making centers in hospitals, i.e. delivery units and cardiac care centers, and the contraction of less profitable centers, such as burn units and level-3 trauma centers, as an example of the consequences of the disincentives created by increased competition (Kaplan 2009; Mahar 2006). This argument, though increasingly relevant in light of increased competition in higher education, has not yet been empirically examined.

Kaplan's argument is consistent with the work of Swaminathan and Delacroix (1991) who argue that organizations generally respond to competition by changing their behaviors in an attempt to adapt and survive. Baum and Singh (1996) build on this to argue that organizations will differentiate themselves in response to increased competition by moving into a niche where they possess a competitive advantage. This argument has also been supported in studies of the California wine industry (Delacroix, Swaminathan, and Solt 1989; Swaminathan and Delacroix 1991). Furthermore research on the U.S. diagnostic imaging industry demonstrated that organization use information about potential competition levels in new areas/niches in deciding how to differentiate themselves from their competitors (Mitchell 1989). However, this body of work has focused on a particular form of differentiation--namely niche expansion, contraction, or switching--and does not address the potential implications of competition for organizational financial behaviors.

My argument in this chapter is that in the context of multi-revenue/multiproduct organizations, such as universities, increases in competition change the incentive structures that

guide spending decisions. Increases in competition create a disincentive to (1) continue spending in the area(s) where competition has increased or (2) increase spending in area(s) where an organization does not hold a competitive advantage or is unlikely to obtain one. I expect the effects of competition on spending to differ for different markets and for universities in different sectors for two reasons. First, the dynamics and conditions of resource markets vary. For example, the average level of competition (i.e. density) in the market for state higher education in 2009 was 100.7 schools whereas the average level of competition in the market for federal R&D finding in 2009 was 487.0 schools. Second, different resources have different constraints that are associated with them (Froelich 1999). In markets where resources are highly restricted (e.g. federal R&D funding) competition will have more focused effects than in markets for resources that lack the same restrictions because universities have greater freedom in allocating these resources across a variety of spending categories.

This argument extends the work of Kaplan by expanding the scope to include multiproduct and multi-revenue organizations generally. I also remove the distinction between profitable and unprofitable activities. I agree with Kaplan that this is a factor in the incentive structures and decision making process that allocate organizational resources. However, I do not think it is the only one. Therefore I focus more generally on the tradeoffs in competing for different resources with different levels of competition and constraints. This argument also extends the work of Swaminathan, Delacroix, Baum, and Singh on niche differentiation, as well as Kaplan's argument about incentive structures in public universities, by: (1) asserting that the effects of competition will depend on the nature of the funding market that the university is competing in, and (2) specifying that the effects of competition on spending will vary depending on the sector of the organization.

Based on this argument I have generated three hypotheses about the effects of competition for state higher education and federal R&D funding on university spending. The first two hypotheses deal with competition in different markets and correspond to the two disincentives outlined above. The first hypothesis is based on the logic that when competition increases, it becomes harder to compete for that resource. Therefore an organization will reduce their spending in that area, or participation in that market, and instead focus on others. This is particularly true in those situations, such as the market for federal R&D funding, where funding is restricted, i.e. it must be spent on a particular activity, in this case research. This forms the basis for the first hypothesis:

> *Hypothesis 1: Schools that face higher levels of competition for federal R&D funding will have lower levels of research spending and higher levels of spending in other areas.*

When competition increases an organization faces incentives to decrease spending in area(s) where an organization does not hold a competitive advantage or is unlikely to obtain one. This is more appropriate in markets for less restricted or unrestricted funds such as the market for state higher education funding. The constraints placed on the allocation of state higher education funding[61] do vary from state to state, but are generally less restrictive than the constraints on federal R&D funding. State funds can be allocated for spending in a variety of areas, so I expect that the effects of state competition to be weaker and more diverse than the effects for federal R&D competition. For example, states view universities as educational organizations and also as economic development engines. Therefore universities who have competitive advantages in these

[61] State funding is composed of both appropriations and grants and contracts, so there are restrictions on some of this funding. However the overwhelming majority of state higher education funding is appropriations as opposed to grants and contracts. On average, 86.43% of state higher education funding was appropriations in 2009.

areas, or think they could obtain one, will increase spending in these areas as competition increases to make themselves more competitive for state higher education funds.

Hypothesis 2: Increases in state competition will increase spending on research and instruction.

The final aspect of my argument is this chapter asserts that there will be differences in the effects of competition on spending based on the sector of these universities. Public and private nonprofit organizations have different resource dependencies, accountability referents or stakeholders, and governance structures (Chapter 3 ; Frumkin 2002; Frumkin and Galaskiewicz 2004; Galaskiewicz, Inouye, Savage, and Molina 2008). These have all been shown to lead to differences in the behaviors of public and private nonprofit organizations generally, and universities specifically. I argue that the differences in structures, constraints, and behaviors of public and private universities in combination with the differential participation of public and private universities in the market for state higher education funding will lead to sector differences in the effects of competition. Therefore I expect that *the effects of competition for state higher education funding and federal R&D funding on university spending should differ for public and private universities.*

Data

I am evaluating two things in this analysis: (1) the nature of competition for federal R&D and state higher education funding and (2) the effect of competition in these markets on university spending. I focus on the markets for state higher education[62] and federal R&D funding for two reasons. First, both are markets for government funding and therefore it is reasonable for

[62] Private universities also compete in this market through generally to a lesser degree than public universities. This is because the market includes appropriations as well as grants and contracts. Private universities received on average $ 5,099,027 in state funding in 2009 and only 50 of the 241 private universities included in this analysis received no state higher education funding in 2009.

me to exclude international universities from an analysis of competition for these two funding sources. Second, these are two key resources for public and private universities. Schools rely on these two funding sources for substantial portions of their budgets (Chapter 2). Therefore it is reasonable to assume that changes in the level of competition for these resources should affect how the universities spend their money. Third, research indicates that competition for these two resources has increased as state funding has declined (Dill 1997; Dill 2001; Rizzo 2006) and the number of universities participating in federally funded research has increased. Analysis of the data used here indicates that the level of competition for state higher education funding increased from an average of 79 schools in 1986 to 93 schools in 2010.[63] The level of competition in the federal R&D market increased from an average of 412 schools in 1998 to 493 schools in 2009.[64]

I compiled data on university finances and competition for state higher education and federal R&D funding as well as a number of control variables for this analysis. The data comes from two sources (1) the Finance, Institutional Characteristics, and Fall Enrollments components of the Integrated Postsecondary Education Data System (IPEDS) and (2) the National Science Foundation's Survey of Research and Development Expenditures at Universities and Colleges (SRDE). I use the IPEDS data to create measures of university spending behaviors (the outcomes of interest), the level of competition for state funding (key independent variable), university resource dependencies, university position in this market, university size, and university type/mission. I use the SRDE data to create measures of the level of competition and market position for the federal R&D market.

The schools of interest for this analysis are those that meet a number of conditions. First, I focus on four-year undergraduate degree granting public and private universities. I chose to exclude two-year and for-profit schools because of their lack of participation in the market for

[63] Author's calculations using IPEDS data.
[64] Author's calculations using SRDE data.

federal R&D funding. Second, I further restricted this group of schools to those that participate in the market for federal R&D funding in 2009.[65] In this analysis I include those schools that "granted a bachelor's degree or higher in science or engineering and performed at least $150,000 in separately budgeted R&D expenditures in a given fiscal year" and that were science and engineering doctorate-granting institutions (ICF Macro 2011). These are the scope conditions that were used to define the SRDE data and therefore form reasonable boundaries for the market for federal R&D funding. I chose to use the boundaries of the market for federal R&D funding to limit this scope of this analysis because this group is, with few exceptions, a subset of the market for state higher education funding. Those schools that are in this group but did not compete in the market for state funding, i.e. received no state higher education funding in 2009, were still included in the analysis because they do compete in the market for federal R&D funding and because it is a relatively small number of schools, only 50 of the 241 included in the analysis.

Dependent Variables

I evaluate the effect of competition on university spending by evaluating spending in six areas: instruction, research, academic services, student services, auxiliary, and institutional expenditures. All of these expenditure streams are adjusted for inflation and are expressed as 2010 dollars per full time equivalent student (FTE) to control for differences in student enrollment across institutions.[66] The descriptive statistics shown in Table 13 provide evidence of the substantial variation in spending levels within schools across spending categories and also across the schools analyzed here.[67]

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[65] The IPEDS data used here is for 2010, therefore this analysis relies on IPEDS data from 2009 and 2010 and SRDE data from 2009 to allow for a one year lag for all of the independent variables to account for potential simultaneity issues.

[66] These variables are also subjected to a log transformation to minimize the impact of outliers.

[67] Additional information on university spending patterns, how they change over time, and how they differ across groups can be found in Chapter 3.

Table 13: Descriptive Statistics for University Resource Allocation Measures , 2010 [68]

Spending Stream	Mean	Standard Deviation	Minimum	Maximum
Instruction Spending per FTE student	$11,451.74	$9,617.78	$2,895.11	$89,377.53
Research Spending per FTE student	$3,951.89	$9,642.73	$0.00	$118,897.00
Academic Support Spending per FTE student	$3,084.12	$3,997.46	$0.00	$62,615.82
Student Services Spending per FTE student	$2,561.71	$1,991.85	$463.59	$21,582.66
Institutional Spending per FTE student	$4,103.15	$3,464.18	$440.98	$29,881.38
Auxiliary Spending per FTE student	$4,290.81	$3,256.42	$0.00	$36,811.52

Measures of Competition

I conceptualize competition as the density or count of organizations within a particular resource space or niche which is consistent with the majority of the organizational research cited above (Baum and Singh 1996; Carroll 1985; Carroll and Swaminathan 2000; Dobrev and Carroll 2003; Dobrev, Kim, and Hannan 2001; Hannan, Carroll, Dundon, and Torres 1995; Hannan and Freeman 1977; Hannan and Freeman 1989; McPherson 1983). Given this operationalization a number of approaches have been developed for defining the boundaries of the resource space(s) within which the densities are measured. I use geographic boundaries of U.S. states to define the resource niche for state higher education funding. Only those universities within a state compete for higher education funding from that particular state.[69] Therefore competition for state funding is measured as the number of higher education organizations within a state that received any

[68] There were 44 schools that, despite their participation in the market for federal R&D funding in 2009, did not record any research expenditures (according to the IPEDS data) in 2010. The majority of these schools were smaller Baccalaureate or Master's Institutions (only one, Barry University, was classified as a Doctoral or Research University according to the 2010 Basic Carnegie Classification). These schools also had an extremely low market share and, with the exception of eight schools, were competing for funding in four research areas or less. These facts suggest that these schools are on the periphery of the market for federal R&D funding and therefore could be entering and exiting the market for federal R&D funding from year to year. Alternatively this discrepancy could be a function of how research expenditures are reported within the IPEDS data.

[69] This approach is similar to that taken by Joel A. C. Baum and Helaine J. Korn (1999) in their study of commuter airlines.

money from the state in the form of appropriations or grants and contracts in 2009.[70] Descriptive statistics for competition for state higher education funding are show in Tables 16 and 17 in the analysis section below.

I rely on the SRDE research area breakdowns to define the resource spaces or niches in the market for federal R&D funding. The SRDE data breaks down the R&D spending[71] by source (e.g. federal, state, and industry) and into eight research areas in which universities can receive/spend federal R&D funding: engineering, physical sciences, geological sciences, mathematical and computer sciences, life sciences, psychology, social sciences, and interdisciplinary/other sciences. These research areas are used to define the discrete but overlapping niches present in the market for federal R&D funding.[72] The niches are discrete because each contains a distinct set of schools that draw on federal funding in that research area. Therefore the density in any given niche is different. The niches are also overlapping because a school that engages in federally funding R&D is not limited to only doing so in one area. For example, the University of Arizona, Vanderbilt University and Florida State University all competed for federal R&D funding in all eight research areas in 2009. However universities that do compete in multiple niches are not participating in each niche to the same degree. For

[70] This measure includes any school included in the IPEDS data that received state funding and therefore includes schools that are not included in the regression portion of the analysis (e.g. public and private nonprofit two-year institutions and private for-profit schools of any degree granting level). I included these schools in the measure of state competition because they are part of this market and therefore should be included in the measures of competition and market conditions for this market even though they are not the focus of this analysis.

[71] Given the restricted nature of these funds, particularly federal research funding, I assert that federally funded R&D expenditures in a particular research area are indicative of federal research dollars received for R&D in that area. Therefore the data on federal R&D spending can be used to generate measures of the level of competition for federal R&D resources and the market position of universities in this market. Using the output of an organization to define a market is also consistent with previous literature on competition. For example Dobrev, Kim and Hannan (2001) use the nature of the engines that automobile manufacturers produce to define the market and niche width of automobile manufacturers in their study of the consequences of crowding and niche width on organizational mortality.

[72] This is similar to the approach taken by Baum and Singh (1996) in their studies of competition between child daycare centers.

example, the University of Chicago, which competes in six niches, pulls 71.66% of its total federal R&D funding from life sciences in 2009 but only 2.16% from psychology. The University of Chicago is competing in both of these niches, but is competing to a greater degree in the life sciences than in psychology.

Due to the nature of this market, I created a measure of federal R&D competition that accounts for different schools competing in different niches to different degrees and also for the differences in the densities in the niches. I did this by calculating a weighted density score in which the density for each niche that a university competed in was weighted by the degree to which the university competes in that niche relative to others. The extent to which a university participates in a niche is measured by the proportion of total federal R&D funding that the university spends in any one of these niches. I then summed these weighted niche densities to create a university level weighted density score. [73] By using this weighted density score, as opposed to a simple density, I am able to control for the degree to which these schools compete in these niches and therefore the extent to which the density of the niche reflects the level of competition the school is actually facing.

The equation used to generate this measure is shown in below. (W_i) is the weighted density in the market for federal R&D funding, (D_{Ei}) is the density in the engineering niche, and (P_{Ei}) is the proportion of total federal R&D funding that a university spends in engineering.

[73] It is important to note that this measure does not account for the differences in the sizes of the resource pools. In other words it does not account for the fact that the pool of resources that the organizations are competing for is larger in life sciences than psychology. I am unable to include a measure of market size in the model here because this measure was highly correlated with the density measures and subsequently lead to multicollinearity issues in the regression models.

Each of the remaining D_i's and P_i's correspond to the remaining niches in the market for federal R&D funding.[74]

$$W_i = \sum_{i=1}^{i=n} \left[\begin{matrix} (D_{Ei} * P_{Ei})(D_{Hi} * P_{Hi})(D_{Gi} * P_{Gi})(D_{Ai} * P_{Ai})(D_{Li} * P_{Li})(D_{Ci} * P_{Ci}) \\ (D_{Si} * P_{Si})(D_{Ri} * P_{Ri}) \end{matrix} \right] \quad \text{(Eq. 8)}$$

Take the University of North Carolina at Chapel Hill (UNC-CH) for example. UNC-CH engages in research, and therefore competes in, the geosciences, life sciences, math/computer science, physical sciences, psychology, and social science niches. The densities of each of these niches (the D_i's) are 391, 612, 437, 520, 327 and 378 schools respectively indicating that between 327 schools and 612 schools compete with UNC-CH for the money available in these six niches in 2009. For UNC-CH the degrees of participation in each of these niches (the P_i's) are: 0.0329 in geosciences, 0.0232 in math/computer sciences, 0.0515 in physical sciences, 0.0165 in psychology, 0.0985 in social sciences and 0.7775 in life sciences. The weighted density score for UNC-CH based on these niche densities and participation scores is 568.24. [75] Descriptive statistics for this measure of federal R&D competition are displayed in Table 18 and Figure 24 in the analysis section below.

Measures of Market Position

The status or position of an organization within a market has been shown to influence organizational behavior and also the impact of competition on those behaviors (Bastedo and Bowman 2010; Bowman and Bastedo 2009; Podolny 1993; Podolny 2008; Podolny, Stuart, and Hannan 1996; Weisbrod, Ballou, and Asch 2008). Therefore I also include measures of the

[74] The remaining niches are physical sciences(D_{Hi} and P_{Hi}), geological sciences (D_{Gi} and P_{Gi}), mathematical and computer sciences (D_{Ai} and P_{Ai}), life sciences (D_{Li} and P_{Li}), psychology (D_{Ci} and P_{Ci}), social sciences (D_{Si} and P_{Si}), and interdisciplinary/other sciences (D_{Ri} and P_{Ri}).

[75] The equation for UNC-CH based on these densities and degrees of participation is: $W_i = \sum_{i=1}^{i=n}[(D_{Gi} * P_{Gi})(D_{Li} * P_{Li})(D_{Ai} * P_{Ai})(D_{Hi} * P_{Hi})(D_{Ci} * P_{Ci})(D_{Si} * P_{Si})] = \sum_{i=1}^{i=n}[(391 * 0.0329)(612 * 0.7775)(437 * 0.0232)(520 * 0.0515)(327 * 0.0165)(378 * 0.0985)] = 568.24$

market position in both markets (state higher education and federal R&D) to control for the effects of market position on university spending.

I use the share of the market held by a school to measure the relative market position of a university. The market share is the proportion of the total amount of funding available in a particular market that a university receives. For state market share this is equal to the proportion of all state higher education funding received by a university in 2009. For example in Table 14 the market share of the University of Wyoming is 66.03 percent indicating that the University of Wyoming held 66.03 percent of all of the state higher education funding available in Wyoming in 2009. Table 14 shows those schools with the highest and lowest state market shares in 2009. Those schools with the lowest state market shares tend to be private institutions and those with the highest market shares tend to be public institutions in states with fewer higher education institutions.

Table 14: Descriptive Statistics for State Market Position Measures

Position in the Market for State Funding	Rank	University	Market Share
Schools with the best market position (across all states) [76]	1	University of Wyoming	66.03%
	2	University of Vermont and State Agricultural College	60.72%
	3	University of Delaware	56.48%
	4	University of Connecticut	50.82%
	5	University of Hawaii at Manoa	50.40%
	6	University of New Hampshire-Main Campus	46.75%
	7	University of Minnesota-Twin Cities	46.42%
	8	University of Alaska Fairbanks	45.74%
	9	West Virginia University	45.36%
	10	University of Rhode Island	41.16%
Schools with the worst market position (across all states) [77]	584	Kenyon College	0.00096%
	585	Lake Forest College	0.00096%
	586	College of Wooster	0.00069%
	587	Rhodes College	0.00063%
	588	University of San Francisco	0.00044%
	589	Trinity University	0.00038%
	590	Colby College	0.00033%
	591	Seattle Pacific University	0.00031%
	592	Oberlin College	0.00013%
	593	Mills College	0.00004%

[76] The mean and standard deviation for state market share are 8.64% and 11.91% respectively for public universities and .31% and 1.78% respectively for private universities.

[77] There are a number of schools that do not compete in the market(s) for state revenues and therefore are not included in this table however they are still included in the regression analysis. These schools are: University of Portland, Willamette University, Augustana College, John Carroll University, Hope College, Lawrence University, Kalamazoo College, Ohio Northern University, Harvey Mudd College, Pacific University, Occidental College, Embry-Ridle Aeronautical University, Brandeis University, Gonzaga University, Furman University, University of Redlands, Georgetown University, Morehouse College, Hampton University, Roanoke College, Williams College, Oakwood College, Claflin College, Carleton College, University of San Diego, California Institute of Technology, Providence College, Gallaudet University, Claremont McKenna College, Wheeling Jesuit University, Tougaloo College, Agnes Scott College, DePauw University, Howard University, American University, Pepperdine University, Southern California College, Texas Christian University, Denison University, Whitman College, Wabash College, Hampshire College, Washington and Lee University, University of Chicago, Bowdoin College, Coe College, Chapman University, Seattle University, Grinnell College, and Roger Williams University.

In the market for federal R&D funding, schools compete in multiple overlapping niches to varying degrees and therefore a weighted measure of market share is necessary. The measure of a school's federal R&D market share is the sum of their market share in each of the eight niches after this number has been weighted by the proportion of total federal R&D funding that the school spends in that niche. The equation used to generate this measure is shown in below. (R_i) is the weighted market share in the federal R&D funding market, (M_{Ei}) is the density in the engineering niche, and (P_{Ei}) is the proportion of total federal R&D funding that a university spends in engineering. Each of the remaining M_i's and P_i's correspond to the remaining niches in the market for federal R&D funding.[78]

$$R_i = \sum_{i=1}^{i=n}\left[\begin{matrix}(M_{Ei} * P_{Ei})(M_{Hi} * P_{Hi})(M_{Gi} * P_{Gi})(M_{Ai} * P_{Ai})(M_{Li} * P_{Li})(M_{Ci} * P_{Ci}) \\ (M_{Si} * P_{Si})(M_{Ri} * P_{Ri})\end{matrix}\right] \quad \text{(Eq. 9)}$$

An example is illustrative here. Brandeis University competes in life sciences, math/computer science, physical sciences, psychology, and social sciences. The market share of Brandeis in each of these research niches in 2009 was 0.0012, 0.0015, 0.0019, 0.0038, and 0.0088 respectively. In other words, Brandeis received between 0.12 percent and 0.88 percent of all federal R&D funding in these niches in 2009. The relative degree to which they are involved in each niche was 0.5614, 0.0541, 0.1375, 0.0619, and 0.1852 respectively in 2009. The weighted sum of Brandeis' niche shares and relative university niche involvement results in a weighted federal R&D market share of 0.002912 or 0.2912 percent.[79]

Figure 23 shows a rank ordering of the universities (horizontal axis) and their federal R&D market share (vertical axis). I also identified some specific schools for contextualization. As Figure 23 clearly shows, the market for federal R&D funding is highly stratified with those

[78] The remaining niches are physical sciences$(M_{Hi}\ and\ P_{Hi})$, geological sciences $(M_{Gi}\ and\ P_{Gi})$, mathematical and computer sciences $(M_{Ai}\ and\ P_{Ai})$, life sciences $(M_{Li}\ and\ P_{Li})$, psychology $(M_{Ci}\ and\ P_{Ci})$, social sciences $(M_{Si}\ and\ P_{Si})$, and interdisciplinary/other sciences $(M_{Ri}\ and\ P_{Ri})$.

[79] $R_i = \sum_{i=1}^{i=n}[(M_{Li} * P_{Li})(M_{Ai} * P_{Ai})(M_{Hi} * P_{Hi})(M_{Ci} * P_{Ci})(M_{Si} * P_{Si})] = \sum_{i=1}^{i=n}[(.0012 * .5641)\ (.0015 * .0541)(.0019 * .1375)(.0038 * .0691)(.0088 * .1852)] = 0.002912$

schools at the top holding the majority of the federal R&D market. In 2009 the top 10 schools held 33.80% of the federal R&D market.[80]

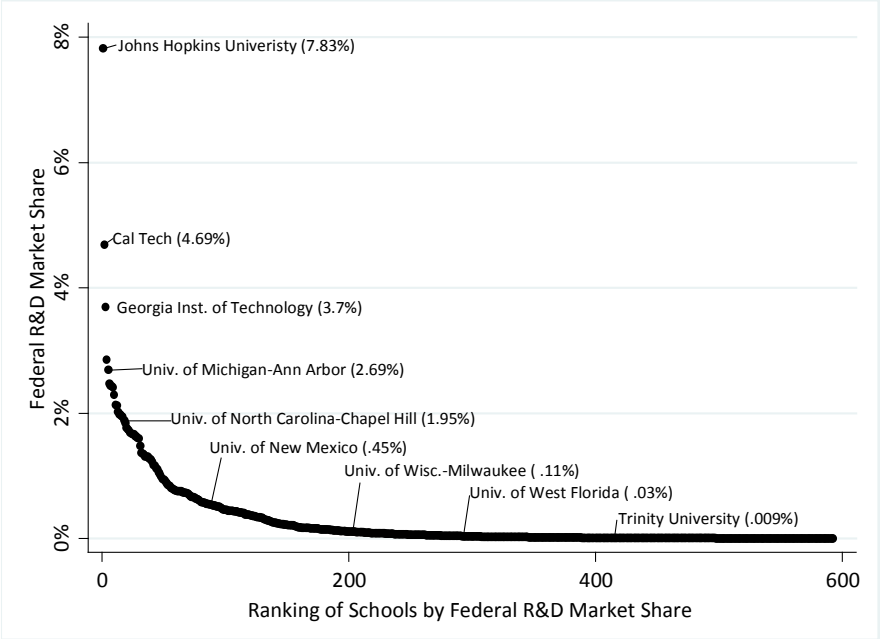

Figure 23: Ranking of Schools by their Federal R&D Market Share, 2009 [81]

University Resource Dependencies, Mission and Size

I also included control variables for three additional factors that previous research shows influence university spending. First, research has shown that organizations are dependent on the groups, individuals, or organizations from whom they receive resources (Pfeffer and Salancik 2003). These dependencies, because they affect the decision making processes within an organization, influence organizational goals, processes, structures, revenue volatilities and spending behaviors (Chapter 3 ; Froelich 1999; Pfeffer and Salancik 2003). Therefore I include variables to control for the key resource dependencies of public and private universities (state funding and tuition respectively) as well as a university's dependency on federal government

[80] Because both federal R&D and state higher education market share were highly skewed they were both subjected to log transformations prior to inclusion in the regression models.

[81] The mean and standard deviation for federal R&D market share are 0.28% and 0.52% respectively for public universities and 0.25% and 0.73% respectively for private universities. A complete list of schools and their federal market shares is available on request from the author.

funding[82] since this is a key component of one of the two markets examined here. I measure resource dependencies as the proportion of total current fund revenues[83] that come from each of these three sources.[84] For example, tuition dependency is the proportion of total revenues that a university receives from tuition.

Second, I also included two variables to control for university mission or type. Research in higher education has frequently argued, and demonstrated, that universities with different missions behave differently (Chapter 3 ; Leslie, Slaughter, Taylor, and Zhang 2012). The first variable, *research*, is coded one for those universities that are classified as doctoral and research universities according to the 2010 Carnegie Classification and zero for all other institutions. The second variable, *masters*, is coded one for all schools classified as master's universities according to the 2010 Carnegie Classification and zero for all other institutions. There are 241 Doctoral and/or Research universities and 234 Master's universities included in the analysis.[85]

Finally, I also included a control variable for size. Size has been shown to impact the behavior of organizations generally and higher education organizations specifically (Kraatz and Zajac 1996; Kraatz and Zajac 2001; Volkwein and Malik 1997). I measure size using the inflation adjusted total current fund revenues, net of investment income and other revenues. Descriptive statistics for these variables are shown in Table 15 below.

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[82] Both state and federal funding include the grants and contracts and appropriations categories of revenues in the IPEDS data.

[83] This is total current fund revenues net of investment income and other income. This was done because of the substantial number of negative values for these income streams in 2009 which made generating proportions problematic.

[84] Federal dependency was highly skewed for both public and private universities and therefore was subjected to a log transformation. In contrast, tuition and state dependencies were both normally distributed for public universities but skewed for private universities. Therefore the log transformation of these variables was included in the private university regressions and the raw percentages were used in the public university regression models.

[85] Baccalaureate institutions serve as the reference category.

Table 15: Descriptive Statistics for Controls and Factors Influencing the Effect of Competition, 2009

Variable	Mean	Standard Deviation	Minimum	Maximum
State Dependency	20.51%	18.04%	0.00%	61.08%
Federal Government Dependency	10.88%	8.92%	0.00%	69.72%
Tuition Dependency	45.53%	20.70%	2.85%	92.48%
Total Current Fund Revenues (1,000s)	$451,000	$699,000	$11,400	$5,360,000

Methods

The goals of this analysis are twofold. First, I evaluate the nature of competition for federal R&D and state higher education funding. Second, I evaluate the effect of competition in these markets on patterns of university spending. These two goals are directly tied to the research questions above and form the basis for the two stages of the analysis presented in the next section.

The first of the two goals is descriptive in nature therefore I use a combination of descriptive statistics, difference in means t-tests, and scatter plots. Descriptive statistics allow me to evaluate the central tendency of, and variation in, the levels of competition in both markets as well as the differences between groups of schools. I also utilize difference in means t-tests to evaluate if the difference in the average levels of competition faced by schools across different groups are statistically significant or if those differences are due to random variation (Warner 2008). Finally I use scatter plots to help contextualize the distribution of the levels of federal R&D competition that universities face.

To address the second goal I use a series of ordinary least squares (OLS) regression analyses to evaluate the impact of competition for federal R&D and state higher education funding on six different spending streams. I use OLS regression because it allows me to estimate the effects of competition in 2009 on university spending behaviors in 2010 net of the control variables included in the models. Because I evaluate the effect of the independent variables on six

different dependent variables and ran the models separately for public and private universities, the results presented in Tables 19 and 20 are the results from 12 separate regression models.

To evaluate how the effects of competition on university spending differ by sector I ran the models separately for public and private universities, as opposed to including an interaction term, for two reasons. First, there is differential participation in the market for state higher education funding. Difference in means t-tests of state market share and state competition measures indicate that despite the fact that both sectors participate in this market private and public universities have statistically significant differences in the market for state funding. Second, there are also significant differences in their resource dependencies which could lead to differences in the effects of competition on university spending (Chapter 3). Furthermore running the models with data from both sectors obscures the nature of the effects of competition on university spending and complicates interpretation of the control variables.

Analysis and Results

The analysis and results outlined here provide a picture of the competitive conditions that schools face in the markets for federal R&D and state higher education funding. They also substantiate the arguments above that competition affects university spending and that these effects differ by sector and market. I will discuss the descriptive findings concerning the nature of competition in these markets before turning to the relationship between competition and university spending.

The Nature of Competition for Government Funding

Competition for resources is a measure of an environmental condition that a university or group of universities faces. Competition is not indicative of the actual behavior of a university. This is why competition measures are not as intuitive for any particular school as measures of

school characteristics or behaviors. A high status school can face the exact same level of competition as a low status school if they are competing in the same market or the same combination of niches. Therefore though I include examples of competition measures for particular schools, particularly for the discussion of federal R&D competition, it is important to remember that these are measures of the environmental conditions facing a particular school rather than a measure of university behavior.

Competition for state higher education funding varies dramatically from state to state. Table 16 presents the 10 states with the highest and lowest levels of competition. The range in the level of competition for state higher education funding is from 219 schools (New York) to 5 schools (Washington D.C.) as shown in Tables 16 and 17. The states with the highest levels of competition are generally the most populous states and those with the lowest levels of competition are generally the least populous states.[86]

[86] Ideally this analysis would also control for differences in the market size across states. However, the measure of the total market size is highly correlated with state density and state market share and therefore is excluded from this analysis. I also considered using an alternative measure for density, the market size divided by the number of competitors in the market. However, this measures the average resources per school as opposed to the density of organizations within a given resource space. Given the unequal allocation of resources across universities in this market and the fact that I am conceptually interested in the level of competition as opposed to the average number of resources I assert that this would be an invalid measure.

Table 16: Descriptive Statistics for State Competition, 2009

Competition for State Funding	Rank	State	Density
States with the Most Competition	1	New York	219
	2	California	209
	3	Pennsylvania	171
	4	Texas	147
	5	Ohio	143
	6	Illinois	117
	7	North Carolina	109
	8	Florida	103
	9	Massachusetts	78
	10	Georgia	74
States with the Least Competition (including Washington D.C.)	42	Vermont	14
	43	South Dakota	13
	44	Hawaii	12
	45	Rhode Island	10
	46	Idaho	10
	47	Nevada	9
	48	Wyoming	8
	49	Alaska	8
	50	Delaware	7
	51	District of Columbia	5

On average 100.59 schools are competing for the same pool of state higher education funding in 2009. However, there is substantial variation around this average as shown by the standard deviation of 69.95 schools (Table 17 below) as well as the overall range (Tables 16 and 17). Table 17 also highlights the differences in the levels of competition for state higher education funding across sectors and schools with different missions. Private universities face higher levels of competition than public universities on average. This difference is statistically significant based on a difference in means t-test for unequal means (p-value =0.0001). This indicates that private universities that rely to some degree on state funding for higher education tend to be located in states where competition for those funds is higher. Though Table 17 indicates that

there are some differences in average levels of competition for state funding across schools with different missions, these differences are not significant based on difference in means t-tests.

Table 17: Descriptive Statistics for State Competition, 2009 (Cont.)

Group	Mean	Std. Deviation	Min.	Max.
Overall (n=592)	100.59	69.95	5	219
Public(N=351)	91.06	66.39	5	219
Private (N=241)	114.47	72.76	5	219
Doctoral/Research (N=240)	96.58	66.79	5	219
Master's (N=232)	105.58	74.34	5	219
Baccalaureate (N=120)	98.96	67.29	12	219

The nature of competition for federal R&D funding is university specific as opposed to competition in the market for state higher education funding where competition is state specific. This is because each school competes in different combinations of research niches to varying degrees and each of these niches has a specific density. I use the weighted density measures because they account for the differential participation of schools in these different niches and render university specific measures of the level of competition a university faces in the market for federal R&D funding in 2009. Competition for state higher education funding is the same for all schools within the same state. For example all schools in New York faced the same level of competition because all 217 schools were competing for the same pool of money and therefore face the same level of competition.

On average universities were competing against 486.94 schools for the same set of federal R&D funds in 2009 (Table 18). This is higher than competition for state higher education funding in any state. Table 18 also shows that there are only minimal differences in the average level of competition for federal R&D funding between public and private universities, and also

between doctoral/research, masters and baccalaureate institutions. The differences in means t-tests confirmed the lack of statistically significant differences between sectors or across schools with different missions. The range in the level of competition for federal R&D funding is much larger than the range for state higher education funding. The range in the level of federal R&D competition faced by the schools in this analysis is clearly shown in the scatterplot in Figure 24. The scatterplot shows the level of competition for federal R&D funding on the vertical axis and the schools are arranged by rank along the horizontal axis. I also identified a number of schools to help contextualize this graph.

Table 18: Descriptive Statistics for Federal R&D Competition, 2009

Group	Mean	Std. Deviation	Min.	Max.
Overall (n=592)	486.94	75.53	186	612
Public(N=351)	486.98	70.51	268.95	612
Private (N=241)	486.88	82.44	186	612
Doctoral/Research (N=240)	488.58	66.13	333.69	612
Master's (N=232)	479.11	84.81	186	612
Baccalaureate (N=120)	498.78	72.92	186	612

The schools that face the highest level of competition are those that are only competing in the life sciences niche which has a density of 612 schools.[87] There are three schools that only compete for federal R&D funding in the interdisciplinary/other niche and therefore face the

[87] There are 21 schools that only compete in the life sciences niche. They are: Grinnell College, Wiles University, Daemen College, Lake Forest College, Touro College, Tougaloo College, Cheyney University of Pennsylvania, Wiley College, Mills College, West Liberty State College, Yeshiva University, Western Connecticut State University, Southern California College, Fort Valley State University, Langston University, Alcorn State University, Midwestern State University, Mayville State University, Frostburg State University Fitchburg State College, and Alabama State University.

lowest level of competition for funding, 186 schools.[88] In between these two extremes the schools are arranged based on the level of competition that they face in the various niches that they are competing for federal R&D funds in. As the illustrative cases indicate, there is not clear link between the levels of competition for federal R&D funding a school faces and their market share or research prestige. This is because competition is an indicator of the market environment a school faces; it does not describe the behavior of the university itself.

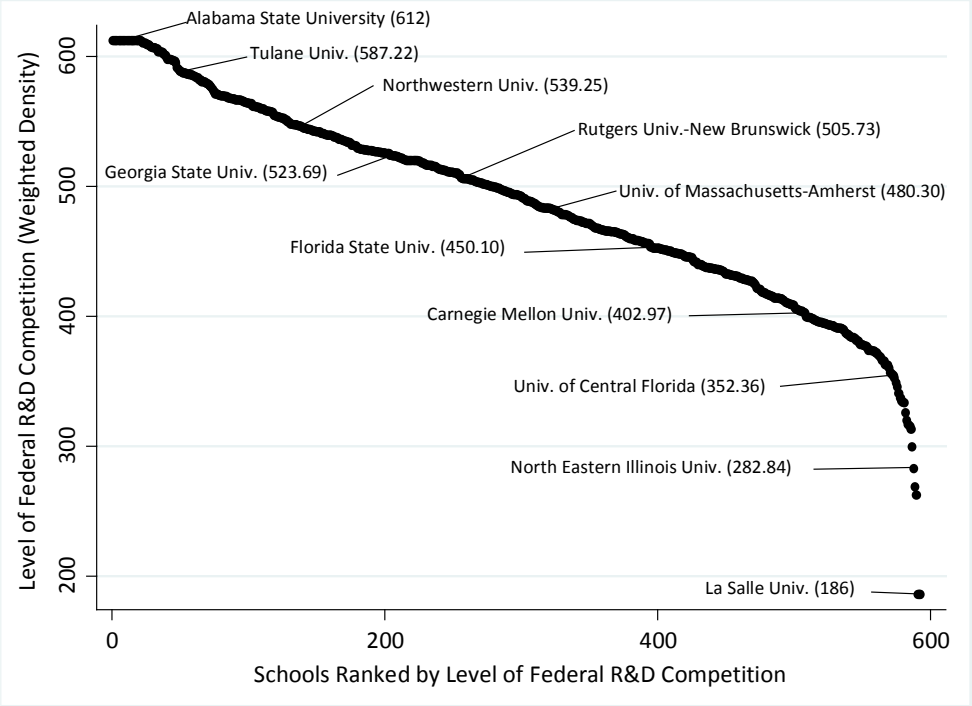

Figure 24: Competition for Federal R&D Funding, 2009

The Effect of Competition on University Spending

The results from the series of OLS regression models, shown in Tables 19 and 20, indicate that competition for federal R&D and state higher education funding significantly affects university spending. Furthermore, there are substantial differences in the effect of increases in competition across the two markets and also between public and private universities. I will

[88] The schools are Le Moyne-Owen College, Philadelphia College of Textiles and Sciences, and La Salle University.

discuss the results for public and private universities in turn and then compare the effects of competition for federal R&D and state higher education funding across the two sectors.

Table 19 presents the regression results for public universities. The first row of Table 19 shows that an increase in the level of competition for federal R&D funding is significantly related to increases in instruction, and institutional support spending. All of the dependent variables were logged and therefore the interpretation of the coefficients depends on the nature of the independent variable in question. I discuss the effects of the level of federal R&D and state higher education funding as the percent change in the spending stream as a result of a ten school increase in the market.[89] In Tables 19 and 20 a coefficient greater than zero indicates an increase in spending and a coefficient less than zero corresponds to a decrease in spending. This indicates that those schools that have higher levels of competition for federal R&D funding spend more on instruction and institutional support expenditures than those schools with lower levels of federal R&D competition. The coefficients for the effects of competition for state higher education funding indicate that schools with higher levels of competition for state higher education funding spend more on instruction, student services, institutional support services and less on auxiliary enterprise expenditures. The strongest effect was for auxiliary enterprise spending which decreased by 2.85% for every ten school increase in competition for state funding.[90]

[89] I exponentiated and multiplied the coefficients in Tables 19 and 20 by 10 for each coefficient to get these effects.
[90] This percent change coefficient was generated using the method described above and in footnote 89.

Table 19: OLS Regression Results for Relationship between Competition and University Spending--Public Universities[91]

	Instruction[92] Spending	Research Spending	Acad. Services Spending	Student Services Spending	Institutional Spending	Auxiliary Enterprise Spending
Weighted Federal R&D Competition	0.0007***	-0.0010	0.0006	0.0004	0.0007*	-0.0002
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
State Competition	0.0016***	-0.0018	0.0003	0.0024***	0.0016*	-0.0029**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Weighted Federal R&D Market Share	0.1531***	0.4305**	0.1211*	0.1687***	0.1295*	0.0959
	(0.029)	(0.154)	(0.049)	(0.050)	(0.052)	(0.076)
State Market Share	0.1143***	0.2836*	0.0015	0.1342**	0.0491	-0.0468
	(0.027)	(0.144)	(0.046)	(0.047)	(0.049)	(0.071)
Federal Dependency	-0.1412***	0.7413***	-0.0814	-0.0180	-0.0404	-0.6922***
	(0.033)	(0.175)	(0.055)	(0.057)	(0.059)	(0.086)
Tuition Dependency	-0.0076***	-0.0375***	-0.0116***	0.0027	-0.0112***	-0.0381***
	(0.002)	(0.008)	(0.003)	(0.003)	(0.003)	(0.004)
State Dependency	-0.0043*	-0.0207*	-0.0054	-0.0064*	-0.0042	-0.0334***
	(0.002)	(0.009)	(0.003)	(0.003)	(0.003)	(0.004)
Research University	0.0129	1.0485**	0.1851	-0.2088*	-0.1439	0.1405
	(0.070)	(0.368)	(0.117)	(0.120)	(0.125)	(0.180)

[91] The market share, dependence and total current fund revenues were all logged before being included in the model. The measures of competition were not.

[92] All independent variables were measured in 2009 and all dependent variables were measured in 2010.

Master's College/ University	-0.0234	-0.3750	0.0236	-0.0902	-0.1890*	-0.2225
	(0.059)	(0.310)	(0.098)	(0.101)	(0.105)	(0.152)
Total Current Fund Revenues	0.0066	0.0666	0.104	-0.2271***	-0.1042*	-0.0384
	(0.034)	(0.176)	(0.056)	(0.057)	(0.060)	(0.086)
Constant	10.3778***	9.2434*	6.6317***	12.9452***	10.9076***	13.5698***
	(0.814)	(4.266)	(1.352)	(1.395)	(1.450)	(2.092)
Observations	351	351	351	351	351	351
R-squared	0.592	0.667	0.435	0.098	0.169	0.470

Standard errors in parentheses

**** p<0.001, ** p<0.01, * p<0.05*

Market position was also significantly related to university spending for public institutions and the effects again differed between the two markets. Universities with better positions in the market for federal R&D funding, i.e. larger market shares, spent more in instruction, research, academic support services, student services, and institutional support services. State market share was less influential than federal R&D market share. Schools with higher state funding market shares had higher levels of spending in instruction, research and student services but the magnitude of these effects were weaker than those for federal R&D market share.

The resource dependencies, missions and size of public universities were also significantly related to public university spending. Schools with higher levels of federal dependencies decreased spending on instruction and auxiliary enterprise expenditures but had significantly and substantially higher levels of spending on research. Those schools with higher levels of tuition dependency had lower expected levels of spending on instruction, research, academic support services, institutional support services and auxiliary enterprise spending. Higher levels of state dependency also decreased spending on instruction, research, academic support, and auxiliary support services but also decreased spending on student services. Doctoral or research universities had substantially higher levels of research spending and lower levels of student services spending relative to non-doctoral/research institutions.[93] Public master's level institutions spend less on institutional support services relative to non-master's institutions. The larger public universities spend more on academic support services and less on student and institutional support services.[94] The R-squared for each of the six spending streams differed

[93] The exponentiated coefficients for doctoral/research and master's institutions represent the percentage increase or decrease in spending as a result of being a doctoral/research or master's institution relative to being a non-doctoral/research or non-masters institution.
[94] The coefficients for total current fund revenues represent the percent change in spending as a result of a 10% increase in total current fund revenues.

dramatically ranging from 0.098 to 0.667. This indicates that the explanatory power of this model specification ranged from explaining 9.8% of the variance in student services spending to 66.7% of instructional spending.

Table 20 below shows the regression results for the effects of competition on private university spending. Private universities that faced higher levels of competition for federal R&D funding had lower levels of spending on research and student services. This is consistent with Hypothesis 1 if private universities, on average, lack a competitive advantage and do not anticipate gaining one in this market. However, an evaluation of the competitive advantages of these institutions, or their perceived advantages, is beyond the scope of this analysis. Therefore this can only be interpreted as offering limited support for Hypothesis 1. Competition for state higher education funding had no statistically significant effects on private university spending. This results in a failure to support Hypothesis 2 in the context of private universities.

Market shares in both markets had significant positive effects on private university spending. Private universities with better positions in the market for federal R&D funding had higher levels of spending on instruction. Private universities with better positions in the market for state higher education funding spend more on academic support and student services. The magnitudes of the effects in both markets are relatively similar but there are differences in the spending streams significantly association with positions in the two markets.

Table 20: OLS Regression Results for Relationship between Competition and University Spending--Private Universities

	Instruction Spending	Research Spending	Acad. Services Spending	Student Services Spending	Institutional Spending	Auxiliary Enterprise Spending
Weighted Federal R&D Competition	-0.0002	-0.0041*	-0.0006	-0.0008*	-0.0002	-0.0012
	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.001)
State Competition	-0.0000	-0.0020	0.0009	0.0005	-0.0001	0.0003
	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.001)
Weighted Federal R&D Market Share	0.2236***	-0.1278	-0.0995	0.1582	0.0977	-0.1144
	(0.060)	(0.417)	(0.112)	(0.084)	(0.073)	(0.183)
State Market Share	0.0146	0.2567	0.2464**	0.1271*	-0.0479	-0.1007
	(0.043)	(0.295)	(0.079)	(0.060)	(0.052)	(0.129)
Federal Dependency	-0.1779***	0.8944***	-0.0863	-0.2010***	-0.0169	-0.0071
	(0.039)	(0.267)	(0.072)	(0.054)	(0.047)	(0.117)
Tuition Dependency	-0.4249***	-0.3842	-0.5588***	-0.3085**	-0.4696***	-0.5172*
	(0.082)	(0.568)	(0.152)	(0.115)	(0.100)	(0.249)
State Dependency	-0.1139*	-0.3932	-0.3019**	-0.2103**	0.0363	-0.1667
	(0.051)	(0.353)	(0.095)	(0.072)	(0.062)	(0.155)
Research University	-0.3547***	-0.5296	-0.1911	-0.4969***	-0.4783***	-0.5521*
	(0.084)	(0.579)	(0.155)	(0.117)	(0.101)	(0.254)

Master's College or University	-0.3261***	-1.3965***	-0.3947***	-0.3351***	-0.4046***	-0.5333**
	(0.059)	(0.404)	(0.108)	(0.082)	(0.071)	(0.177)
Total Current Fund Revenues	0.2766***	1.2642***	0.2432**	-0.0114	0.1436*	0.2546
	(0.046)	(0.318)	(0.085)	(0.064)	(0.056)	(0.139)
Constant	8.1112***	-13.9707	7.3193**	12.4788***	8.5460***	5.3183
	(1.261)	(8.707)	(2.333)	(1.764)	(1.527)	(3.815)
Observations	241	241	241	241	241	241
R-squared	0.709	0.474	0.394	0.300	0.435	0.132

Standard errors in parentheses

**** p<0.001, ** p<0.01, * p<0.05*

The resource dependencies, missions and size of private universities were also significant predictors of private university spending (Table 20). Private universities with higher levels of federal dependency had lower levels of spending on instruction and student services but higher levels of spending on research. Private universities that were more dependent on students had lower levels of spending across the board. Private universities with higher levels of state dependency spent less on instruction, academic support, and student services. Private doctoral and research universities spent less on instruction, student services, institutional support and auxiliary enterprises relative to private non-doctoral/research universities. Private masters institutions spent less in all spending categories relative to non-masters universities. Larger private universities spent more in all spending categories except for student services.

Sector Differences in the Effects of Competition

There are substantial differences in the effects of competition on university spending for public and private universities. To develop a clearer understanding of these differences and to evaluate the hypotheses outlined above, I outline the substantive implications of the effects of competition for federal R&D and state higher education funding. The substantive implications of the levels of competition in the markets for federal R&D and state higher education funding can be most easily understood by thinking about the dollar per full-time equivalent (dollar/FTE) student change in spending as a result of an increase of 10 schools within a given market. Because these coefficients represent a percent change, rather than a unit change, the dollar/FTE changes in spending will depend on the initial spending levels of a particular school. In other words, the effect of competition on university spending is a function of initial spending levels for a particular university. Therefore, Figures 25 and 26 below show changes in dollar/FTE student

spending for schools at the 25th, 50th, and 75th percentiles to provide a benchmark for the range of changes different schools will experience as competition increases.[95]

Figure 25 highlights the sector differences in the effects of competition for federal R&D funding on university spending. Figure 25 shows the dollar per FTE changes in spending that result from the statistically significant effects of competition for federal R&D funding. Private universities that faced higher levels of competition for federal R&D funding had lower levels of spending on research and student services whereas public universities with higher levels of competition for federal R&D funding spent more in instruction and institutional support services. There were also differences in the magnitude of these effects. Private universities were more affected by federal competition than their public counterparts as evidenced by the larger (in absolute value) magnitude of the coefficients shown in Tables 19 and 20. The dollar per FTE differences were also largest the declines in private university research spending. However, due to the higher initial levels of spending on instruction, the dollar per FTE changes in public university spending are larger than the dollar per FTE changes in private university student services spending.

[95] The figures only show the dollar/FTE student changes for the coefficients in that were statistically significant in Tables 19 and 20.

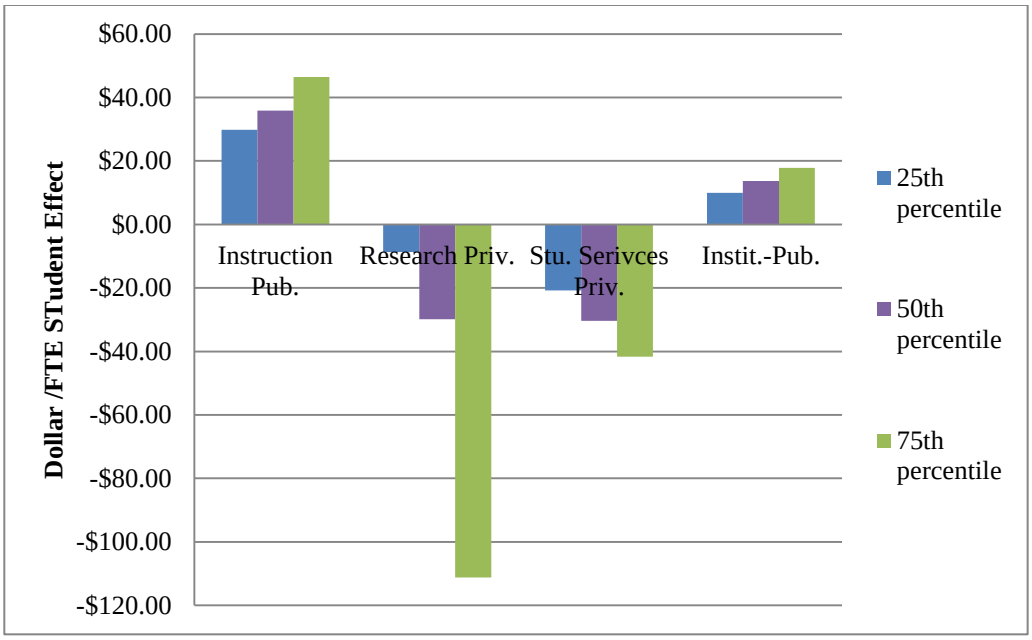

Figure 25: Dollar per FTE Student Change in Spending as a Result of a 10 School Increase in Federal R&D Competition

Figure 26 highlights the sector differences in the effects of competition for state higher education funding on university spending. Figure 26 shows the dollar per FTE changes in spending that resulted from the statistically significant effects of competition for state higher education funding. There were no statistically significant differences in private university spending for different levels of competition for state higher education funding. Public universities with higher levels of competition for state higher education funding had higher levels of spending in instruction, student services, and institutional support services, and lower levels of spending on auxiliary enterprises. The strongest relationship, in terms of the coefficient in Table 19, was the decline in auxiliary enterprise spending for those schools that face higher levels of competition for state higher education funding. However due to the higher initial levels of spending on instruction the dollar per FTE changes in instructional spending were larger than the dollar per FTE changes in auxiliary enterprise spending.

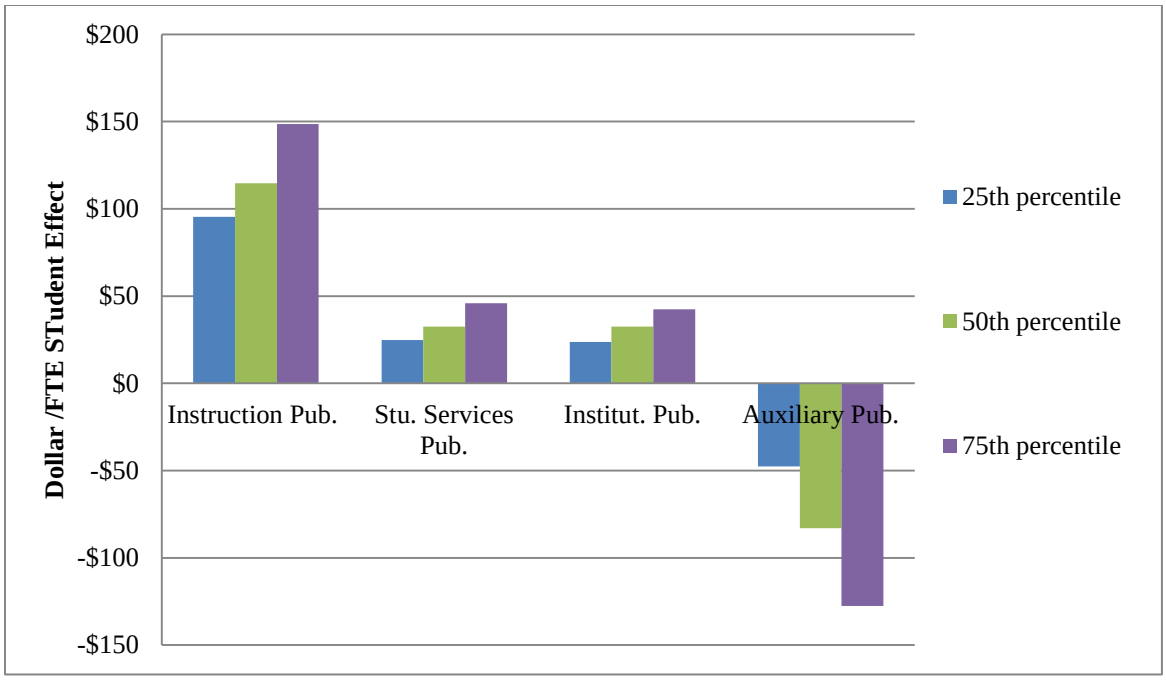

Figure 26: Dollar per FTE Student Change in Spending as a Result of a 10 School Increase in State Competition

Discussion and Conclusion

The results outlined above have a number of implications for the argument and hypotheses laid out here as well as key implications for university administrators and policy makers. I first summarize the findings in the context of the three hypotheses. I then turn to the empirical and theoretical contributions of this research for researchers, policy makers, and university administrators. I conclude with the limitations of this analysis and the directions for future research.

Competition for federal R&D and state higher education funding was significantly related to differences in university spending. There were substantial sector differences in the effects of competition in both markets. Furthermore there were also substantial differences in the effects of competition on university spending between the two markets.

The results for the effects of competition for federal R&D funding lend some support to Hypothesis 1. Hypothesis 1 states that schools that face higher levels of competition for federal R&D funding will have lower levels of research spending and higher levels of spending in other areas. The decline in research spending for private universities (Table 20 and Figure 25) lends support to the first portion of the hypothesis and the increases in spending for instruction, academic support services and institutional support services for public universities (Table 19 and Figure 25) lends support for the second half of the hypothesis. These findings support the argument laid out above that differences in competition lead to different incentive structures that influence how universities decide to allocate their limited resources.

Competition for state higher education funding affected more spending streams than competition for federal R&D funding for either public or private universities. This suggests that the effects of competition in this market are more diverse in than those in the market for federal R&D funding. The magnitude of these effects were also substantially larger (in terms of the coefficients in Tables 19 and 20) than the effects of competition for federal R&D funding for public universities. This suggests that public universities are more responsive to competition in the market for state higher education funding than to the conditions in the market for federal R&D funding. Hypothesis 2 stated that an increase in state competition should be significantly and positively related to spending on research and instruction. There was some support for this hypothesis but it was not conclusive. There were statistically significant positive effects of the level of competition for state higher education funding on public university spending in instruction (Table 19 and Figure 26). However the level of competition for state higher education funding had no significant effect on public university research spending. This could indicate that these universities have competitive advantages, or hope to gain one in instruction and student services.

These results also point to the potential of differentiation as an adaptive strategy for organizations when faced with high levels of competition for a particular resource. If schools are increasing spending in areas where they have or hope to gain a competitive advantage in response to increase in competition in other areas, this provides some initial evidence that they could be attempting to differentiate themselves from those that they are competing against for funding. The evidence for this is strongest when evaluating the effects of state higher education funding on pubic university spending. However, the current analysis does not provide the necessary information to fully evaluate the extent to which universities pursue differentiation as an adaptive strategy but this would be a fruitful direction for future research.

The final aspect of the argument asserts that the effects of competition for state higher education funding and federal R&D funding on university spending should differ for public and private universities. This expectation is strongly supported by the results for competition for both state higher education and federal R&D funding. The sector differences in the effects of federal R&D competition on university spending that are displayed in Figure 25 highlight two key sector differences in these effects. First, private universities are more influenced by differences in the level of competition in this market than public universities. This suggests that private universities are more susceptible to market forces within the context of this market. Second, higher levels of federal competition lead to public universities spending at higher levels in other areas (instruction and institutional support services) but differences in competition do not effect on research spending. Private universities in contrast decrease their spending on research and student services when faced with higher levels of competition for federal R&D funding.

The lack of statistically significant relationships between the level of competition for state higher education funding and private university spending highlights another key sector difference in the effects of competition on university spending. Whereas public university

spending is significantly affected by competition in this market, private universities are insulated from these market forces. Because private universities participate in this market to a lesser degree because they are less dependent on state funding it is understandable that they would be less affected by competition in this market. These results lend support to the idea that the dependence of an organization on a resource should influence the degree to which competition for that resource affects organizational spending or behavior generally.[96]

Contributions, Limitations, and Implications

I have made three contributions to the literature based on the arguments, analysis, and results presented here. First, I have extended our understanding of competition in higher education and how competition affects these organizations. Using measures of competition derived from the population ecology tradition, I have empirically measured the level of competition in two markets in which higher education organizations compete. I have also demonstrated that the levels of competition in both markets are significantly related to university spending patterns. I argue that this is because changes in levels of competition can alter the incentive structures that guide university spending. Understanding the role of competition in influencing spending is becoming increasingly important as these institutions face more competitive environments as funding sources decline and the number of schools competing for these smaller resource pools increases. However, the scope of this analysis was limited to two markets, federal R&D and state higher education funding. Higher education organizations compete in additional markets for tuition revenues or students, donations, and private grants to name a few. Further research must be done to fully understand the role of competition in influencing organizational behavior, namely other dimensions of competition must be examined

[96] This has been supported in preliminary analyses by the author and is the subject of a working paper that evaluates the role of dependency in mediating the effects of competition and how the effects of competition change over time.

and the impact of competition on other organizational behaviors should also be evaluated. Furthermore, even though this analysis has established that the level of competition in these markets is significantly related to university spending, it cannot directly shed light on the mechanism through which the two are linked. I argue here that it is the incentive structures that guide university spending that form this link, but empirically evaluating if this is the case is beyond the scope of this analysis. Further research that combines quantitative data and qualitative information gathered from university decision makers and other interested parties is necessary to fully evaluate the role of incentive structures in linking competition and university spending.

Second, I expand Kaplan's argument to include not only public research universities but public universities generally as well as private universities. I do this for two reasons. First, research has shown that both sectors are becoming more susceptible to competitive pressures (Dill 1997; Dill 2001). Evidence outlined below also shows that the levels of competition for state higher education and federal R&D funding is increasing over time and universities in both sectors are active participants in these markets. Therefore public research universities are not the only universities susceptible to changing incentives structures due to increases in competition, especially in the markets analyzed here. Second, both public and private universities engage in practices of cross-subsidization (James 1983; James 2003; Leslie, Slaughter, Taylor, and Zhang 2012; Weisbrod, Ballou, and Asch 2008). Therefore schools in both sectors are faced with conflicting goals (pursue mission or obtain resources) when competition for resources increases.

Third, I have shown that the effects of the level of competition in the markets for state higher education and federal R&D funding differ for public and private universities. This extends our understanding of competition in higher education and organizations generally by demonstrating that in mixed market industries, like higher education, the effects of competition where different for public and private nonprofit organizations. While public universities were

significantly affect by competition in both markets, private universities were more susceptible to competition in the market for federal R&D funding. This is consistent with the commonly held idea that private universities are more susceptible to market pressures than public universities. It is beyond the scope of this analysis to determine why this is the case, if it is in fact that private universities are more susceptible to market forces or if there is some other factor that is leading to the larger effects of competition in the market for federal R&D funding.

Fourth, I examined competition in two markets, for state higher education and federal R&D funding. This has allowed me to evaluate the extent to which the organizational responses to competition differ in different markets. Results show that competition for state higher education funding and competition for federal R&D funding have different effects on university spending. This is consistent with the argument laid out above. This highlights the need to understand the source of the competitive forces when we talk about the effects of increased competition for higher education organizations because different sources of competition affect organizations differently. This illuminates a need for further research that (1) evaluates the mechanisms through which competition in different markets affects organizations differently and (2) evaluates the effects of competition in other markets to substantiate these results.

In addition to making a number of contributions to the literature, the analysis in this chapter has also pointed out a number of directions for future research beyond those outlined already in this section. First, this analysis does not fully address the question of how competition has changed over time or how the effects of competition on university spending may have changed over time. One could anticipate given that the level of competition in the markets examined here has increased over time the effects of competition on university spending may have grown stronger. However, further research is necessary to determine if this is the case. Second, there was no evaluation of possible differences in the effects of competition across

different types of universities; namely those with different missions and those with different resource dependencies. Preliminary analyses show that the effects of competition on university spending do vary by university mission and also by a university's level of dependence on state funding, federal funding, and tuition funding. Future research by the author will examine these differences and their implications for researchers, policy makers, and university managers. Finally, the level of competition is only one market condition. There are other aspects of the markets in which universities are competing for resources that research has shown should affect their behaviors and also possibly the effect competition has on university spending. Future research that examines the role of the size, the concentration, and the in more detail, the market position of a university within the market or niche that they are competing for resources in would establish a basis from which researchers, policy makers, and university leaders could more fully understand the effect of market forces on university behaviors.

CHAPTER 5: CONCLUSION

In this dissertation I set out to answer evaluate three sets of questions each of which evaluates the utility of organizational theories of change and environmental forces that influence these organizations. These questions were evaluated using the case of public and private universities in the U.S. between 1980 and 2010. I outline the answers to each of these questions and the contributions of each chapter in turn. Following this I outline the limitations of the analyses as a whole due to some overlapping issues across the three analyses. I then outline what I see as the five areas for future research based on the analyses and arguments presented here. I conclude with a discussion of the policy implications of the results of the analyses.

Key Questions and Results

The Financial Profiles of Public Colleges and Universities

The goal of Chapter 2 was to map out the different ways in which organizations change over time. I examined how public universities change two dimensions of their financial behaviors--their revenue and spending profiles between 1986 and 2010 and the extent to which these two behaviors are tightly or loosely coupled to each other. Results indicated that the revenue profiles of these organizations changed in a variety of ways between 1986 and 2010, but the spending profiles of the overwhelming majority of public universities did not change during this period. There was also no strong correspondence between the changes in the revenue profiles and the spending profiles of these institutions all four revenue profiles were loosely coupled to all three spending profiles. This, along with the changes in revenue profiles without corresponding changes in spending profiles, suggests a discontinuity between these two behaviors. Understanding how the financial behaviors of these organizations change over time provides key insights into how the constraints and enacted missions, as measured by relative spending in

different areas, changes over time. This suggests that these organizations have erected a buffer between the environment and university spending or enacted mission that I propose is to ensure their ability to pursue their mission through utilizing resource allocation practices like cross-subsidization.

This analysis made a number of contributions. First, it evaluated changes in the revenue and spending profiles over time as opposed to the analysis of individual funding streams. This provides a more nuanced and holistic picture of the different ways university finances have changed over time by allowing researchers to view the financial profiles as a whole. This was made possible through the use of multilevel latent class analysis (MLCA) which allowed me to generate these profiles based on the observed financial behaviors of these institutions.

Second, this analysis enumerated the different ways in which public universities altered their financial behaviors over time. There have been a multitude of analyses of how organizations change over time and the factors that affect organizational change. However there has been limited investigation into the diversity of ways that organizations within a given field or industry adapt to their environmental conditions. The use of MLCA allowed me to estimate and evaluate the different ways in which these institutions changed their behaviors over time.

Third, this analysis presented evidence of the loose coupling between revenue and spending profiles and also the discontinuity in the extent to which these change over time. This provides evidence that the spending behaviors of these institutions are somehow buffered or insulated from the environmental and market forces that affect university revenues. This suggests the need for further research that capitalized on both quantitative and qualitative analyses to investigate the internal structures and processes that affect the decision making processes that guide the resource allocation practices of these institutions.

Fourth, there are a number of field-level trends that are apparent from this analysis as well. Frist, there is little evidence of homogenization in the revenue and spending profiles over time. Second, there is evidence of privatization, as measured by increased reliance on earned income, of public universities. However, privatization is occurring to different degrees across different institutions and state governments are also still key players in the majority of public universities. Third, despite the privatization that is occurring these institutions are not changing the spending profiles. In effect this indicates that despite substantial declines in state funding these schools are not altering their enacted missions.

The Limited Role of Stakeholders

The third chapter focuses on differences in the behaviors and stakeholders of public and private universities and how these change over time. There were three goals in this analysis. First, I evaluated how the economic influence of four stakeholder groups--students, state governments, private contributors, and the federal government--differed across universities and changed over time using descriptive analysis. Second, also using descriptive statistics, I evaluated how public and private universities differed in their spending patterns and how these changed over time. Third, I evaluated the relationship between the relative economic influence of these stakeholder groups and university spending. I argued that the economic influence of these stakeholders should be significantly related to university spending patterns because the university was dependent on these groups for resources and therefore would engage in services and activities that would be consistent with the expectations and desires of these stakeholder groups. Furthermore, I argued that taking differences in the relative economic influence of these four stakeholder groups into account would provide an alternative to the dichotomous sector distinction that would allow for variation within the sectors and over time.

Results indicate that the economic influence of these four stakeholder groups changed substantially between 1980 and 2010 but the differences between public and private universities remained statistically significant for almost the entire period. The relative influence of students increases in both public and private universities. The relative influence of state governments and private contributors declined in public and private universities respectively. This led to a convergence between the sectors in the economic influence of these two stakeholder groups. Federal government influence was the only stakeholder group that exhibited a divergence between the two sectors over time, with publics becoming more dependent on federal funds.

Results from the analysis of university spending indicate that spending behaviors of public and private universities were significantly different and generally diverged over time for all six of the spending streams I analyzed here.[97] Furthermore the variation within the sectors, across institutional types, increased markedly throughout the period. In effect even though spending is increasing for all schools on average across all six spending categories, the rich are getting richer faster than the poor.

The economic influence of the four stakeholder groups was significantly related to university spending and this relationship changes significantly over time. Contrary to expectations, the effects of the four stakeholder groups on university spending were, with the exception of federal government influence, more diverse than expected. State government and student influence were negatively related to the majority of the spending streams. Private contributor influence was positively related to all but one of the spending streams. Federal government influence exhibited the only "focused" effect, a positive relationship with research spending and a negative or non-significant relationship with all of the other spending categories.

[97] For this analysis I focused on individual spending streams, as opposed to spending profiles, because of my interest in the changing variation in behaviors over time, the differences across sectors, and the relationship between stakeholder influence indicators and specific spending streams.

Furthermore all of the statistically significant effects declined in magnitude between 1986 and 2010. In effect, regardless of the initial direction or magnitude the effects of all the stakeholder groups on all of the spending streams became weaker over time.

Like Chapter 2, this analysis also made a number of empirical and theoretical contributions. First, this analysis contributed to and updated the relatively small number of longitudinal studies of higher education finances. Second, it provided evidence of both converging sector differences (stakeholder influence) and diverging sector differences (university spending). Some evidence of the privatization of public universities was provided but this was tempered by evidence of diverging sector differences in the spending behaviors of these institutions.

Third, I proposed, and established evidence in favor of, an alternative explanation of the sector differences between public and private higher education organizations. Specifically I argued that using the economic influence of stakeholder groups as a way to understand differences in spending between sectors allows us to incorporate the fact that there is also variation within each of the sectors and variation over time. Using the economic influence of these stakeholder groups, as opposed to the dichotomous sector distinction, allows us to speak more directly to these changing sector boundaries. Accounting for stakeholder influence removed the need to allow the effect of sector to vary over time. However, the main effects for sector persisted and added substantially to model fit. This indicates that while stakeholder influence can help us to understand changing sector differences over time it cannot account for the overall differences in public and private university spending. I propose that this is a function of legacy effects. Namely public and private universities have historically had dramatic differences in resource dependencies and raw resources. Despite a recent convergence in resource dependencies the legacy effects of these historic differences in resources and resource dependencies still persist.

Fourth, the analysis evaluated the relationship between the economic influence of stakeholders and university behaviors. Much of the research on organizations generally, and higher education organizations specifically, assumes that the stakeholders of these organizations can and do exert influence over the behaviors of these institutions rather directly or indirectly. This analysis empirically evaluated that claim for the relative economic influence of these groups and one aspect of university behavior over which they should have some influence: university spending. The results presented here call into question the utility of this explanation of organizational behaviors in the context of multi-revenue and multiproduct organizations. The only stakeholder that was significantly related to university spending streams in a manner predicted by resource dependency theory was the federal government. I argue that this is because of the control that they retain over the resources after the money is given to these organizations. Furthermore through all four stakeholder groups had significant effects on university spending the absolute magnitude of the effects of all four stakeholders weakened significantly over time.

Overall the regression results point to the existence of a buffer between the environmental and market conditions that do affect the revenues and relative economic influence of stakeholder groups and university spending behaviors. I argue that practices like cross-subsidization, the political influence of stakeholders in the decision making process, and the role of mission are key aspects of this buffer between the environment and university spending decisions. However, an empirical investigation of these factors was beyond the scope of the dissertation.

Competition and University Spending

In the final chapter of this analysis I accomplished two goals. First I assessed the nature of competition for two resources that public and private universities competed for in 2009 and 2010--state higher education funding and federal research and development (R&D) funding.

Second I evaluated the relationship between the level of competition in these markets and university spending behaviors and the extent to which this differed for public and private universities. I argue that in the context of multi-revenue/multiproduct organizations, such as universities, increases in competition change the incentive structures that guide spending decisions. Increases in competition create incentives to (1) discontinue spending in the area(s) where competition has increased or (2) decrease spending in area(s) where an organization does not hold a competitive advantage or is unlikely to obtain one. Furthermore the effects of competition on spending should differ for different markets and for universities in different sectors because differences in the resource constraints and market conditions across different resource markets and different degrees of participation in different markets by universities in the public and private nonprofit sectors.

Results indicate that the level of competition in these markets is significantly related to university spending. Furthermore this relationship varies across sectors and between the two markets. Private universities are more susceptible to competition for federal R&D funding while public universities are more susceptible to competition for state higher education funding. The effects of competition for state higher education funding were also more diverse than the effects for federal R&D funding. Specifically, competition for federal R&D funding supports the idea that when competition increases in one area schools will decrease their spending in that area and increase their spending in other areas. Competition for state higher education funding, on the other hand, supports a slightly different set of incentive structures, the idea that universities when faced with higher levels of competition will reallocate spending to enhance an existing competitive advantage within a particular market. For example schools facing higher levels of competition for state higher education funding increased spending on instruction which would enhance their competitive advantage in the market for state funding. They also increased their

spending on student services, though to a lesser degree, indicating that some schools were perhaps trying to increase their competitive advantage in the market for students and thereby obtain additional tuition revenues.

This analysis makes four contributions. First I posited a mechanism by which competition should affect one aspect of university behavior--university spending. I assert that changes in the level of competition that universities face for particular resources will alter the incentive structures that guide their decision making. This results in universities altering their spending patterns as the level of competition for key resources change.

Second, I generated measures of competition in two key resource markets for higher education organizations based on the population ecology tradition of organizational research. This is a substantial contribution in the higher education literature because to my knowledge there has not been an empirical investigation of the level of competition organizations face in their environments. The focus has been instead on measuring the position of markets on the continuum between perfect competition and monopolies.

Third, I provided evidence of a significant relationship between the level of competition universities faced for state higher education and federal R&D funding and university spending behaviors. I was able to establish a statistically significant link between competition for resources and university behaviors. This has long been assumed in this literature but has not been empirically evaluated. Establishing the nature and extent of this relationship is increasingly important as competition increases for these resources and others.

Finally, I presented evidence that the relationship between competition and university spending varies by sector and across the resource markets. This, in addition to the variation in the effects across spending streams, highlights the need for further investigation into how universities obtain information about the level of competition universities face, who their competitors are, and

the extent to which this information becomes part of the decision making process for university spending decisions. In effect, this indicates that effects of competition vary based on the context of the organization, namely the particular resource that they are competing for, the conditions in that market, the sector of the institution, and, as current research indicates, the mission and resource dependencies of these organizations.

Limitations

Despite these substantial contributions there are six limitations to the analyses presented here. First, as with any analysis, I am limited by the data I am using. Since I use IPEDS data to measure university revenue and spending behaviors I am constrained by the revenue and spending categories that they use. There are three limitations in these categorizations that are relevant here. First, it is hard to distinguish the degree to which universities are spending money on students or other stakeholder groups (e.g. states or private contributors). This is because categories like auxiliary enterprise revenues or expenditures include a variety of activities (e.g. student housing, food services, student healthcare, faculty housing) that benefit a number of different stakeholder groups. Second, these categories are rather broad, take for example academic support services expenditures incorporate activities such as student retention, libraries, museums, galleries, instructional media, academic administration, course and curriculum development, and instructional technology. Because all of these activities are in a single category I am unable to evaluate how changes in competition or stakeholder influence affect curriculum development, student retention, and IT investment for example. Third, these categories are also somewhat ambiguous and there is of course variation in how universities classify different revenues or expenditures which limits the inferences that can be made from this data.

Second, I only focus on one area of organizational behavior here and only one "case"; namely financial behavior and the case of higher education in the U.S. I argue that these results are applicable to other multi-revenue and multiproduct organizations that are constrained by their missions. This is because these organizations have similar sets of constraints and difficulties negotiating those constraints while trying to continue to pursue their mission. However, it is important to understand that I am analyzing organizational change, the effect of stakeholders and the effect of competition on the financial behaviors of public and private universities in the U.S. from 1980-2010.

Third, despite the arguments presented here that the internal structures, decision making processes, political influence and cross-subsidization practices serve as a buffer between the external environment of universities and the resource allocation practices of these institutions, an in-depth empirical analysis of these factors is beyond the scope of the current analysis.

The fourth limitation only pertains to the analyses presented in Chapter 2. I have only analyzed the public university revenue and spending profiles. I have not analyzed the revenue and spending profiles of private universities. Therefore the results and implications of Chapter 2, in contrast to the other chapters, are limited to public universities. Evaluating the revenue and spending profiles of private universities would (1) provide a helpful point of reference for understanding the profiles of public organizations and (2) allow for the comparison of public and private university revenue profiles, their correspondence, and how they change over time. However it was beyond the scope of the work presented here.

The fifth and sixth limitations pertain to Chapter 4. The fifth limitation is that I only evaluated two market conditions, the level of competition and the market position of universities. There are other market factors that I expect will have a substantial influence eon the behavior of universities including: market size, market concentration, and some measure of the degree to

which a school is involved in these markets. These measures were generated and investigated here but were excluded from the analyses presented in Chapter 4 due to substantial multicollinearity issues.

Finally, I only investigated competition and its effect on university spending in two markets. Universities also compete in markets for students, faculty, donations, athletic revenues, prestige, and status. The conditions universities face in each of these markets differs as do the particular competitors a university faces and the degree to which they participate in these markets. Therefore it is reasonable to expect that the effects of competition in these markets will also differ from those effects presented here for the markets for state higher education and federal R&D funding. However an empirical analysis of these markets is beyond the scope of this analysis.

Policy Implications

There are a number of policy implications for the arguments and analyses presented here. First, and perhaps foremost, the results presented here indicate that despite dramatic shifts in resources, including the privatization of public universities, these organizations are continuing to pursue their missions. This is clearly indicated by the results in Chapters 2 and 3. Regardless of the financial challenges, public universities especially have created an organizational structure that allows them to continue to pursue their mission. In effect they have generated a buffer between their environment and university spending which I assert here is a measure of the enacted missions of these schools. This is somewhat surprising but also extremely important. In the context of public universities it is evidence that privatization doesn't result in mission drift at the level of relative emphasis on teaching, research, and other activities represented in the IPEDS data.

Second, a key concern for students, policy makers, and society generally is the rising cost of higher education and the subsequent increases in student debt. Both of these things can and do have significant long term consequences not only for students but for the economic health of the country as a whole. While the arguments and analyses presented here cannot shed light on this directly they do have potential implications for this. Namely the consistently rising spending levels of public and private universities for the entire period show that despite the rising costs universities are spending this money. However, some universities are increasing spending at a much faster rate than others. For example, results in Chapter 3 indicate that private research universities are increasing spending at faster rates than other groups of institutions. This has substantial implications for costs in these institutions but also in those that aspire to be in this group. The key question of whether or not these increases in spending are beneficial to students and other key constituencies is beyond the scope of this analysis and has yet to be fully answered in the literature.

Third, the increased variation in spending within and across public and private universities indicates that stratification, in terms of spending levels per FTE student, has increased substantially since the mid-1980s. Given that spending levels have been significantly linked to graduation rates (Gansemer-Topf and Schuh 2006; Hamrick, Schuh, and Shelley II 2004; Toutkoushian and Smart 2001), student persistence (Chen 2011; Chen and DesJardins 2010; Titus 2006), and student recruitment (Allen and Shen 1999; Winston 1999; Winston 2004); increased stratification can have substantial consequences in terms of educational quality and student outcomes particularly if these differences continue to increase.

Fourth, the results of the analysis presented in Chapters 3 and 4 indicate that despite substantial convergences in the relative power of key stakeholders in public and private universities sector differences still persist in the spending patterns in, and effects of competition

on, public and private universities during this period. I propose that this is due to legacy effects of the historic differences between the two sectors as discussed above. This indicates that public universities, with few exceptions, are not closing the gap with private universities; the privatization of these institutions has been unable to close the gap between these two groups.

Future Research

As with any analysis as results are determined there are always more questions to be answered. I will briefly outline five areas for future research that were illuminated by the analyses presented here. First, an investigation into the revenue and spending profiles of private universities would provide another point of comparison. This would allow me to expand on the analysis of organizational change that I presented in Chapter 2. Furthermore I could assess whether or not the loose coupling and discontinuity in the relationships between revenue and spending profiles are also present in private universities or if this loose coupling and discontinuity is unique to public higher education.

A second related avenue of future research is to shed additional light on the field-level dynamics occurred in higher education. The analysis in Chapter 2 presented a number of field level trends that are occurring as a consequence of the changes in university behaviors between 1986 and 2010. A more detailed investigation into these trends would enhance our limited knowledge of the field dynamics is this large and complicated industry. Furthermore, additional analysis that allows us to empirically evaluate the stratification or fragmentation present in the field and how it has changed over time would be illuminating.

Third, given the arguments presented here for the role of cross-subsidization in the resource allocation practices of these institutions, an in-depth examination of these patterns is warranted. Researchers have long asserted that cross-subsidization is occurring within higher

education organizations but large scale empirical investigations have been limited. Larry Leslie and his colleagues (2012) contribute to filling this gap in the literature through their evaluation of the relationship between revenues and expenditures of 96 public and private research universities from 1984 to 2007. They discovered evidence of differences across public and private universities. Specifically they determine that public research universities generally spend various revenues in the expected ways whereas private research universities tend to strategically deploy their resources to recruit students and engage in research. In effect, private universities are cross-subsidizing but perhaps not in ways we would expect. In order to help address this gap in the literature I am currently engaged in an analysis of cross-subsidization in four-year degree granting public and private universities from 1986-2011. The initial results indicate that both public and private universities are cross-subsidizing, to varying degrees, and the nature of this practice has changed over time and varies across groups.

Fourth, in light of the significant effects of competition on university spending further evaluations of the effects of this and other market forces are warranted. Specifically there are three key areas that warrant further investigation. First, competition within the higher education industry has increased over time. Given this increase a longitudinal examination of the effects of competition on university spending and how this has changed over time is warranted. Second, in this analysis I only examined two market conditions, competition and market share or position. There are a number of other aspects of these markets that also stand to have substantial impacts on university behavior including: the overall size of the resource market, the concentration of the market, and the degree to which an organization is dependent on that market. Third, higher education organizations are multi-revenue organizations therefore they are competing for a multitude of different resources. This analysis makes a substantial contribution by examining two of these markets but there are other markets that warrant investigation. For example, the market

for students and the market for donors are two that are central to these organizations and where relatively little research has been done.

Finally this analysis only examined one form of stakeholder influence economic. These stakeholders also have political influence within these organizations that they can exert over the decision making process. By political influence I mean the degree to which stakeholder groups are able to communicate their desires to universities, exert influence over the decision making process, and override the concerns/desires of other stakeholder groups. Based on the results presented here I expect that the political influence of stakeholder groups is more relevant than the economic influence of these groups in multi-revenue multiproduct organizations such as public and private universities.

To this end I would like to investigate two things about the political influence of stakeholder groups. First, how do universities collect and interpret information about their environment. This will provide a window into who or what they collect information from and on, what mechanisms they utilize to gather this information, how it enters into the decision making process, and also which of their stakeholder groups influences their information gathering processes. Second, I would like to investigate which stakeholder groups have a seat at the table so to speak. I want to look at decision making in key areas such as enrollment management, strategic planning, finances, and possibly curriculum and program development. This would allow me to evaluate the decision making processes of these organizations, what stakeholders are involved and to what degree, the role of mission in this process, and how the decision making process is linked to university behaviors like spending patterns and cross-subsidization.

APPENDIX A: ADDITIONAL TABLES FOR CHAPTER 2

Table A1: Definitions of Key Expenditure and Revenue Streams

Expenditure Stream	Definition
Instruction Expenditures	A functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted. Includes general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions. Also includes expenses for both credit and non-credit activities. Excludes expenses for academic administration where the primary function is administration (e.g., academic deans). Information technology expenses related to instructional activities if the institution separately budgets and expenses information technology resources are included (otherwise these expenses are included in academic support). Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.
Research Expenditures	A functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. The category includes institutes and research centers, and individual and project research. This function does not include non-research sponsored programs (e.g., training programs). Also included are information technology expenses related to research activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support.) Institutions include actual or allocated costs for operation & maintenance of plant, interest, and depreciation.
Academic Support Expenditures	A functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service. It includes the retention, preservation, and display of educational materials (for example, libraries, museums, and galleries); organized activities that provide support services to the academic functions of the institution (such as a demonstration school associated with a college of education or veterinary and dental clinics if their primary purpose is to support the instructional program); media such as audiovisual services; academic administration (including academic deans but not department chairpersons); and formally organized and separately budgeted academic personnel development and course and curriculum development expenses. Also included are information technology expenses related to academic support activities; if an institution does not separately budget and expense information technology resources, the costs associated with the three primary programs will be applied to this function and the remainder to institutional support. Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.

Student Services Expenditures	A functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well - being and to their intellectual, cultural, and social development outside the context of the formal instructional program. Examples include student activities, cultural events, student newspapers, intramural athletics, student organizations, supplemental instruction outside the normal administration, and student records. Intercollegiate athletics and student health services may also be included except when operated as self - supporting auxiliary enterprises. Also may include information technology expenses related to student service activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in institutional support.) Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.
Institutional Support Expenditures	A functional expense category that includes expenses for the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. Also includes information technology expenses related to institutional support activities. If an institution does not separately budget and expense information technology resources, the IT costs associated with student services and operation and maintenance of plant will also be applied to this function.
Operation and Maintenance Expenditures	A functional expense category that includes expenses for operations established to provide service and maintenance related to campus grounds and facilities used for educational and general purposes. Specific expenses include utilities, fire protection, property insurance, and similar items. This function does include amounts charged to auxiliary enterprises, hospitals, and independent operations. Also includes information technology expenses related to operation and maintenance of plant activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in institutional support). Institutions may, as an option, distribute depreciation expense to this function. FASB institutions do not use this function. Instead these expenses are charged to or allocated to other functions.
Auxiliary Enterprise Expenditures	Expenses for essentially self-supporting operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service. Examples are residence halls, food services, student health services, intercollegiate athletics (only if essentially self-supporting), college unions, college stores, faculty and staff parking, and faculty housing. Institutions include actual or allocated costs for operation and maintenance of plant, interest and depreciation.

Revenue Stream	**Definition**
Tuition and Fees	Gross revenues from tuition and associated fees. This includes: federal student financial aid, institutional aid, state government financial aid, and scholarship income.

State Funding	This includes: (1) revenues from state government agencies that are for training programs and similar activities for which amounts are received or expenditures are reimbursable under the terms of a state government grant or contract and (2) revenues received by an institution through acts of a state legislative body, except grants and contracts. These funds are for meeting current operating expenses and not for specific projects or programs. The most common example is a state's general appropriation. Appropriations primarily to fund capital assets are classified as capital appropriations.
Federal Funding	This includes: (1) revenues from federal governmental agencies that are for training programs, research, or public service activities for which expenditures are reimbursable under the terms of a government grant or contract and (2) revenues received by an institution through acts of the federal legislative body, except grants and contracts. These funds are for meeting current operating expenses and not for specific projects or programs. Appropriations primarily to fund capital assets are classified as capital appropriations.
Private Gifts, Grants and Contracts	Revenues from private donors for which no legal consideration is involved and from private contracts for specific goods and services provided to the funder as stipulation for receipt of the funds. Includes only those gifts, grants, and contracts that are directly related to instruction, research, public service, or other institutional purposes. Includes monies received as a result of gifts, grants, or contracts from a foreign government. Also includes the estimated dollar amount of contributed services.
Auxiliary Enterprise Revenues	Revenues generated by or collected from the auxiliary enterprise operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service. Auxiliary enterprises are managed as essentially self-supporting activities. Examples are residence halls, food services, student health services, intercollegiate athletics, college unions, college stores, and movie theaters.

APPENDIX B: DISCUSSION OF MLCA MODEL SPECIFICATIONS (CHAPTER 2)

In evaluating model fit for MLCA models there are a number of factors that must be taken into account, particularly when dealing with continuous data. I will outline the five factors that I utilized in this chapter before walking through the decision making process that led me to the two model specifications presented in this chapter.

First, and perhaps most important, is the consistency of the log likelihood statistics (Hagenaars and McCutcheon 2002). Consistency in this case means that the log likelihood statistics are the same when the exact same model (same number of latent classes, same parameters, same model options, etc.) is estimated two different times. This is fundamental because this allows you to see if the parameter estimates, model fit statistics, case allocation, and other aspects of the model accurately represent the model and data or if the model is stuck at a local maximum and therefore providing different parameters with each estimation of the model.

Second, the model fit statistics are helpful in determining what the optimal number of latent classes is for a particular set of data and model specification (Eliason, Mortimer, Vuolo, and Tranby 2007; Macmillian and Eliason 2003; Vermut 2003). Because the models are nested, you can compare the Bayesian Information Criteria (BIC) or other model fit statistics such as the AIC or CAIC, to determine if adding an additional latent class to the model specification increases or decreases model fit. Because these are MLCA models, adding one additional latent class adds more than one parameter therefore I look at the average difference in the BIC statistics per degree of freedom and compared this to the guidelines laid out by Adrian Raftery (1995). This point of model comparison is depicted in the far-right columns of Tables B2 and B4 for the revenue and spending profile models respectively.

Third, in addition to the log likelihood statistics being consistent, it is also important that the parameters, proportion of cases in each latent class, the over time trajectories, and the profile

characteristics (i.e. the conditional means for the observed variations on the different latent classes) are also consistent.

Fourth, examining the proportion of cases (in this case university-years) that are in each class helps the researcher to determine if there is meaningful variation being captured by the inclusion of an additional latent class or if the model is capturing substantively unimportant information. A useful guideline that I utilized here is if a latent class is capturing less than one percent of the cases and the characteristics of this profile are not dramatically different from the other latent classes, i.e. it isn't capturing a small but distinct set of cases, then the additional latent class is not capturing meaningful variation across the cases and therefore should not be included.

Finally it is also important to utilize substantive knowledge about the cases and how they are related (e.g. schools that are part of the same university system or reside in the same state) to inform the examination of the parameters, conditional means, the schools that are in the clusters etc. This, when used in combination with these other techniques aid a research in determining the appropriate number of latent classes.

Of these five factors the consistency of the log likelihood statistics, conditional means, model parameters, and latent trajectories, were the most relevant factors in the determination of the model specifications presented in this chapter.

Determining the Revenue Profile Model Specification

Table B1 below shows the log likelihood statistics for the revenue profiles for the revenue profile measurement model specified with between one and seven latent classes. The models were identical across the two estimations and were identical across the different numbers of latent classes in all aspects expect the number of latent classes that were specified.

Table B1: Log Likelihood Statistics for Evaluating Revenue Profile Model Fit

Number of Latent Classes	Log Likelihood First Run	Log Likelihood Second Run
1	30,259.090	30,259.090
2	36,429.945	36,429.945
3	41,417.680	41,417.680
4	44,505.210	44,505.210
5	47,161.249	47,163.234
6	49,272.515	49,273.976
7	51,286.735	51,251.475

As Table B1 shown the log likelihood statistics were generally consistent across the two estimations up through six latent classes.[98] I therefore took a closer look at the models with between two and six latent classes to using the model fit statistics and the consistency of the parameters, trajectories, and conditional means to further evaluate these models. Table B2 below displays the BIC and CAIC statistics, number of parameters, and the average difference in the BIC statistics per degree of freedom increase between modes for the first run of the models with between one and six latent classes. The smaller the BIC and CAIC statistic the better the model fit (Raftery 1995). Table B2 indicates that according to the BIC and CAIC statistics the model with six latent classes is the best fit of those that were estimated with consistent log likelihoods. The average difference in the BIC statistics per degree of freedom[99] indicates that the declines in the BIC statistics are all statistically significant based on Raftery's guidelines for model comparison using the BIC statistic (Raftery 1995).

[98] I estimated a third run of the models with two, three, and four latent classes and the log likelihood statistics for these were consistent with the first two runs.

[99] This was calculated by determining the difference in the BIC statistic between two models and then dividing this by the difference in the number of parameters. For example the -1224.730 for the model with the two latent classes was calculated by subtracting the BIC statistic for the model with two latent classes and subtracting the BIC statistic for the model with one latent class and then dividing this number by the different in the number of parameters: [-72652-(-60404.89)]/[22-12]=-1224.730.

Table B2: Model Fit Statistics for Evaluating Revenue Profile Model Fit

Number of Latent Classes	BIC Statistic (First Run)	CAIC Statistic (First Run)	Number of Parameters	Avg. BIC Difference /d.f.
1	-60404.89	-60392.89	12	--
2	-72652.20	-72630.20	22	-1224.730
3	-82533.26	-82501.26	32	-988.107
4	-88613.92	-88571.92	42	-608.065
5	-93831.59	-93779.59	52	-521.767
6	-97959.72	-97897.72	62	-412.813

Based on the BIC statistics comparisons I started with the model with six latent classes and compared the conditional means of each of the observed variables for each of the six latent classes for the two runs of the model to see if they were consistent across the two runs. I did this by comparing the pie charts for the six latent classes for the two runs of the model to see if all six were consistent. I then compared the overall proportion of cases that were in each of the latent classes across the two estimations of the model. When comparing the proportion of cases in each of the latent class pairs that were matched based on their profile characteristics it was clear that only three of the six latent classes had consistent proportions. I also compared the latent trajectories estimated based on the linear variable for time and the random trajectory effect to have a third point of comparison. These two comparisons revealed that while the conditional means of the latent revenue profiles were consistent across the two estimations of the model the proportion of cases in each profile and the trajectories were not.

Given the inconsistent trajectories I performed the same comparison for the two estimations of the model with five latent classes. The comparison revealed that though the conditional means of the five latent classes were again consistent across the two runs of the model, the proportion of cases in the five latent classes and the latent trajectories were again inconsistent. The trajectories were not as inconsistent as those for the model with six latent

classes but they were still inconsistent across the two estimations of the model. Therefore I performed the same set of comparisons for the two estimations of the model with four latent classes.

The conditional means, trajectories and the proportion of cases in each of the latent classes were consistent across the two estimations of the model with four latent classes. I therefore concluded that the model with four latent classes is the best fitting consistent model of the revenue profiles of public universities from 1986-2010.

Determining the Spending Profile Model Specification

The process that I used to determine the best fitting consistent model for the revenue profiles was also used to determine that the best fitting consistent model specification for the spending profiles. Table B3 below shows that the log likelihood statistics are only consistent through the model with four latent classes. Therefore I use this as the starting point for the model fit evaluation.

Table B3: Log Likelihood Statistics for Evaluating Spending Profile Model Fit

Number of Latent Classes	Log Likelihood First Run	Log Likelihood Second Run
1	56600.055	56600.055
2	67469.748	67469.748
3	73441.462	73441.462
4	77586.438	77586.438
5	80340.630	80387.501
6	82676.550	82574.579
7	84332.661	84197.003

The BIC and CAIC model fit statistics shown in Table B4 below indicate that the model with four latent classes is the best fitting of the models with the consistent log likelihood statistics. This is clear from the low values for the BIC and CAIC statistics as well as the

significant differences in the BIC statistics as evidenced in the right hand column of Table B4. Therefore I began the check for the consistent conditional means, trajectories and proportion of cases in each latent class across the two model estimations for each number of latent classes with the model with four latent classes.

Table B4: Model Fit Statistics for Evaluating Spending Profile Model Fit

Number of Latent Classes	BIC Statistic (First Run)	CAIC Statistic (First Run)	Number of Parameters	Avg. BIC Difference /d.f.
1	-113,049.061	-113,033.061	16	--
2	-134,675.161	-134,647.161	28	-1,802.175
3	-146,505.304	-146,465.304	40	-985.845
4	-154,681.970	-154,629.970	52	-681.389

The comparison of the conditional means was consistent across the two estimations of the model with four latent classes. However the proportion of the cases that were in each latent class and the trajectories were inconsistent for two of the four latent classes. Therefore I performed the same comparisons for the model with three latent classes. The comparison of the conditional means for the observed variables, the trajectories, and the proportion of cases in the latent classes was consistent across the two runs of the model with three latent classes. Based on this I determined that the best fitting consistent model specification for the spending profiles for public universities from 1986-2010 was the one with three latent classes.

APPENDIX C: ADDITIONAL TABLES AND FIGURES CHAPTER 3

Table C1: Definitions of Key Spending Categories and Revenue Streams

Expenditure Stream	Definition
Instruction Expenditures	A functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted. Includes general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions. Also includes expenses for both credit and non-credit activities. Excludes expenses for academic administration where the primary function is administration (e.g., academic deans). Information technology expenses related to instructional activities if the institution separately budgets and expenses information technology resources are included (otherwise these expenses are included in academic support). Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.
Research Expenditures	A functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. The category includes institutes and research centers, and individual and project research. This function does not include nonresearch sponsored programs (e.g., training programs). Also included are information technology expenses related to research activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support.) Institutions include actual or allocated costs for operation & maintenance of plant, interest, and depreciation.

Academic Support Expenditures	A functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service. It includes the retention, preservation, and display of educational materials (for example, libraries, museums, and galleries); organized activities that provide support services to the academic functions of the institution (such as a demonstration school associated with a college of education or veterinary and dental clinics if their primary purpose is to support the instructional program); media such as audiovisual services; academic administration (including academic deans but not department chairpersons); and formally organized and separately budgeted academic personnel development and course and curriculum development expenses. Also included are information technology expenses related to academic support activities; if an institution does not separately budget and expense information technology resources, the costs associated with the three primary programs will be applied to this function and the remainder to institutional support. Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.
Student Services Expenditures	A functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well - being and to their intellectual, cultural, and social development outside the context of the formal instructional program. Examples include student activities, cultural events, student newspapers, intramural athletics, student organizations, supplemental instruction outside the normal administration, and student records. Intercollegiate athletics and student health services may also be included except when operated as self - supporting auxiliary enterprises. Also may include information technology expenses related to student service activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in institutional support.) Institutions include actual or allocated costs for operation and maintenance of plant, interest, and depreciation.
Institutional Support Expenditures	A functional expense category that includes expenses for the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. Also includes information technology expenses related to institutional support activities. If an institution does not separately budget and expense information technology resources, the IT costs associated with student services and operation and maintenance of plant will also be applied to this function.

Auxiliary Enterprise Expenditures	Expenses for essentially self-supporting operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service. Examples are residence halls, food services, student health services, intercollegiate athletics (only if essentially self-supporting), college unions, college stores, faculty and staff parking, and faculty housing. Institutions include actual or allocated costs for operation and maintenance of plant, interest and depreciation.

Table C2: Evaluating Differences in Economic Influence of Stakeholder Groups

		Public Universities				Private Universities			
Stakeholder Groups	**Year**	**Mean**	**Standard Deviation**	**Min.**	**Max.**	**Mean**	**Standard Deviation**	**Min.**	**Max.**
Students (Tuition Income)	*1980*	16.92	9.22	1.51	86.46	50.90	15.35	0.47	95.23
	1990	21.09	9.29	4.71	72.73	55.08	14.55	1.80	99.30
	2000	25.31	9.25	5.01	67.78	60.68	15.81	2.15	100.00
	2010	35.38	11.20	6.52	83.14	69.61	14.83	3.20	99.19
Private Contributors (Private Gifts, Grants and Contracts)	*1980*	1.55	1.68	0.00	12.45	12.86	10.58	0.00	86.15
	1990	2.49	2.63	0.00	25.88	10.60	8.31	0.02	60.57
	2000	3.21	3.07	0.00	24.15	17.49	11.86	0.00	72.43
	2010	3.04	3.19	0.00	25.12	9.70	8.09	0.00	67.06
State Govt. (State Grants, Contracts, and Appropriations)	*1980*	53.87	13.71	0.00	89.80	1.68	2.72	0.00	29.34
	1990	49.00	11.67	14.75	78.75	3.63	3.97	0.00	23.25
	2000	42.05	11.10	0.00	73.47	1.54	2.76	0.00	25.41
	2010	30.30	9.95	0.00	60.71	1.00	2.15	0.00	22.01
Federal Govt. (Federal Grants, Contracts, and Appropriations)	*1980*	9.54	8.41	0.00	77.03	8.24	9.07	0.00	81.54
	1990	11.52	6.70	1.60	38.78	9.03	8.62	0.00	73.73
	2000	11.13	6.34	0.00	35.86	4.34	7.42	0.00	67.58
	2010	15.62	7.23	0.96	46.86	4.28	7.59	0.00	68.59
Local Govt. (Local Grants, Contracts, and Appropriations)	*1980*	0.98	5.08	0.00	80.20	0.14	1.19	0.00	24.75
	1990	1.10	6.94	0.00	83.08	0.05	0.23	0.00	1.94
	2000	0.58	3.95	0.00	66.85	0.11	0.70	0.00	11.08
	2010	0.56	2.37	0.00	37.30	0.05	0.32	0.00	5.69

Table C3: T-tests for Differences in Economic Influence of Stakeholder Groups By Sector, 1980-2010

	Students		State Governments		Federal Government		Private Contributors	
Year	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.
Overall	**-33.65**	**0.00**	**41.37**	**0.00**	**5.97**	**0.00**	**-10.37**	**0.00**
1980	-33.98	0.00	52.19	0.00	1.30	0.01	-11.36	0.00
1984	-32.38	0.00	48.75	0.00	1.17	0.00	-10.30	0.00
1985	-33.22	0.00	49.72	0.00	1.37	0.00	-10.16	0.00
1986	-32.88	0.00	49.27	0.00	1.45	0.00	-10.27	0.00
1987	-32.74	0.00	46.51	0.00	3.47	0.00	-10.39	0.00
1988	-33.06	0.00	46.87	0.00	3.52	0.00	-9.67	0.00
1989	-33.67	0.00	46.47	0.00	3.43	0.00	-8.80	0.00
1990	-33.99	0.00	45.37	0.00	2.49	0.00	-8.11	0.00
1991	-34.12	0.00	43.98	0.00	3.03	0.00	-7.75	0.00
1992	-33.14	0.00	41.87	0.00	3.58	0.00	-7.11	0.00
1993	-32.30	0.00	39.00	0.00	4.76	0.00	-6.87	0.00
1994	-32.80	0.00	40.35	0.00	3.88	0.00	-6.89	0.00
1995	-33.79	0.00	40.65	0.00	3.96	0.00	-6.78	0.00
1996	-32.50	0.00	40.25	0.00	4.36	0.00	-7.51	0.00
1997	-34.20	0.00	41.07	0.00	6.46	0.00	-14.49	0.00
1998	-34.06	0.00	41.22	0.00	6.89	0.00	-14.26	0.00
1999	-34.51	0.00	41.24	0.00	7.14	0.00	-14.37	0.00
2000	-35.38	0.00	40.51	0.00	6.79	0.00	-14.28	0.00
2001	-36.06	0.00	40.17	0.00	7.12	0.00	-13.26	0.00
2002	-35.72	0.00	40.62	0.00	8.15	0.00	-12.84	0.00
2003	-35.27	0.00	38.27	0.00	8.83	0.00	-11.81	0.00
2004	-33.64	0.00	14.77	0.00	8.94	0.00	-11.58	0.00
2005	-33.00	0.00	35.02	0.00	8.92	0.00	-11.25	0.00
2006	-32.26	0.00	35.18	0.00	8.51	0.00	-11.78	0.00
2007	-32.33	0.00	35.23	0.00	8.31	0.00	-12.03	0.00
2008	-33.55	0.00	35.31	0.00	8.50	0.00	-11.17	0.00
2009	-34.36	0.00	33.07	0.00	8.68	0.00	-8.50	0.00
2010	-34.23	0.00	29.30	0.00	11.34	0.00	-6.66	0.00

Table C4: Economic Influence of Key Stakeholder Groups by Sector and Carnegie Classification

Economic Influence of Stakeholders (% of Total Revenues)	Public Universities				Private Universities			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
	Doctoral/Research Universities							
Students(Tuition)	22.59	9.99	1.99	63.60	53.25	23.14	1.62	95.34
Private Contributors	3.91	2.89	0.00	47.70	10.58	8.11	0.00	85.06
State Revenues	39.14	12.64	2.09	80.98	1.76	2.30	0.00	29.34
Federal Revenues	14.40	6.78	0.86	40.71	10.94	10.29	0.00	69.33
	Masters Colleges and Universities							
Students(Tuition)	26.94	10.36	1.70	87.44	67.23	13.13	5.72	99.79
Private Contributors	1.43	1.88	0.00	25.88	9.63	8.14	0.00	79.77
State Revenues	46.27	12.25	0.00	93.87	2.18	3.33	0.00	35.01
Federal Revenues	10.26	6.58	0.00	77.03	4.54	6.05	0.00	82.01
	Baccalaureate Colleges							
Students(Tuition)	29.37	14.33	0.00	86.46	55.34	13.32	0.00	100.00
Private Contributors	1.66	2.50	0.00	26.24	15.39	10.77	0.00	92.33
State Revenues	42.47	14.11	0.00	86.77	1.75	3.23	0.00	38.95
Federal Revenues	12.15	7.52	0.00	61.37	5.93	8.20	0.00	75.97

Table C5: T-tests for Differences in Economic Influence of Stakeholder Groups By Sector, 1980-2010

	Doctoral/Research Universities							
	Students		State Governments		Federal Government		Private Contributors	
Year	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.
Overall	**-30.660**	**0.000**	**37.377**	**0.000**	**3.462**	**0.000**	**-6.678**	**0.000**
1980	-30.803	0.000	47.099	0.000	-1.305	0.301	-6.668	0.000
1984	-30.838	0.000	45.026	0.000	0.130	0.899	-6.315	0.000
1985	-31.861	0.000	46.023	0.000	0.408	0.698	-6.203	0.000
1986	-32.122	0.000	45.407	0.000	0.467	0.659	-5.924	0.000
1987	-32.07	0.00	43.64	0.00	0.59	0.77	-5.00	0.00
1988	-32.49	0.00	43.09	0.00	2.91	0.16	-4.36	0.00
1989	-32.58	0.00	42.44	0.00	2.28	0.31	-4.26	0.00
1990	-32.12	0.00	41.49	0.00	1.13	0.65	-4.06	0.00
1991	-31.77	0.00	40.42	0.00	3.35	0.13	-3.98	0.00
1992	-30.40	0.00	38.82	0.00	2.35	0.03	-3.92	0.00
1993	-29.88	0.00	36.67	0.00	5.97	0.01	-3.55	0.00
1994	-29.11	0.00	37.45	0.00	2.36	0.03	-3.58	0.00
1995	-30.25	0.00	37.26	0.00	2.29	0.03	-3.66	0.00
1996	-28.53	0.00	37.40	0.00	3.04	0.00	-4.37	0.00
1997	-33.32	0.00	36.84	0.00	1.86	0.19	-10.74	0.00
1998	-30.46	0.00	37.27	0.00	3.10	0.00	-9.58	0.00
1999	-31.72	0.00	37.01	0.00	4.07	0.00	-9.30	0.00
2000	-32.64	0.00	36.25	0.00	3.75	0.00	-9.95	0.00
2001	-32.60	0.00	36.06	0.00	3.79	0.00	-8.97	0.00
2002	-31.80	0.00	36.39	0.00	5.23	0.00	-9.47	0.00
2003	-30.59	0.00	33.50	0.00	5.58	0.00	-8.43	0.00

2004	-29.20	0.00	31.54	0.00	5.60	0.00	-8.30	0.00
2005	-28.69	0.00	30.62	0.00	5.58	0.00	-7.98	0.00
2006	-28.11	0.00	30.59	0.00	5.47	0.00	-8.68	0.00
2007	-27.99	0.00	30.72	0.00	5.45	0.00	-9.01	0.00
2008	-28.47	0.00	30.94	0.00	5.36	0.00	-8.91	0.00
2009	-29.42	0.00	28.66	0.00	5.73	0.00	-6.91	0.00
2010	-28.40	0.00	25.36	0.00	7.27	0.00	-4.33	0.00

Master's Colleges and Universities

	Students		**State Governments**		**Federal Government**		**Private Contributors**	
Year	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**
Overall	**-40.29**	**0.00**	**44.10**	**0.00**	**5.72**	**0.00**	**-8.20**	**0.00**
1980	-39.61	0.00	54.86	0.00	0.62	0.38	-10.94	0.00
1984	-38.06	0.00	51.35	0.00	0.85	0.11	-9.77	0.00
1985	-39.38	0.00	52.35	0.00	1.00	0.04	-9.51	0.00
1986	-38.86	0.00	51.73	0.00	1.27	0.01	-9.69	0.00
1987	-39.21	0.00	48.89	0.00	1.68	0.14	-9.63	0.00
1988	-39.44	0.00	48.85	0.00	2.46	0.05	-8.57	0.00
1989	-39.79	0.00	48.87	0.00	2.75	0.02	-7.66	0.00
1990	-40.23	0.00	47.88	0.00	1.05	0.34	-6.79	0.00
1991	-40.53	0.00	46.26	0.00	1.69	0.13	-6.28	0.00
1992	-39.25	0.00	44.63	0.00	2.93	0.00	-5.93	0.00
1993	-38.68	0.00	40.89	0.00	3.38	0.01	-5.36	0.00
1994	-39.42	0.00	42.65	0.00	3.59	0.00	-5.43	0.00
1995	-40.48	0.00	42.87	0.00	3.68	0.00	-4.94	0.00
1996	-39.14	0.00	42.76	0.00	3.83	0.00	-5.63	0.00
1997	-41.35	0.00	44.25	0.00	6.41	0.00	-10.83	0.00
1998	-41.55	0.00	43.92	0.00	6.99	0.00	-10.73	0.00

1999	-41.90	0.00	44.41	0.00	7.18	0.00	-10.80	0.00
2000	-43.05	0.00	43.51	0.00	7.01	0.00	-10.65	0.00
2001	-44.07	0.00	43.15	0.00	7.30	0.00	-9.34	0.00
2002	-43.15	0.00	43.73	0.00	8.23	0.00	-9.57	0.00
2003	-42.40	0.00	41.39	0.00	8.85	0.00	-8.83	0.00
2004	-40.03	0.00	18.53	0.00	8.91	0.00	-8.70	0.00
2005	-39.17	0.00	37.98	0.00	8.75	0.00	-8.61	0.00
2006	-38.96	0.00	38.24	0.00	8.05	0.00	-8.46	0.00
2007	-39.31	0.00	38.18	0.00	8.03	0.00	-8.42	0.00
2008	-40.08	0.00	38.41	0.00	8.23	0.00	-7.95	0.00
2009	-39.98	0.00	35.71	0.00	8.53	0.00	-5.94	0.00
2010	-40.24	0.00	31.77	0.00	11.66	0.00	-4.59	0.00

Baccalaureate Colleges and Universities

	Students		**State Governments**		**Federal Government**		**Private Contributors**	
Year	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**
Overall	**-25.98**	**0.00**	**40.72**	**0.00**	**6.22**	**0.00**	**-13.73**	**0.00**
1980	-28.00	0.00	53.66	0.00	0.10	0.01	-13.28	0.00
1984	-25.86	0.00	47.91	0.00	2.03	0.02	-12.66	0.00
1985	-26.15	0.00	48.61	0.00	2.39	0.02	-12.58	0.00
1986	-26.06	0.00	48.92	0.00	1.82	0.17	-12.79	0.00
1987	-24.61	0.00	43.13	0.00	5.55	0.02	-12.95	0.00
1988	-25.27	0.00	48.33	0.00	1.93	0.01	-12.57	0.00
1989	-26.50	0.00	47.66	0.00	3.33	0.01	-11.79	0.00
1990	-26.58	0.00	45.20	0.00	3.55	0.00	-11.07	0.00
1991	-26.22	0.00	44.20	0.00	3.56	0.01	-10.64	0.00
1992	-24.94	0.00	40.22	0.00	4.39	0.00	-9.76	0.00
1993	-23.93	0.00	38.54	0.00	4.21	0.00	-9.91	0.00

1994	-24.79	0.00	39.83	0.00	3.96	0.00	-9.85	0.00
1995	-26.16	0.00	40.94	0.00	4.31	0.00	-9.90	0.00
1996	-24.18	0.00	38.71	0.00	4.81	0.00	-10.26	0.00
1997	-25.23	0.00	39.19	0.00	7.97	0.00	-19.24	0.00
1998	-25.31	0.00	40.05	0.00	7.62	0.00	-19.34	0.00
1999	-25.97	0.00	39.93	0.00	8.60	0.00	-19.93	0.00
2000	-26.40	0.00	40.10	0.00	7.47	0.00	-19.67	0.00
2001	-27.57	0.00	39.80	0.00	7.98	0.00	-18.77	0.00
2002	-28.10	0.00	39.38	0.00	8.27	0.00	-16.52	0.00
2003	-28.07	0.00	37.95	0.00	8.72	0.00	-15.09	0.00
2004	-26.78	0.00	36.06	0.00	8.38	0.00	-14.72	0.00
2005	-26.04	0.00	34.71	0.00	8.56	0.00	-14.25	0.00
2006	-24.09	0.00	34.45	0.00	8.03	0.00	-15.30	0.00
2007	-23.93	0.00	34.89	0.00	7.56	0.00	-15.92	0.00
2008	-26.04	0.00	34.56	0.00	8.38	0.00	-14.40	0.00
2009	-27.97	0.00	33.82	0.00	8.20	0.00	-11.24	0.00
2010	-27.78	0.00	29.55	0.00	11.53	0.00	-10.06	0.00

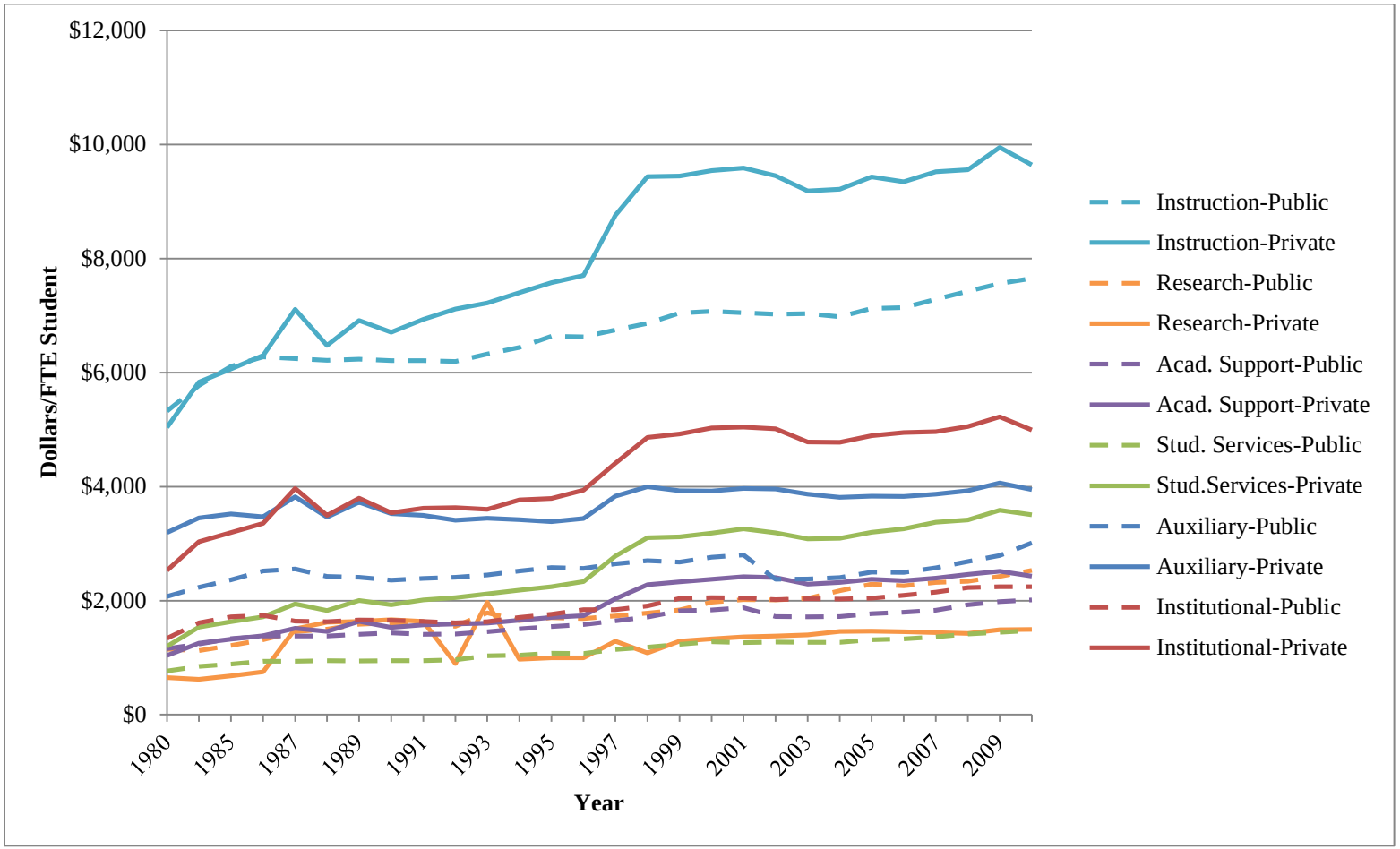

Figure C1: University Spending By Sector, 1980-2010

Table C6: T-tests for Differences in Spending Behaviors (per FTE Student) By Sector, 1980-2010

	Instruction		Research		Academic Support Services		Student Services		Institutional Support Services		Auxiliary Enterprise	
Year	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.	Mean Difference	P-val.
Overall	**-1,411.18**	**0.00**	**578.80**	**0.00**	**-318.66**	**0.00**	**-1,437.01**	**0.00**	**-2,355.08**	**0.00**	**-1,172.84**	**0.00**
1980	283.64	0.06	497.42	0.00	120.66	0.01	-431.56	0.00	-1,189.86	0.00	-1,121.26	0.00
1984	-63.80	0.71	499.44	0.00	-15.06	0.77	-684.62	0.00	-1,421.97	0.00	-1,214.85	0.00
1985	43.51	0.81	528.38	0.00	11.50	0.83	-744.71	0.00	-1,474.27	0.00	-1,151.48	0.00
1986	-26.45	0.89	559.02	0.00	-2.64	0.96	-778.66	0.00	-1,610.23	0.00	-945.96	0.00
1987	-863.89	0.05	-49.47	0.86	-136.97	0.07	-1,007.03	0.00	-2,322.21	0.00	-1,268.70	0.00
1988	-265.24	0.19	-119.11	0.69	-77.99	0.20	-879.05	0.00	-1,861.35	0.00	-1,039.26	0.00
1989	-676.81	0.01	-47.15	0.88	-226.70	0.02	-1,060.91	0.00	-2,133.96	0.00	-1,319.60	0.00
1990	-497.31	0.02	-58.56	0.85	-97.33	0.12	-982.07	0.00	-1,888.58	0.00	-1,165.04	0.00
1991	-723.90	0.00	-32.63	0.91	-162.62	0.01	-1,061.58	0.00	-1,982.82	0.00	-1,106.26	0.00
1992	-919.54	0.00	655.77	0.00	-174.66	0.01	-1,089.53	0.00	-2,018.66	0.00	-1,000.28	0.00
1993	-894.27	0.00	-185.39	0.58	-151.21	0.01	-1,086.38	0.00	-1,971.71	0.00	-993.61	0.00
1994	-959.45	0.00	678.67	0.00	-150.19	0.02	-1,140.36	0.00	-2,059.54	0.00	-897.79	0.00
1995	-942.04	0.00	702.98	0.00	-160.89	0.01	-1,168.46	0.00	-2,029.37	0.00	-803.24	0.00
1996	-1,075.18	0.00	687.16	0.00	-157.34	0.02	-1,258.10	0.00	-2,098.40	0.00	-878.49	0.00
1997	-2,011.85	0.00	442.36	0.14	-386.42	0.00	-1,637.11	0.00	-2,566.11	0.00	-1,186.80	0.00
1998	-2,574.12	0.00	698.15	0.01	-568.04	0.00	-1,918.84	0.00	-2,953.87	0.00	-1,299.83	0.00
1999	-2,404.69	0.00	546.05	0.05	-509.02	0.00	-1,888.37	0.00	-2,886.26	0.00	-1,254.29	0.00
2000	-2,463.82	0.00	647.35	0.03	-536.47	0.00	-1,905.58	0.00	-2,976.66	0.00	-1,160.36	0.00
2001	-2,536.76	0.00	652.80	0.02	-541.84	0.00	-1,993.18	0.00	-2,998.49	0.00	-1,167.05	0.00
2002	-2,425.34	0.00	633.93	0.03	-684.90	0.00	-1,913.45	0.00	-2,999.04	0.00	-1,580.26	0.00
2003	-2,150.97	0.00	638.76	0.03	-573.80	0.00	-1,815.42	0.00	-2,748.92	0.00	-1,486.92	0.00

2004	-2,237.49	0.00	714.55	0.02	-600.23	0.00	-1,823.57	0.00	-2,746.65	0.00	-1,407.65	0.00
2005	-2,307.47	0.00	820.34	0.01	-607.66	0.00	-1,881.41	0.00	-2,853.07	0.00	-1,328.20	0.00
2006	-2,203.45	0.00	803.21	0.01	-549.58	0.00	-1,932.06	0.00	-2,853.61	0.00	-1,329.16	0.00
2007	-2,233.73	0.00	875.47	0.01	-563.05	0.00	-2,010.93	0.00	-2,813.03	0.00	-1,292.39	0.00
2008	-2,133.90	0.00	913.64	0.01	-533.54	0.00	-2,001.27	0.00	-2,823.05	0.00	-1,239.13	0.00
2009	-2,382.86	0.00	932.20	0.01	-531.76	0.00	-2,140.37	0.00	-2,976.83	0.00	-1,271.15	0.00
2010	-1,990.15	0.00	1,033.60	0.00	-417.03	0.00	-2,025.75	0.00	-2,748.10	0.00	-934.49	0.00

Table C7: Evaluating Differences in Spending Between Public and Private Universities By Carnegie Classification

	Public Universities				Private Universities			
	Mean	**Standard Deviation**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
Per Full Time Equivalent Student	**Doctoral and Research Universities**							
Instruction Expenditures	$8,641	$3,480	$3,125	$31,423	$16,558	$14,281	$0	$92,768
Research Expenditures	$4,438	$4,428	$0	$41,762	$8,615	$15,106	$0	$151,420
Academic Support Services Expenditures	$2,265	$1,429	$248	$32,710	$4,044	$5,398	$0	$62,616
Student Services Expenditures	$1,085	$545	$182	$3,748	$2,451	$2,194	$0	$62,518
Auxiliary Expenditures	$3,313	$2,114	$0	$29,557	$4,846	$4,547	$0	$127,490
Institutional Expenditures	$1,963	$927	$209	$12,573	$5,473	$5,060	$0	$136,234
	Master's Colleges and Universities							
Instruction Expenditures	$5,718	$1,521	$0	$21,675	$6,474	$4,309	$0	$257,375
Research Expenditures	$401	$2,060	$0	$62,741	$147	$571	$0	$17,972
Academic Support Services Expenditures	$1,285	$588	$7	$8,765	$1,480	$1,336	$0	$54,402
Student Services Expenditures	$1,125	$527	$2	$5,052	$2,132	$1,211	$0	$40,585
Auxiliary Expenditures	$2,092	$1,323	$0	$9,874	$2,710	$2,239	$0	$141,798
Institutional Expenditures	$1,778	$972	$0	$15,066	$3,406	$2,329	$0	$129,581
	Baccalaureate Colleges							
Instruction Expenditures	$5,300	$1,562	$0	$13,489	$7,451	$4,841	$0	$201,934
Research Expenditures	$255	$664	$0	$13,313	$259	$1,061	$0	$34,284
Academic Support Services Expenditures	$1,205	$682	$0	$5,420	$1,782	$1,613	$0	$43,325
Student Services Expenditures	$1,266	$678	$27	$8,209	$2,947	$1,901	$0	$82,244

Auxiliary Expenditures	$2,258	$1,892	$0	$14,697	$4,227	$2,767	$0	$104,049
Institutional Expenditures	$1,917	$1,183	$0	$14,847	$4,489	$3,545	$0	$230,714

Table C8: T-tests for Differences in Spending Behaviors (per FTE Student) By Sector and Carnegie Classification, 1980-2010

Doctoral/Research Universities

	Instruction		Research		Academic Support Services		Student Services		Institutional Support Services		Auxiliary Enterprise	
Year	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**	**Mean Difference**	**P-val.**
Overall	**-7916.94**	**0.00**	**-4176.96**	**0.00**	**-1778.42**	**0.00**	**-1366.04**	**0.00**	**-3509.54**	**0.00**	**-15332.79**	**0.00**
1980	-2907.99	0.00	-1975.08	0.03	-398.08	0.04	-290.78	0.00	-1440.57	0.00	-895.29	0.00
1984	-3840.31	0.00	-1922.37	0.02	-724.17	0.00	-493.93	0.00	-1746.87	0.00	-994.04	0.00
1985	-3850.20	0.00	-2191.12	0.02	-618.50	0.01	-577.67	0.00	-1799.33	0.00	-1015.81	0.00
1986	.4242.511	0.00	-2543.58	0.02	-714.72	0.01	-674.67	0.00	-2042.21	0.00	-931.38	0.00
1987	-4963.56	0.00	-4171.54	0.00	-955.19	0.00	-748.28	0.00	-2270.76	0.00	-1063.60	0.00
1988	-5028.09	0.00	-4234.91	0.00	-972.33	0.00	-807.60	0.00	-2432.11	0.00	-1453.98	0.00
1989	-6137.99	0.00	-4178.69	0.00	-1171.72	0.00	-1482.42	0.03	-3853.88	0.01	-2844.74	0.04
1990	-5703.40	0.00	-4195.32	0.00	-831.28	0.00	-846.59	0.00	-2477.88	0.00	-1555.40	0.00
1991	-6142.58	0.00	-4092.77	0.00	-1001.18	0.00	-976.32	0.00	-2591.40	0.00	-1590.67	0.00
1992	-6657.43	0.00	-2963.71	0.01	-1063.93	0.00	-995.54	0.00	-2815.32	0.00	-1508.67	0.00
1993	-6836.36	0.00	-3975.31	0.00	-948.40	0.00	-975.19	0.00	-2743.52	0.00	-1398.96	0.00
1994	-7271.23	0.00	-3009.22	0.01	-950.42	0.00	-1018.04	0.00	-2765.93	0.00	-1327.52	0.00
1995	-7567.14	0.00	-2894.47	0.02	-871.69	0.00	-1101.91	0.00	-2872.59	0.00	-1217.46	0.00
1996	-7424.92	0.00	-3063.71	0.02	-949.64	0.00	-1101.13	0.00	-3032.84	0.00	-1250.70	0.00
1997	-8134.53	0.00	-5102.53	0.02	-1676.66	0.00	-1416.84	0.00	-3674.57	0.00	-1440.72	0.00
1998	.8642.461	0.00	-3130.19	0.06	-1986.95	0.00	-1668.74	0.00	-3667.94	0.00	-1554.66	0.00
1999	-9700.18	0.00	-4882.71	0.01	-2510.45	0.00	-1741.57	0.00	-4407.81	0.00	-1438.69	0.00
2000	-9789.02	0.00	-4745.86	0.01	-2394.05	0.00	-1756.87	0.00	-4479.88	0.00	-1337.73	0.00
2001	-10175.57	0.00	-4929.05	0.01	-2768.13	0.00	-1882.82	0.00	-4724.27	0.00	-1517.03	0.00
2002	-10197.70	0.00	-5071.15	0.01	-2840.86	0.00	-1841.33	0.00	-4588.59	0.00	-2085.34	0.00

2003	-10132.82	0.00	-5250.44	0.00	-2678.21	0.00	-1680.10	0.00	-4359.77	0.00	-1994.58	0.00
2004	-10403.84	0.00	-5365.84	0.00	-2665.14	0.00	1846.46	0.00	-4549.27	0.00	-2021.99	0.00
2005	-10356.56	0.00	-5243.41	0.01	-2675.49	0.00	-1822.57	0.00	-4411.95	0.00	-1763.79	0.00
2006	-10543.24	0.00	-5354.24	0.01	-2870.86	0.00	-1960.91	0.00	-4605.32	0.00	-1951.84	0.00
2007	-10893.66	0.00	-5254.08	0.01	-2933.70	0.00	-2005.11	0.00	-4631.00	0.00	-1935.32	0.00
2008	-10896.96	0.00	-5176.84	0.01	-2986.66	0.00	-2061.17	0.00	-4905.43	0.00	-1775.71	0.00
2009	0-11300.01	0.00	-5411.05	0.01	-3121.34	0.00	-2177.60	0.00	-5040.58	0.00	-1741.66	0.00
2010	-10562.50	0.00	-5209.89	0.01	-2864.31	0.00	-2112.88	0.00	-4688.13	0.00	-1196.94	0.03

Master's Colleges and Universities

	Instruction		**Research**		**Academic Support Services**		**Student Services**		**Institutional Support Services**		**Auxiliary Enterprise**	
Year	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**
Overall	**-756.37**	**0.00**	**253.50**	**0.00**	**-195.23**	**0.00**	**-1006.60**	**0.00**	**-1628.34**	**0.00**	**-617.43**	**0.00**
1980	581.49	0.00	173.29	0.02	164.48	0.00	-264.97	0.00	-899.55	0.00	-666.82	0.00
1984	272.53	0.07	167.26	0.03	38.11	0.45	-458.48	0.00	-998.77	0.00	-727.08	0.00
1985	271.18	0.08	211.87	0.02	48.28	0.37	-484.12	0.00	-1070.20	0.00	-647.38	0.00
1986	232.38	0.17	267.29	0.04	22.02	0.67	-515.50	0.00	-1178.38	0.00	-511.89	0.00
1987	-987.69	0.25	215.90	0.14	-143.89	0.20	-738.46	0.00	-1833.91	0.00	-1045.24	0.03
1988	35.97	0.84	175.99	0.21	-11.63	0.82	-601.42	0.00	-1378.57	0.00	-551.27	0.00
1989	-487.79	0.15	183.30	0.26	-303.55	0.11	-796.12	0.00	-1705.80	0.00	-703.60	0.00
1990	-121.38	0.47	166.49	0.23	-47.15	0.37	-716.20	0.00	-1388.29	0.00	-595.74	0.00
1991	-274.36	0.10	102.99	0.30	-106.55	0.05	-748.85	0.00	-1479.62	0.00	-540.63	0.00
1992	-437.13	0.01	199.54	0.03	-141.36	0.01	-796.61	0.00	-1489.05	0.00	-486.81	0.00
1993	-419.65	0.01	65.31	0.55	-137.05	0.01	-732.10	0.00	-1417.70	0.00	-486.62	0.00
1994	-431.05	0.01	146.01	0.16	-141.69	0.02	-814.71	0.00	-1462.14	0.00	-404.71	0.00
1995	-369.92	0.03	197.94	0.02	-138.06	0.02	-839.71	0.00	-1455.81	0.00	-298.14	0.01
1996	-506.60	0.00	207.16	0.02	-143.70	0.02	-951.43	0.00	-1384.55	0.00	-311.52	0.01

1997	-1174.71	0.00	221.23	0.01	-306.01	0.00	-1207.81	0.00	-1787.23	0.00	-609.94	0.00
1998	-1545.46	0.00	245.66	0.01	-366.62	0.00	-1283.95	0.00	-2059.18	0.00	-650.27	0.00
1999	-1515.12	0.00	229.64	0.02	-300.28	0.00	-1358.22	0.00	-1952.06	0.00	-681.59	0.00
2000	-1399.39	0.00	202.63	0.00	-300.94	0.00	-1348.84	0.00	-1804.26	0.00	-416.46	0.00
2001	-1574.50	0.00	309.98	0.01	-281.16	0.00	-1400.63	0.00	-1869.79	0.00	-490.45	0.00
2002	-1531.93	0.00	249.41	0.01	.417.3552	0.00	-1373.62	0.00	-1941.29	0.00	-878.96	0.00
2003	-11175.37	0.00	243.88	0.01	-317.89	0.00	-1236.33	0.00	-1766.07	0.00	-827.61	0.00
2004	-1146.31	0.00	295.81	0.06	-311.87	0.00	-1255.31	0.00	-1743.10	0.00	-747.97	0.00
2005	-1642.86	0.00	295.95	0.02	-472.83	0.00	-1353.76	0.00	-2111.28	0.00	-793.54	0.00
2006	-1207.25	0.00	305.99	0.00	-286.38	0.00	-1336.34	0.00	-1827.87	0.00	-745.45	0.00
2007	-1158.17	0.00	444.96	0.07	-305.18	0.00	-1350.81	0.00	-1870.03	0.00	-696.60	0.00
2008	-1050.10	0.00	428.39	0.05	-288.46	0.00	-1328.01	0.00	-1850.73	0.00	-642.70	0.00
2009	-1291.67	0.00	440.48	0.08	-278.01	0.00	-1433.65	0.00	-2004.61	0.00	-666.19	0.00
2010	-1049.65	0.00	445.13	0.04	-208.38	0.01	-1384.10	0.00	-1854.47	0.00	-446.69	0.00

Baccalaureate Colleges and Universities

	Instruction		**Research**		**Academic Support Services**		**Student Services**		**Institutional Support Services**		**Auxiliary Enterprise**	
Year	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**	**Mean Difference**	**P-value**
Overall	**-2151.45**	**0.00**	**-3.87**	**0.83**	**-576.98**	**0.00**	**-1680.38**	**0.00**	**-2571.10**	**0.00**	**-1968.75**	**0.00**
1980	-583.66	0.00	38.33	0.52	-144.41	0.03	-580.91	0.00	-1271.89	0.00	-1873.30	0.00
1984	-848.05	0.00	13.52	0.76	-240.49	0.00	-863.53	0.00	-1677.46	0.00	-2018.20	0.00
1985	-737.97	0.00	-5.69	0.91	-273.91	0.00	-954.04	0.00	-1724.76	0.00	-1926.44	0.00
1986	-774.37	0.00	-9.77	0.86	-300.13	0.00	-984.09	0.00	-1878.60	0.00	-1674.23	0.00
1987	-1352.29	0.01	-117.88	0.16	-336.75	0.00	-1225.33	0.00	-2538.40	0.00	-1948.39	0.00
1988	-864.26	0.00	-122.77	0.15	-339.22	0.00	-1041.91	0.00	-1973.32	0.00	-1762.20	0.00
1989	-1218.79	0.00	-144.60	0.08	-426.47	0.00	-1134.05	0.00	-2020.43	0.00	-1826.27	0.00
1990	-1204.98	0.00	-98.16	0.25	-424.18	0.00	-1180.57	0.00	-2038.22	0.00	-1896.41	0.00

1991	-1460.74	0.00	-58.26	0.54	-472.07	0.00	-1267.84	0.00	-2064.08	0.00	-1889.73	0.00
1992	-1728.52	0.00	21.06	0.77	-477.58	0.00	-1229.41	0.00	-2126.53	0.00	-1775.13	0.00
1993	-1652.94	0.00	-257.34	0.03	-472.64	0.00	-1337.49	0.00	-2122.17	0.00	-1715.94	0.00
1994	-1714.99	0.00	-47.85	0.56	-481.88	0.00	-1339.52	0.00	-2198.09	0.00	-1683.98	0.00
1995	-1649.29	0.00	-78.98	0.47	-543.35	0.00	-1358.38	0.00	-2189.87	0.00	-1573.07	0.00
1996	-1773.25	0.00	1.54	0.99	-550.90	0.00	-1401.62	0.00	-2402.26	0.00	-1711.47	0.00
1997	-2945.98	0.00	19.74	0.93	-732.78	0.00	-1886.84	0.00	-2822.13	0.00	-2074.21	0.00
1998	-3499.46	0.00	-25.46	0.83	-901.77	0.00	-2188.79	0.00	-3208.46	0.00	-2235.95	0.00
1999	-3288.53	0.00	-37.20	0.65	-784.91	0.00	-2209.64	0.00	-3151.91	0.00	-2276.56	0.00
2000	-3273.62	0.00	-41.67	0.64	-816.81	0.00	-2154.09	0.00	-3452.40	0.00	-2255.96	0.00
2001	-3354.03	0.00	-25.11	0.79	-720.41	0.00	-2325.36	0.00	-3361.53	0.00	-2215.28	0.00
2002	-3135.69	0.00	41.00	0.73	-859.23	0.00	-2197.83	0.00	-3312.73	0.00	-2396.84	0.00
2003	-2785.20	0.00	69.57	0.46	-740.69	0.00	-2088.70	0.00	-3039.20	0.00	-2267.37	0.00
2004	-2845.83	0.00	84.65	0.41	-738.30	0.00	-211.62	0.00	-3028.83	0.00	-2184.11	0.00
2005	-2998.84	0.00	59.44	0.55	-752.56	0.00	-2134.06	0.00	-2978.48	0.00	-2044.79	0.00
2006	-2922.18	0.00	37.52	0.66	-750.04	0.00	-2243.89	0.00	-3177.28	0.00	-2017.16	0.00
2007	-2966.27	0.00	36.66	0.65	.753.9696	0.00	-2374.90	0.00	-3102.37	0.00	-2034.09	0.00
2008	-2899.62	0.00	46.03	0.55	-788.20	0.00	-2377.91	0.00	-3046.20	0.00	-2063.51	0.00
2009	-3249.31	0.00	33.75	0.65	-773.52	0.00	-2568.82	0.00	-3217.04	0.00	-2111.53	0.00
2010	-2783.05	0.00	43.86	0.56	-666.49	0.00	-2386.00	0.00	-2976.75	0.00	-1723.58	0.00

Table C9: Basic Model with Intercept and Trajectory Effects Only (Model 1)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0317***	0.00604	0.0395***	0.0471***	0.0173***	0.00268
	(0.00105)	(0.00348)	(0.00208)	(0.00158)	(0.000799)	(0.00196)
Time-Quadratic Effect	-0.0005***	--	-0.000756***	-0.00058***	--	--
	(3.10e-05)	--	(5.76e-05)	(4.61e-05)	--	--
Public	-0.142***	1.538***	-0.0976*	-0.573***	-0.730***	-0.470***
	(0.0318)	(0.151)	(0.0390)	(0.0356)	(0.0303)	(0.0744)
*Public*Time*	-0.00799***	0.0335***	-0.00395	-0.00942***	-0.00350**	-0.00119
	(0.000924)	(0.00562)	(0.00206)	(0.00140)	(0.00130)	(0.00320)
Doctoral/ Research Institution	0.559***	4.110***	0.631***	-0.254***	0.0420	0.251**
	(0.0343)	(0.167)	(0.0405)	(0.0361)	(0.0327)	(0.0928)
Masters Institution	--	--	--	-0.256***	-0.191***	-0.304***
	--	--	--	(0.0282)	(0.0255)	(0.0705)
Land Grant Institution	--	1.525***	--	--	--	0.492***
	--	(0.299)	--	--	--	(0.147)
Constant	8.498***	1.676***	6.850***	7.379***	8.081***	7.906***
	(0.0200)	(0.0904)	(0.0255)	(0.0260)	(0.0215)	(0.0536)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C10: Effects of Stakeholder Influence on University Spending (Model 2)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0241***	-0.00418	0.0305***	0.0424***	0.0151***	-0.00460*
	(0.00116)	(0.00383)	(0.00226)	(0.00173)	(0.000923)	(0.00216)
Time-Quadratic Effect	-0.0005***	--	-0.000717***	-0.0005***	--	--
	(3.20e-05)	--	(5.97e-05)	(4.77e-05)	--	--
Public	-0.271***	1.540***	-0.197***	-0.612***	-0.849***	-0.655***
	(0.0327)	(0.155)	(0.0468)	(0.0422)	(0.0355)	(0.0796)
*Public*Time*	-0.0030***	0.0280***	0.00234	-0.006***	0.0024	0.00813*
	(0.000943)	(0.00566)	(0.00212)	(0.00146)	(0.00134)	(0.00322)
Doctoral/ Research Institution	0.286***	3.194***	0.290***	-0.350***	-0.0656	-0.0883
	(0.0339)	(0.165)	(0.0437)	(0.0426)	(0.0369)	(0.0969)
Masters Institution	--	--	--	-0.259***	-0.174***	-0.336***
	--	--	--	(0.0284)	(0.0246)	(0.0673)
Land Grant Institution	--	1.237***	--	--	--	0.383***
	--	(0.273)	--	--	--	(0.139)
Total Current Fund Revenues	0.134***	0.436***	0.163***	0.0434***	0.0433***	0.151***
	(0.00793)	(0.0348)	(0.0124)	(0.0104)	(0.00914)	(0.0193)
Student Influence	-0.0967***	0.0182	-0.133***	-0.0766***	-0.174***	-0.293***
	(0.0110)	(0.0450)	(0.0198)	(0.0160)	(0.0141)	(0.0258)
Federal Government Influence	-0.0307***	0.218***	-0.0319***	-0.0289***	-0.0353***	-0.060***
	(0.00419)	(0.0172)	(0.00776)	(0.00613)	(0.00544)	(0.00983)
State Government Influence	-0.0192***	-0.077***	-0.0461***	-0.0134*	-0.0162**	-0.070***
	(0.00402)	(0.0170)	(0.00739)	(0.00592)	(0.00519)	(0.00931)
Private Contributor Influence	0.0143***	0.0711***	0.0227***	0.0277***	0.0381***	-0.00408
	(0.00363)	(0.0142)	(0.00673)	(0.00537)	(0.00464)	(0.00822)

Constant	6.687***	-6.247***	4.713***	6.978***	8.040***	6.758***
	(0.151)	(0.661)	(0.242)	(0.200)	(0.176)	(0.363)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C11: Effects of Stakeholder Influence on University Spending with Sector Interactions (Model 4)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0246***	-0.00570	0.0297***	0.0426***	0.0153***	-0.00103
	(0.00119)	(0.00392)	(0.00231)	(0.00177)	(0.000953)	(0.00221)
Time-Quadratic Effect	-0.0005***	--	-0.000711***	-0.0005***	--	--
	(3.22e-05)	--	(6.00e-05)	(4.80e-05)	--	--
Public	-0.700*	-1.397	0.88	-1.129**	-0.881*	-6.165***
	(0.350)	(1.572)	(0.517)	(0.425)	(0.371)	(0.853)
*Public*Time*	-0.0046***	0.0305***	0.00619*	-0.0064***	0.00112	-0.00575
	(0.00121)	(0.00655)	(0.00242)	(0.00175)	(0.00158)	(0.00370)
Doctoral/ Research Institution	0.286***	3.085***	0.317***	-0.348***	-0.0407	-0.234*
	(0.0355)	(0.171)	(0.0454)	(0.0440)	(0.0380)	(0.0994)
Masters Institution	--	--	--	-0.259***	-0.173***	-0.331***
	--	--	--	(0.0285)	(0.0246)	(0.0674)
Land Grant Institution	--	0.961***	--	--	--	0.182
	--	(0.281)	--	--	--	(0.143)
Total Current Fund Revenues	0.129***	0.419***	0.179***	0.0417***	0.0460***	0.0877***
	(0.00869)	(0.0381)	(0.0136)	(0.0114)	(0.00998)	(0.0210)
Total Revenues Public*	0.0242	0.0885	-0.0523*	0.0141	-0.00405	0.278***
	(0.0169)	(0.0777)	(0.0237)	(0.0197)	(0.0171)	(0.0417)
Student Influence	-0.0861***	-0.00394	-0.0973***	-0.0757***	-0.180***	-0.425***
	(0.0153)	(0.0628)	(0.0276)	(0.0224)	(0.0197)	(0.0358)
Student Influence Public*	0.0109	-0.0643	-0.0678	0.0362	0.0565	0.233***
	(0.0232)	(0.0949)	(0.0415)	(0.0334)	(0.0295)	(0.0545)

Federal Government Influence	-0.0285***	0.152***	-0.0195*	-0.0264***	-0.0261***	-0.080***
	(0.00465)	(0.0191)	(0.00864)	(0.00681)	(0.00604)	(0.0109)
Federal Govt. Influ. Public*	0.00456	0.369***	-0.0544*	0.00566	-0.0396*	0.0321
	(0.0121)	(0.0492)	(0.0221)	(0.0174)	(0.0155)	(0.0287)
State Government Influence	-0.0171***	-0.077***	-0.0540***	-0.0154*	-0.0175***	-0.061***
	(0.00421)	(0.0179)	(0.00774)	(0.00621)	(0.00545)	(0.00974)
State Govt. Influ. Public*	0.00634	0.103	0.0575*	0.0494*	0.0245	-0.113**
	(0.0163)	(0.0661)	(0.0292)	(0.0233)	(0.0206)	(0.0386)
Private Contributor Influence	0.0294***	-0.00228	0.0257**	0.0374***	0.0546***	-0.039***
	(0.00473)	(0.0189)	(0.00877)	(0.00699)	(0.00613)	(0.0108)
Private Contrib. Influ. Public*	-0.0428***	0.207***	0.00500	-0.0285**	-0.0500***	0.0676***
	(0.00749)	(0.0298)	(0.0139)	(0.0111)	(0.00981)	(0.0174)
Constant	6.695***	-5.543***	4.277***	6.977***	7.959***	8.476***
	(0.174)	(0.757)	(0.282)	(0.233)	(0.204)	(0.415)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C12: Effects of Stakeholder Influence on University Spending with Time and Sector Interactions (Model 5)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0179***	0.0246	0.0252**	0.0142*	0.0172**	-0.0107
	(0.00453)	(0.0194)	(0.00865)	(0.00680)	(0.00598)	(0.0111)
Time-Quadratic Effect	-0.0004***	--	-0.000581***	-0.0005***	--	--
	(3.85e-05)	--	(7.31e-05)	(5.78e-05)	--	--
Public	-0.599	-0.672	1.422**	-1.230**	-0.591	-5.586***
	(0.352)	(1.583)	(0.522)	(0.431)	(0.374)	(0.859)
*Public*Time*	-0.0106***	0.0113	-0.00936*	-0.00637	-0.0179***	-0.0260***
	(0.00222)	(0.0106)	(0.00440)	(0.00332)	(0.00286)	(0.00589)
Doctoral/ Research Institution	0.282***	3.050***	0.306***	-0.344***	-0.0435	-0.227*
	(0.0354)	(0.170)	(0.0452)	(0.0442)	(0.0379)	(0.0992)
Masters Institution	--	--	--	-0.256***	-0.173***	-0.314***
	--	--	--	(0.0286)	(0.0245)	(0.0670)
Land Grant Institution	--	0.919***	--	--	--	0.192
	--	(0.280)	--	--	--	(0.142)
Total Current Fund Revenues	0.135***	0.426***	0.194***	0.0405**	0.0444***	0.0992***
	(0.00934)	(0.0418)	(0.0147)	(0.0128)	(0.0109)	(0.0226)
Total Revenues Time*	-0.00044	0.000645	-0.000837	-0.000174	2.67e-05	-0.000836
	(0.000262)	(0.00129)	(0.000531)	(0.000396)	(0.000351)	(0.000720)
Total Revenues Public*	0.0200	0.0788	-0.0733**	0.0151	-0.00511	0.258***
	(0.0169)	(0.0778)	(0.0236)	(0.0198)	(0.0171)	(0.0417)
Student Influence	-0.114***	0.0508	-0.152***	-0.161***	-0.166***	-0.502***
	(0.0199)	(0.0855)	(0.0366)	(0.0296)	(0.0252)	(0.0476)
Student Influence Time*	0.0018	-0.00162	0.00428*	0.00603**	-0.00183	0.00510*

	(0.000932)	(0.00421)	(0.00187)	(0.00141)	(0.00119)	(0.00237)
Student Influence Public*	0.0213	-0.116	-0.0621	0.0483	0.0615*	0.246***
	(0.0233)	(0.0954)	(0.0416)	(0.0336)	(0.0296)	(0.0548)
Federal Government Influence	-0.0957***	0.358***	-0.111***	-0.0712***	-0.104***	-0.164***
	(0.00835)	(0.0367)	(0.0158)	(0.0126)	(0.0106)	(0.0194)
Federal Govt. Influence Time*	0.00489***	-0.0148***	0.00695***	0.00339***	0.00576***	0.00655***
	(0.000501)	(0.00228)	(0.000988)	(0.000755)	(0.000644)	(0.00122)
Federal Govt. Influence Public*	0.00311	0.377***	-0.0553*	0.00514	-0.0489**	0.0244
	(0.0121)	(0.0492)	(0.0220)	(0.0175)	(0.0155)	(0.0287)
State Government Influence	-0.0253***	-0.153***	-0.0763***	-0.0293**	-0.0576***	-0.120***
	(0.00745)	(0.0356)	(0.0141)	(0.0112)	(0.00985)	(0.0183)
State Govt. Influence Time*	0.000549	0.00676**	0.00197*	0.00102	0.00294***	0.00469***
	(0.000512)	(0.00239)	(0.00100)	(0.000769)	(0.000676)	(0.00128)
State Govt. Influence Public*	0.00945	0.0818	0.0592*	0.0557*	0.0179	-0.116**
	(0.0164)	(0.0663)	(0.0292)	(0.0234)	(0.0207)	(0.0387)
Private Contributor Influence	0.0518***	0.125***	0.112***	0.0275*	0.0835***	0.0136
	(0.00860)	(0.0388)	(0.0163)	(0.0129)	(0.0114)	(0.0212)
Private Contrib. Influence Time*	-0.0017***	-0.008***	-0.00616***	0.000626	-0.00253***	-0.0041***
	(0.000497)	(0.00228)	(0.000968)	(0.000749)	(0.000668)	(0.00126)
Private Contrib. Influence Public*	-0.0324***	0.189***	0.0220	-0.0214	-0.0410***	0.0821***
	(0.00754)	(0.0301)	(0.0140)	(0.0112)	(0.00986)	(0.0175)
Constant	6.800***	-6.485***	4.225***	7.477***	8.025***	8.656***
	(0.189)	(0.816)	(0.309)	(0.259)	(0.223)	(0.447)

Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C13: Effects of Stakeholder Influence on University Spending without Trajectory Effects For Sector (Model 6)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0131**	0.0351	0.0229**	0.0115	0.00999*	-0.0182*
	(0.00444)	(0.0192)	(0.00849)	(0.00667)	(0.00590)	(0.0109)
Time-Quadratic Effect	-0.0005***	--	-0.000661***	-0.0006***	--	--
	(3.68e-05)	--	(6.95e-05)	(5.52e-05)	--	--
Public	-0.312***	1.935***	-0.153***	-0.700***	-0.819***	-0.534***
	(0.0291)	(0.138)	(0.0411)	(0.0343)	(0.0297)	(0.0744)
Doctoral/ Research Institution	0.282***	3.154***	0.272***	-0.344***	-0.0652	-0.0938
	(0.0338)	(0.165)	(0.0437)	(0.0427)	(0.0368)	(0.0966)
Masters Institution	--	--	--	-0.254***	-0.172***	-0.321***
	--	--	--	(0.0285)	(0.0245)	(0.0668)
Land Grant Institution	--	1.204***	--	--	--	0.371**
	--	(0.273)	--	--	--	(0.138)
Total Current Fund Revenues	0.141***	0.443***	0.178***	0.0437***	0.0472***	0.162***
	(0.00864)	(0.0389)	(0.0136)	(0.0119)	(0.0101)	(0.0210)
*Total Revenues*Time*	-0.000629*	0.000642	-0.00128*	-0.000274	-0.000437	-0.00107
	(0.000256)	(0.00125)	(0.000519)	(0.000389)	(0.000340)	(0.000691)
Student Influence	-0.145***	0.0749	-0.217***	-0.171***	-0.198***	-0.384***
	(0.0150)	(0.0666)	(0.0277)	(0.0224)	(0.0192)	(0.0369)
Student Influence Time*	0.00368***	-0.00376	0.00695***	0.00705***	0.00118	0.00685**
	(0.000830)	(0.00391)	(0.00167)	(0.00125)	(0.00110)	(0.00218)
Federal Government Influence	-0.0993***	0.428***	-0.115***	-0.0739***	-0.118***	-0.138***
	(0.00803)	(0.0356)	(0.0151)	(0.0121)	(0.0102)	(0.0187)

Federal Govt. Influ. Time*	0.00495***	-0.0151***	0.00632***	0.00338***	0.00586***	0.00597***
	(0.000496)	(0.00227)	(0.000974)	(0.000747)	(0.000641)	(0.00120)
State Government Influence	-0.00823	-0.178***	-0.0463***	-0.0161	-0.0240**	-0.106***
	(0.00625)	(0.0306)	(0.0119)	(0.00946)	(0.00834)	(0.0160)
State Govt. Influ. Time*	-0.000977*	0.00835***	0.000158	0.000169	0.000341	0.00291**
	(0.000391)	(0.00196)	(0.000787)	(0.000591)	(0.000531)	(0.00106)
Private Contributor Influence	0.0322***	0.185***	0.0949***	0.0158	0.0552***	0.0491*
	(0.00774)	(0.0356)	(0.0146)	(0.0117)	(0.0103)	(0.0193)
Private Contrib. Influ. Time*	-0.00104*	-0.0078***	-0.00471***	0.000978	-0.00127*	-0.00357**
	(0.000465)	(0.00215)	(0.000903)	(0.000701)	(0.000622)	(0.00118)
Constant	6.861***	-7.159***	4.801***	7.493***	8.198***	6.988***
	(0.167)	(0.726)	(0.268)	(0.228)	(0.195)	(0.396)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C14: Effects of Stakeholder Influence on University Spending without Sector Effects (Model 7)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0133**	0.0363	0.0234**	0.0101	0.0102	-0.0173
	(0.00444)	(0.0192)	(0.00849)	(0.00669)	(0.00594)	(0.0109)
Time-Quadratic Effect	-0.0004***	--	-0.000647***	-0.0005***	--	--
	(3.68e-05)	--	(6.94e-05)	(5.53e-05)	--	--
Doctoral/ Research Institution	0.231***	3.479***	0.259***	-0.498***	-0.250***	-0.223*
	(0.0346)	(0.172)	(0.0437)	(0.0456)	(0.0426)	(0.0962)
Masters Institution	--	--	--	-0.367***	-0.307***	-0.428***
	--	--	--	(0.0309)	(0.0291)	(0.0662)
Land Grant Institution	--	1.953***	--	--	--	0.190
	--	(0.283)	--	--	--	(0.138)
Total Current Fund Revenues	0.129***	0.463***	0.172***	0.0188	0.0169	0.150***
	(0.00867)	(0.0392)	(0.0136)	(0.0123)	(0.0108)	(0.0210)
*Total Revenues*Time*	-0.000610*	0.000296	-0.00127*	-2.49e-05	-0.000284	-0.000952
	(0.000256)	(0.00125)	(0.000519)	(0.000390)	(0.000343)	(0.000691)
Student Influence	-0.113***	-0.0725	-0.186***	-0.0649**	-0.0688***	-0.325***
	(0.0147)	(0.0659)	(0.0264)	(0.0219)	(0.0188)	(0.0359)
Student Influence Time*	0.00350***	-0.00216	0.00658***	0.00639***	0.000424	0.00594**
	(0.000829)	(0.00391)	(0.00166)	(0.00125)	(0.00110)	(0.00218)
Federal Government Influence	-0.0998***	0.417***	-0.115***	-0.0730***	-0.116***	-0.135***
	(0.00802)	(0.0356)	(0.0151)	(0.0122)	(0.0102)	(0.0187)
Federal Govt. Influ. Time*	0.00501***	-0.0148***	0.00637***	0.00351***	0.00582***	0.00587***
	(0.000496)	(0.00227)	(0.000974)	(0.000749)	(0.000644)	(0.00120)

State Government Influence	-0.0183**	-0.109***	-0.0585***	-0.0416***	-0.0617***	-0.130***
	(0.00617)	(0.0303)	(0.0115)	(0.00940)	(0.00824)	(0.0156)
State Govt. Influ. Time*	-0.00119**	0.00815***	0.000228	-0.00122*	-0.000200	0.00337***
	(0.000390)	(0.00196)	(0.000787)	(0.000588)	(0.000535)	(0.00106)
Private Contributor Influence	0.0407***	0.142***	0.104***	0.0407***	0.0864***	0.0662***
	(0.00769)	(0.0355)	(0.0144)	(0.0117)	(0.0103)	(0.0191)
Private Contrib. Influ. Time*	-0.00115*	-0.0069***	-0.00491***	0.000821	-0.00181**	-0.0041***
	(0.000464)	(0.00215)	(0.000901)	(0.000703)	(0.000625)	(0.00117)
Constant	6.862***	-6.406***	4.751***	7.381***	8.079***	6.872***
	(0.168)	(0.735)	(0.268)	(0.236)	(0.208)	(0.397)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table C15: Effects of Stakeholder Influence and Number of Primary Dependencies on University Spending (Model 8)

	Instruction	Research	Academic Support Services	Student Services	Institutional Support	Auxiliary Enterprise
Time-Linear Effect	0.0242***	-0.00422	0.0310***	0.0421***	0.0151***	-0.00470*
	(0.00116)	(0.00383)	(0.00226)	(0.00173)	(0.000923)	(0.00216)
Time-Quadratic Effect	-0.0005***	--	-0.000731***	-0.0005***	--	--
	(3.21e-05)	--	(5.98e-05)	(4.78e-05)	--	--
Public	-0.264***	1.549***	-0.175***	-0.623***	-0.857***	-0.617***
	(0.0328)	(0.156)	(0.0471)	(0.0425)	(0.0357)	(0.0798)
*Public*Time*	-0.00286**	0.0283***	0.00297	-0.0058***	0.00219	0.00921**
	(0.000948)	(0.00568)	(0.00213)	(0.00146)	(0.00134)	(0.00323)
Doctoral/ Research Institution	0.284***	3.190***	0.282***	-0.346***	-0.0626	-0.109
	(0.0339)	(0.165)	(0.0437)	(0.0426)	(0.0370)	(0.0967)
Masters Institution	--	--	--	-0.258***	-0.174***	-0.341***
	--	--	--	(0.0284)	(0.0246)	(0.0672)
Land Grant Institution	--	1.236***	--	--	--	0.375**
	--	(0.273)	--	--	--	(0.139)
Total Current Fund Revenues	0.135***	0.437***	0.163***	0.0430***	0.0431***	0.154***
	(0.00793)	(0.0348)	(0.0124)	(0.0105)	(0.00914)	(0.0193)
Student Influence	-0.0959***	0.0196	-0.130***	-0.0780***	-0.175***	-0.288***
	(0.0111)	(0.0451)	(0.0198)	(0.0160)	(0.0141)	(0.0258)
Federal Government Influence	-0.0302***	0.218***	-0.0299***	-0.0300***	-0.0360***	-0.057***
	(0.00420)	(0.0172)	(0.00778)	(0.00614)	(0.00546)	(0.00984)
State Government Influence	-0.0193***	-0.078***	-0.0467***	-0.0132*	-0.0161**	-0.071***
	(0.00402)	(0.0170)	(0.00738)	(0.00592)	(0.00519)	(0.00930)
Private Contributor Influence	0.0165***	0.0745***	0.0306***	0.0238***	0.0354***	0.00951
	(0.00381)	(0.0150)	(0.00706)	(0.00563)	(0.00490)	(0.00867)

Number of Primary Dependencies	-0.0084	-0.0126	-0.0299***	0.0149*	0.00998	-0.049***
	(0.00434)	(0.0173)	(0.00809)	(0.00644)	(0.00570)	(0.0100)
Constant	6.680***	-6.263***	4.706***	6.983***	8.042***	6.703***
	(0.151)	(0.661)	(0.242)	(0.200)	(0.176)	(0.363)
Observations	26,062	25,044	26,062	26,057	26,062	26,018
Number of groups	1,344	1,344	1,344	1,344	1,344	1,344

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

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