EXAMINING MANAGEMENT'S IMPACT ON INSTITUTIONAL PERFORMANCE IN HIGHER EDUCATION

by

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Abstract

Extensively studied in several public policy contexts, O'Toole and Meier's (OTM) (1999) framework modeling public management's impact has shown that managerial, structural, and environmental influences matter for performance. This framework may have similar predictive value to explain performance for higher education in the United States. Utilizing primary data drawn from a random-stratified sample of 166 four-year public universities spanning 9-years (2002-2010), this study operationalizes the full inventory of components in the OTM framework to examine how various managerial strategies and characteristics, along with university and state environmental factors, influence institution-level performance (graduation rates). Results suggest that active management of the operating environment can substantially influence graduation rates, but that internal managerial actions may be more critical for low-performing institutions whose autonomy and resources are limited by contextual and structural constraints. Collectively, findings from the present study also suggest that effectively managing and enhancing graduation rates are contingent on the political and socio-economic conditions of an institution's operating environment; in order to achieve the increasingly public goals of higher education, efforts to enhance performance will likely entail a great deal of managerial innovation and the strategic internal investment of limited institutional resources. Over the coming years, deciding which management actions to pursue and achieve performance will be critical for public universities, especially as demographic and socio-political shifts continue to redefine the goals and reshape the landscape of public higher education. Accordingly, the theoretical and practical contributions realized from the present study clarify *how* public managers can shape performance, as well as our understanding of *when* and under *what* circumstances managerial actions might matter.

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List of Abbreviations

AA	Accreditation Agency
ACS	Alternative Covariance Structure
CHEA	The Council for Higher Education Accreditation
CUPC	Carnegie Undergraduate Profile Classification
DOE	Department of Education
HBCU	Historically Black Colleges and Universities
HE	Higher Education
HEA	Higher Education Act
HLM	Heirarchical Linear Modeling
IGR	IPEDS Graduation Rates
IHE	Institutions of Higher Education
IPEDS	Integrated Postsecondary Education Data System
LGI	Land Grant Institution
MLMM	Multilevel Mixed Model
NPM	New Public Management
OTM	O'Toole Meier Framework
OTM	O'Toole Meier Framework
P.L.	Public Law
PA	Public Administration
PCA	Principal Components Analysis
U.S.	United States
URM	Underrepresented Minority

Preface

The relationship between public management and performance has long been distilled into two questions surrounding efficiency and economy. The first is how can government administration provide better services with available resources? The second is how can government maintain the current level of public services while spending less money? Public Administration's early scholars argued that public goals surrounding efficiency and economy stressed the need for a professionalized bureaucracy accountable to the public (Goodnow 1900; Long 1949; Wilson 1887). In order for a democratic government to achieve optimal performance, public managers and administrators should be appointed based on their merit and ability, be prepared to lead and organize the functions of government, and ultimately pursue clear responsibilities that serve public interests. Unlike management in the private sector, managers of public organizations often face substantially different challenges when seeking to assess, measure, and improve performance.

Adding complexity to these historical antecedents, contemporary public management is conceptualized as [often] purposeful efforts to achieve shared objectives and goals through the coordination of relevant actors and resources (Brudney, O'Toole, and Rainey 2001; O'Toole and Meier 1999). An extensive list of scholarship contributing to this understanding sought to demonstrate that management matters for performance. Early scholars argued the importance of management's role to organizational performance was best observed through changes to an organization's structural features. More broadly captured by the notion of POD-SCORB,[1] the management of organizational inputs and processes that established clear lines of authority, communication, and personnel functions should correspond with more efficient outputs (i.e., performance).

In years since Gulick and Urwick's (1938) foundational work, an understanding of the various managerial strategies influencing organizational performance

[1]Gulick and Urwick's (1938) acronym refers to the Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting features of administrative management

has extended to span structural, psychological, and social/cultural dimensions. Whereas efficiency is often a suitable performance metric for the private sector, public organizations also pursue goals of equity, ethics, and effectiveness (Frederickson 1996; 2010). The very public nature of such goals, coupled with the complexity of public institutional arrangements and government bureaucracy, reveal that a solely internal focus to management may not adequately, nor justifiably, enhance organizational performance (Kettl 1993; Milward, Provan, and Else 1993). Indeed, "substantively rational" (Simon 1976, 66) managers must guide public organizations in complex environments spanning multiple institutional settings that require coordinating and networking with various public and private stakeholders/agencies, and are subject to political and external administrative influences (Agranoff and McGuire 1998; McGuire 2002; O'Toole 1997; Provan and Milward 1995).

Due to the complex nature of public organizational settings, isolating the impact of managerial efforts on performance has been fraught with difficulty. Scholarship in the fields of public management, leadership, and performance, however, have made progress over the past few decades (Ban 1995; Cohen and Eimicke 1995; Doig and Hargrove 1987; Ingraham and Donahue 1999; O'Toole and Meier 1999, 2003, 2004, 2006; 2010; Meier, O'Toole, and Boyne 2007; Provan and Milward 1995; Rainey and Steinbauer 1999; Ricucci 1995; Wolf 1993). Nevertheless, a comprehensive understanding of the interactive aspects of management, environment, structure and their relationship to organizational performance continued to elude scholars into the twenty-first century.

In light of scholarships' lack of focus on the diversity of these factors, perhaps O'Toole and Meier (1999) have made significant progress formally modeling the impact that complex features of management have on performance. In addition to detailing how structural elements (organizations within networks and hierarchies) may affect managerial activities and shape subsequent organizational

performance, O'Toole and Meier incorporate temporal, behavioral, and environmental elements that interact with managerial strategies and directly influence organizational performance. Indeed, prior performance, management's efforts to exploit opportunities and buffer against environmental constraints, as well as system stability factors shape performance in some way and may have long-lasting impacts. To capture the important yet complex line of inquiry driving this study, I begin with an essential caveat offered by O'Toole and Meier (1999); "management is crucial but also contingent" (523).

The proposed study builds on the foundational work of the OTM framework by attempting to account for known and untested management and interactive factors influencing organizational performance. Specifically, this dissertation sets out with the ambitious goals of operationalizing the OTM framework (1999) by extending it to a previously untested public program area in which managements' impact on performance is less known; Public Higher Education. Whether the value of public higher education is defined in economic terms or broader societal contributions, increased attention on the importance and growth of higher education (HE) in the United States (U.S.) demand the identification of factors contributing to performance. Ever salient to both policy-makers and consumers, graduation rates are the proposed measure of performance for this study.

Several theoretical and practical contributions may be realized from the present study. Turning first to a theoretical perspective, great inroads have been made to utilize the OTM framework in order to distill the relationship between public management and organizational performance (S. Nicholson-Crotty and O'Toole 2004; Meier and O'Toole 2002; 2007; 2009; 2010; O'Toole and Meier 1999; 2003). Many of the associated studies segment the formal model and test the extent to

which organizational performance is affected by internal versus external management strategies, while also leveraging the impact that various environmental opportunities and constraints may have on such strategies and subsequent performance. Related findings suggest that management substantively affects performance, but data limitations have precluded the full operationalization of the OTM framework (a point that O'Toole and Meier (1999, 524) concede). No known literature to date has attempted to account for the full inventory of factors O'Toole and Meier's (1999) model propose influence the relationship between management and performance. Only components of the OTM framework have been tested within program areas related to K-12 education, environmental, and criminal justice.

Beyond simply gauging the validity of the OTM framework, a more comprehensive understanding of how institutional structures, political and economic factors, and management strategies interact and directly influence performance is needed; especially in the policy area of higher education. Specifically, how do different approaches to management, in light of an organization's environmental context, explain variation in performance across universities? Recent scholarship in political science and higher education policy echo the need for a further unpacking of the impact that institutional structures, a fundamental OTM factor, may have in state policy processes and outcomes (Tandberg and Griffith 2013). This study seeks to bridge these apparent gaps.

On a related practical front, a better understanding of the managerial strategies, in light of contextual factors that enhance performance, may allow HE stakeholders to identify the levers necessary to improve graduation rates which hover around 60 percent nationally (National Center for Education Statistics 2019).
While increased graduation rates may provide economic and civic benefits to public institutions of higher education (IHEs) as well as society more broadly, individual

consumers of education stand to be in a better position to make decisions that benefit their social and economic mobility. Undoubtedly, understanding how management matters for performance for a critical public good such as higher education, has important theoretical and societal implications.

Accordingly, this study broadly seeks to understand how universities manage performance and the extent to which the OTM framework can aid in this endeavor. This endeavor is guided by the following primary research question and sub-questions that will be tested to understand the direct and contingent relationship of public management and organizational performance:

1. Why do certain IHEs perform at higher levels than other IHEs?

    1.1 How does the OTM framework account for this variation?

    1.2 How do internal and external management strategies influence IHE performance?

    1.3 To what extent do state higher education governance structures explain variation in levels of performance?

    1.4 How are levels of institutional stability associated with the magnitude of management's impact on IHE performance?

    1.5 What institutional and state-level environmental factors influence performance?

To address these research questions, this study utilizes quantitative data from a stratified-random sample of approximately 166 four-year public universities spanning 9-years (2001-2010). The unit of analysis for this study is IHE/year and includes three levels; with level-one representing time and the dependent variable, nested within IHEs at level two, nested within a third level composed of state factors. To help guide the ambitious objectives of this study, this preface concludes with a description of the overall layout of proceeding sections.

Chapter 1 provides a brief narrative on the history of HE within the context of performance and accountability. This chapter includes describing unique features of this empirical setting surrounding bureaucracy, accountability, and the development of performance metrics in HE. The next step of this investigation reviews relevant literature evidencing how management can influence performance, but importantly, moves beyond understanding that "management matters" by untangling the complex features of this relationship within a HE context. Accordingly, Chapter 2 begins with describing the theoretical foundations of public management as well as more contemporary understandings of the relationship between management and performance found in public administration and HE scholarship. In addition to reviewing current gaps in knowledge, this section also includes the presentation of the OTM framework, and its extension to the current study. Following the illustration of a conceptual model generated from the literature review, Chapter 2 concludes with the presentation of hypotheses associated with the research questions of this study.

Chapter 3 describes the research design guiding the inquiry of this dissertation. Specifically, this chapter provides summary details on the case selection strategy, data sources and operationalization, and describe the analytical approaches used to address guiding research questions. Lastly, Chapters 4 through 6 presents results from various models grounded in the OTM framework that test the hypothesized relationships between management and performance in HE. The conclusions drawn from these results and the associated practical and theoretical implications of this study are discussed in Chapter 7.

1

Introduction

The year 1776 was a momentous and fervent period in American history. Notable events include the on-going Revolutionary War, the ratification of the Declaration of Independence, and culminates with George Washington's famed December Crossing of the Delaware. While much of the country's attention focused on securing independence, the Fifth Provincial Congress of North Carolina began laying groundwork to secure the America's educational future. During this year, lawmakers passed legislation formally tying public funds to higher education (see Battle 1907).[1] By 1862, "four-fifths of the existing 33 states" had at least one publicly funded institutions of higher education (Goldin and Katz 1999, 50). Higher education's landscape further expanded during the period with the introduction of federal assistance through the Morrill Acts.

The passage of the 1862 and 1890 Morrill acts incentivized states to establish Land-Grant universities by providing federal dollars and land appropriations

[1]North Carolina's 1776 Constitution uses the term "universities." It is likely that historical and contemporary conceptions of what constitutes "higher education" differ to some extent.

to states (Goldin and Katz 1999). The resulting expansion of public HE helped increase accessibility to HE for throughout the U.S., enhancing educational opportunities for both ordinary and disenfranchised Americans during the late 19th century. In fact, Nineteen Historically Black Colleges and Universities (HBCUs) were established throughout the southeastern U.S. as result of the 1890 Morrill Act (National Museum of African American History and Culture 2019). Across the types of IHEs that continue to exist today, such as Land-Grants and HBCUs, policy processes and managerial strategies vary greatly across different geo-political, socio-economic, and demographic contexts (J. Nicholson-Crotty and Meier 2003), a point taken up further in Chapter 3. The research questions guiding seek not only to understand how these managerial strategies contrast, but also how these differences might affect performance in HE. The following sections in Chapter 2 prime this investigation by describing HE's perceived public value and how these perceptions have evolved over time to shape accountability efforts and performance.

The Purpose and Managerial Context of Higher Education

The desire for economic growth and support for practical disciplines (i.e., Agricultural and Mechanical colleges) has long driven public investment in higher education (Edwards and McCluskey 2015). This disposition of public support for higher education broadly held well into the 20th century. However, the value of public higher education has become increasingly difficult to define. Some argue that higher education is a critical component to the fabric of society, instilling democratic values and civic mindfulness in a nation's youth (Giamatti 1990). Others embrace the individual benefits of higher education, citing evidence that suggests those with a college degree will earn 75 percent more during their lifetime (Day and Newburger 2002). Relatedly, the value of higher education may also lie in its contribution to state coffers. Based on work by Klor de Alva and Schneider (2011), states can expect a net return of $52,000 - $150,000 dollars in additional

tax receipts alone. Regardless of how the value of education is defined it is important to acknowledge the myriad of values that lawmakers and citizens attach to HE because much like other governmental agencies, perceptions underlie many of the bureaucratic structures influencing agency decisions and policy outcomes. Examining this relationship highlights the important role of an agency's external environment, where political or economic influences (as the manifestation of public perceptions) can affect agency performance (Andrews et al. 2005; Meier and O'Toole 2002; O'Loughlin 1990). A plausible assessment of HE might describe a highly regulated bureaucratic environment (Knott and Payne 2004). A closer inspection of governance structures in HE, however, reveals that there is great variability among individual IHEs in the extent to which they are centralized and subject to governmental control and oversight. Leveraging this variation is an important focal point of this study, as HE governance structures have been shown to influence state-level policy outcomes, such as the amount of funds states' appropriate to HE (J. Nicholson-Crotty and Meier 2003; Lowry 2001).

However, IHEs and other public organizations do not operate in a vacuum nor are agency managers automatons. Administrators often exercise levels of discretion, and the agencies they manage possess varying degrees of autonomy across different governance structures. In this sense, bureaucratic structures may function to buffer external influences but can also magnify the importance of managerial decisions within agencies pursuing institutional and broader state-level policy goals. The magnification of this relationship in HE may be due to state mechanisms of accountability which have increasingly become "more integrated [with traditional] state policy tools" (Ewell and Jones 2006, 13). Indeed, the amount of state appropriations an IHE receives may be contingent on the extent to which that institution was able to achieve state public policy goals. For instance, in response to an increased number of educated residents relocating out of state, states such as Oklahoma have adopted a performance-based funding formula that awards more state dollars to those IHEs with increased degree completion rates

(Oklahoma State Regents for Higher Education 2008). Such mechanisms of accountability. In light of these increased institutional responsibilities, accountability mechanisms highlight the important role of autonomy that IHEs are afforded in the pursuit of state policy agendas (Ewell and Jones 2006). The delegation of authority to unelected bureaucrats in the policy-making process, such as university administrators, is not without conflict.

On one hand, students of bureaucracy contend that discretion is necessary to effectively perform and fulfill policy goals (Andrews et al. 2005; O'Loughlin 1990; O'Toole and Meier 2000; Selznick 1948; Wilson 1991). Fostering autonomy can enable managers to pursue strategies best suited to their organizational context. On the other hand, organizations given more power and flexibility might also pursue other motivations in the absence of control mechanisms. Within a HE context, Knott and Payne's (2004) examination show that structure can directly impact state policy outputs but also indirectly influence managerial decisions and strategies at the institutional-level. Their findings indicate that more autonomous public IHEs may direct more attention to institutional interests, whereas management strategies at more regulated IHEs tended to reflect broader state-level priorities. Such findings raise important questions surrounding the nature of bureaucratic accountability, and particularly to which goals or performance metrics are IHEs accountable? Remaining sections of this chapter move to describe this relationship in a HE context to begin unpacking how IHEs manage performance.

Managing Performance in Higher Education

Structural elements and discretion are key features of public organizations that enable them to mirror the political environment, preserve the democratic purpose of government, and ensure that public agencies are responsive to public interests (McCubbins, Noll, and Weingast 1987; O'Loughlin 1990). Accountability is thus a key dimension of bureaucracy and entails an agency's responsibility to justify its actions and evidence the outcomes these actions produce (O'Loughlin 1990).

"Answerability" might satisfy a prior political definition of accountability (Romzek and Dubnick 1987), but in modern Public Administration, expectations to uphold the great "promise of performance" have shifted away from elected officials to focus attention on managers and agencies (Dubnick 2005, 377). Concepts of New Public Management however, coupled with competing purposes and unique structural arrangements observed in HE, complicate even this contemporary understanding of accountability.

Although universities are subject to state control, many states during the 19th century sought to expand constitutional autonomy to universities (see McLendon 2003). As a result, today's IHEs and their institutional-level governing boards (e.g., board of visitors) have retained high levels of control over managing substantive aspects of their university while the state role often concerns funding or procedural regulation.[2] These distinctions were generally associated with greater state centralization of HE across the U.S. in an effort to constrain competition between intra-state agencies and limit the inefficient use of state resources (McGuinness 1997; McLendon 2003). Nevertheless, variation in these relationships and HE governance structures continues to exist. Knott and Payne (2004) found that in competitive budgetary environments, IHEs subject to greater state control were allocated fewer resources than IHEs in more decentralized states. Thus, fewer state funds may be allocated to IHEs operating within more centralized structures if lawmakers perceive other functions of government more critical to fulfilling state policy goals. It is because levels of state control and priorities vary that universities employ different strategies to manage performance and meet policy goals.

Ewell and Jones (1994, 25) describe that IHEs take the following approaches to manage performance. Broadly, these include measuring the cost/benefit and return on investment (e.g., who benefits and who pays, graduation rates) and the

[2]Stemming from Berdahl et al.'s (1971) work, substantive can be described as functions related to the "academic core" of a university, such as its "purposes and goals" (McLendon 2003, 68). Similarly, procedural regulation can be defined as "how appropriated funds will be used, how funds will be accounted for, and how personnel will be hired" (McLendon 2003, 68).

realization of unit-specific or institutional goals (e.g., increased administrative and scholarly productivity, costs savings, increases in consumer satisfaction, etc.). Although public IHEs are creatures of the state and subject to government regulation, the levels of autonomy IHEs are afforded in managing themselves can vary. Because a central purpose of this dissertation examines how performance and accountability function in public HE, attention for the remainder of this chapter is focused on understanding how performance is actually measured. Interestingly, a solid understanding of performance metric development in HE can be gleaned through the lens of accreditation by distilling the role that federal funding and accreditation agencies have had on the way IHEs define and manage performance.

Accreditation and Performance

The accreditation of IHEs in the United States has long been a voluntary process, dating back to the late nineteenth century. As Hegji (2014) describes, IHEs began forming voluntary associations in 1895 to establish general rules that dictated IHE membership. In light of competition associated with an ever-growing HE landscape, these associations sought to address and distinguish the purpose of higher education and over the course of several decades, are what came to be known as external accreditation bodies; organizations that sought to enhance standards and IHE qualifications. "By the early 1970's," all but a handful of IHEs were accredited to some extent (Hegji 2014, 1). It can be said then that the purpose of accreditation was to give IHEs credibility, an important factor in demonstrating the value of higher education. However, for the first half of the 20th century, accreditation was not a requirement to receive federal dollars. This circumstance would change with the passage of the Veterans' Readjustment Assistance Act (VRAA) (P.L. 82-550) in the year of 1952, as well as the National Defense of Education Act (NDEA) (P.L. 85-864) in 1958 (Hegji 2014). For the first time, the Department of Education (formerly known as the U.S. Office of Education (USOE)) established authority to

officially recognize accreditation organizations and state approval agencies for the purposes of dispersing federal funds (Proffitt 1979).

This spurred the creation of the federal National Commission on Accrediting, which developed guidelines for accrediting agencies to use in their efforts of determining institutional quality while maintaining access to federal funds. Ultimately, all of these developments prior to 1965 set the stage for an even deeper role of the federal government in IHE accreditation. Indeed, accreditation's place in higher education was solidified in the coming decade, as part of President Lyndon B. Johnson's domestic policy initiative termed the "Great Society." The Great Society's broad goal was to address racial inequality and eliminate poverty in the United States by enhancing: 1) educational quality and access, 2) medical spending, 3) environmental conservation, 4) criminal justice efforts, and 5) spending on economically depressed regions (Freidel and Sidey 2006). A significant part of the initiative was the Higher Education Act of 1965, which was spearheaded by President Johnson to make quality higher education available to all Americans.

In turn, the 1965 Higher Education Act (HEA) and the federal government have impacted the way that IHEs manage performance. The purpose of the 1965 Higher Education Act (HEA) is to "Strengthen the educational resources of [United States] colleges and universities and to provide financial assistance for students in postsecondary and higher education" (Pub. L. No. 89-329). HEA authorized the federal government to distribute aid to both individuals and Institutions of Higher Education (IHEs) through various federal aid programs. Still today, Title II, III, and V of the HEA are intended to provide institutional aid (e.g., capital financing, institutional grant funding, etc.) while Title IV of HEA authorizes federal support at the individual student level (e.g., direct federal loans, pell grants, scholarship programs, etc.). Title IV federal student aid (FSA), however, is only eligible to students who attend Title IV eligible institutions. To be considered a Title IV eligible institution, IHE's must meet the following three requirements:

- "Licensed or otherwise legally authorized to operate in the state in which it is physically located,
- accredited or preaccredited by an agency recognized for that purpose by the Department of Education (DOE),
- and certified by [the DOE] as eligible to participate in Title IV programs." (Hegji 2014).

According to the United States Department of Education (USDOE) during the 2014-2015 academic years, there were 7,310 IHEs eligible to receive Title IV FSA funds (Ginder, Kell-Reid, and Mann 2014), while only 6,101 actually received those funds (United States Department of Education [USDOE] 2015). On one hand, state licensure and accreditation requirements are intended to provide a form of accountability to both the states and federal government, while also protecting consumers of higher education. On the other hand, the Title IV eligibility requirement provides the sole point at which the federal government has ultimate authority; by indirectly determining an IHE's eligibility for federal funding. Together, these requirements (state licensure, accreditation, and DOE certification of eligibility) form "the program integrity triad" (PIT) (Hegji 2014). Collectively, the PIT is important to understanding how IHE's become eligible to receive Title IV funds through federal programs. A considerable amount of time can be spent on better understanding each piece of the PIT. However, as IHEs become increasingly reliant on federal funds to address increased institutional spending and state budget cuts, state law-makers, politicians, the media, and consumers alike are questioning the value of a college degree (Campos 2015; Hacker 2003; Grasgreen 2010). Indeed, the extent to which IHEs are held accountable and measure their performance as a result of this federal requirement makes accreditation a key component of understanding management and performance in HE.

Today, the federal government (specifically the U.S. Department of Education (USDOE)) does not accredit IHE's directly. Instead, the U.S. DOE's role is to recognize third-party or state-run accrediting agencies as a "reliable authority as to the quality of education or training offered" by an IHE (Hegji 2014, 20). This regulation is specifically defined as The Secretary's Recognition of Accrediting Agencies (34 C.F.R. 602), and falls under the broader governing law of the reauthorized Higher Education Act (HEA) of 1965. Thus, the primary actors in IHE accreditation are the federal government (by way of the USDOE), accreditation agencies, and the educational institutions themselves. Nevertheless, there are secondary actors also involved in accreditation. These actors include 1) political leaders and congressional lawmakers who work to formulate and amend accountability standards, 2) units within the Department of Education such as the Accreditation Agency Evaluation Unit and the National Advisory Committee on Institutional Quality and Integrity, 3) as well as state, other governmental, and external organizations that also gauge the effectiveness of accreditors and institutions, such as The Council for Higher Education Accreditation (CHEA).

Turning the focus more specifically to Title IV accreditation policy, a similar arrangement between the federal government and accrediting bodies has persisted since HEA's passage in 1965, with relatively little changes until the early 1990's. As Hegji (2014) describes, "between the 1965 enactment of the HEA and its reauthorization in 1992, accrediting agencies were required to be recognized for Title IV purposes, but the HEA specified few, if any, criteria for [USDOE] recognition" (p. 9). The HEAs reauthorization in 1992, however, laid out stricter guidelines for accrediting agencies (AAs) to be recognized. With the addition of HEA Section 496 (P.L. 102-325), the federal government required that AAs begin to assess specific IHE standards (e.g., enrollment and recruitment data, matriculation, retention & attrition, employability rates, etc.), being reauthorized in 1998 and again in 2008, as part of the Higher Education Opportunity Act of 2008. Although there have been several amendments to the HEA (as mentioned previously), Title IV of this

policy continues to dictate the role of accreditation for IHE. Today, IHEs continue to have wide latitude in how they choose to be in compliance with mandated performance metrics, but generally manage their organizations based on requirements stemming from AA's and the HEA and AA's; these goals include:

- Student achievement and outcomes,
- Curricula, program/degree objectives and length,
- faculty and administrative characteristics and practices,
- student support services and facility capacity,
- recruitment and adminissions activities,
- and financial compliance (Hegji 2014).

The intended goal of the recognition of accrediting agencies is to ensure that accreditation bodies are a "reliable authority as to the quality of education or training offered" at IHEs (SRAA 2008). When these standards have been deemed to be met by the Department of Education and Secretary of Education, the institutions in which those accreditors assess are eligible to receive Title IV funds (including funds from other various federal programs). Ultimately, the broader goal of HEA's section 496 is to hold both AAs, and by extension IHEs, accountable to the public they serve. This circumstance has ultimately impacted the way in which IHEs measure and manage performance. Unlikely to go away are debates surrounding whether typically utilized metrics (student/faculty ratio, resources available, class size, retention, and graduation rates, employability) are sound performance indicators for IHEs. Nevertheless, it is important to recognize these goals because they inform the indicators that IHEs actively pursue and informs the primary variable of interest in the present investigation: graduation rates.

Summary

Many economic and social benefits have been derived from a robust public system of HE. As HE's footprint has increased since the late 18th century, so too have the perceived values attached to this public good. The number of goals to which IHEs are accountable are extensive, and the management strategies employed to meet them vary across IHE contexts. In addition to affecting internal management activities, these complex bureaucratic features of governance structures influence the way in which IHEs interact with their operating environment and vice-versa. Many studies investigating bureaucracy in an HE context focus on these external relationships, providing evidence of the role political, socio-economic, and structural factors have on state-level policy outputs (Archibald and Feldman 2006; Hovey 1999; Lowry and Fryar 2013; McLendon, Hearn, Mokher 2009; J. Nicholson-Crotty and Meier 2003; Okunade 2004; Tandberg and Griffith 2013).

Many of the public and individual benefits associated with HE cannot be realized unless students complete their degree; only 60 percent of the approximately two-million students that enroll in HE every year obtain their degree (National Center for Education Statistics 2019). Thus, understanding which management strategies universities can use to ensure students graduate is of great societal importance. However, few studies endeavor to study institutional and environmental features IHE alongside managerial influences on institutional-level measures of performance; a central pursuit of the present investigation.

To facilitate the understanding of how management might impact graduation rates, the next Chapter begins with describing the theoretical foundations of public management as well as more contemporary understandings of the relationship between management and organizational performance. This chapter also introduces the OTM framework, and then examines its relative utility to unpack management factors associated with performance by reviewing previous studies utilizing OTM and current gaps in knowledge. By building on the historical and contemporary

foundations presented up this point, Chapter 2 moves to provide the rationale for fully operationalizing the OTM framework by making the logical connection between performance and management in a public HE context. This link illustrates the practical importance associated with this vein of inquiry and facilitates the presentation of the proposed conceptual model that illustrates the theory underpinning the proposed relationship between public management and organizational performance in the context of this study. The second chapter concludes with the formulation of hypotheses associated with research questions driving the current study.

2

Literature Review

Introduction

A basic definition of public management is the means through which government pursues its goals. Two primary perspectives have informed study and practice of public management over the past forty years. The first seeks to explain public management through governance and emphasizes the role of networked or resource dependent relationships. In this conception, coordinated and cooperative relationships are critical as stakeholders aid in policy formulation and public agencies endeavor to achieve policy goals (Agranoff and McGuire 2001; Lynn, Heinrich, and Hill 2000). The second view of public management deemphasizes public administration's role in the policy process and holds that the activities of government can be conceived from intra-organization principles of New Public Management (NPM). NPM advocates that provided a clear set of objectives, the agency role is confined to the efficient and effective implementation of governmental services to achieve the goals of government (Klijn 2012). NPM is also heavily associated with

the performance management movement of the early 1990's and development of the numerous performance standards presently observed throughout the public domain today, such as the regulation of HE (Osborne and Gaebler 1992).

While critics continue to debate the merits of governance and NPM and each perspective's ability to best understand management in public administration (Meier and Hill 2005), features of both are often observed in contemporary theory and practice. Public-private partnerships serve as a good example of the merging ideas surrounding governance and NPM approaches. As Klijn (2010) explains, more effective and efficient policy outcomes are sought through cooperation in these relationships, where both private and public actors share resources and costs in the pursuit of mutually beneficial and clearly defined goals. A key take-away from this understanding is that both NPM and governance approaches in are useful lens to study modern public management. Indeed, these perspectives serve as the foundation to the current investigation, informing both the OTM framework as well as the conception and management of performance in HE.

In summary of the goals of this chapter, the following sections proceed in the following manner. The first section draws on early public administration scholarship in order to retrace the origins of public management and subsequently describe its current state as a field of study. After describing the historical antecedents of public management, attention is then given to more recent work exploring the relationship between public management and performance. Specifically, the next section presents the OTM framework and explores how components of the framework have been used to enhance an understanding of management's impact on performance. The utility of the framework is further examined in the context of HE, resulting in the specification of the conceptual framework driving the current investigation. Final sections of this chapter summarize existing gaps in the public management and higher education literature, concluding with the research questions and hypothesis generated in the present study.

Foundations

As the industrial revolution catalyzed the modernization of society and the labor force, early management and public administration (PA) scholars (Taylor, Frederickson, Weber) sought to understand how organizational structures could enhance worker productivity and organizational outputs. However, other scholars (Simon, Maslow, Barnard, Mayo) associated with the Human Relations movement insisted that a focus on structural arrangements neglected the social and human elements of organizations. Importantly, this line of thought highlighted the important role of organizational leaders to manage not only work flows, job specialization, and reporting lines, but also to identify and manage worker motivations and navigate employee relations in order to achieve organizational goals.

Theories of scientific management reinforce such concepts and sought to identify their underlying principles of effective and economic organizations. These principles emphasized the importance of managerial control, clear divisions of organizational labor in order to achieve effectiveness and economy (Taylor 1919). Weber further posited that the modernization of society has led to a demand for efficiency, predictability, and mechanism. No longer was society relying on culturally driven decision making by the turn of the nineteenth century. Following his observations, Max Weber believed that bureaucracies should be organized according to rational principles in order to be efficient. Specifically, bureaucracies should be fixed and ordered by rules/laws that regulate the administration of government. Paramount to this argument was the need for an established hierarchy, in which authority flows top-down.

Similar to both Taylor and Weber, Gulick (1937), believed that the scientific method should be used to improve organizational efficiency. He also held that a well-managed, efficient bureaucracy would provide the best form of a responsive, democratic government. One of his most notable contributions to principles of

management is known as his emphasis on planning, organizing, staffing, directing, coordinating, reporting, and budgeting (PODSCORB). Nevertheless, Gulick was less convinced that solely top-down, rule driven organizations were feasible. Instead, he asserted that in order to be efficient, organizations should be a combination of both top-down and bottom-up approaches. Moreover, strict rules and clear divisions of labor were not always possible (sometimes, work we engage in is not naturally divisible). Although limiting political influence in the administration of government is important, there should be a unity of command and clear communication channels of among organizations (organizational members).

However, the perceived utility of scientific management principles to enhance organizational performance became less clear as the 20th century unfolded. The introduction of the human relations movement, coupled with the blurring of public/private sector jurisdictional boundaries, cast considerable doubt on the ability of managerial efforts to improve performance by emphasizing hierarchical structures and job specialization. Following major growth in the public sector and population after the Second World War, rigid management principles were clearly unable to curb widespread corruption, nor address the formation of intergovernmental networks complicating bureaucratic capacity (Frederickson 1999). Consequently, Principles of NPM sought to address these changing dynamics in the administrative landscape by correcting the perversions of merit and public service with a renewed emphasis on the purpose of governmental administration and need for greater accountability in the public sector (Light 1999).

Public Management and Organizational Performance

Contemporary Public Management is conceptualized as [often] purposeful efforts to achieve shared objectives and goals through the coordination of relevant actors and resource (Brudney, Hebert, and Wright 1999). Central to this argument is that the various roles of management impacting performance span structural, psychological, and social/cultural dimensions. In terms of structure, Gulick and Erwin

(1937) held that management could improve organizational performance by optimizing efficiency. Eternalized as POSDCORB in their 1937 "Notes on the Theory of Organization" work, Gulick and Erwin detail how executives (i.e., managers) may create an organizational hierarchy by dividing an organization's functional processes into subunits (i.e., departments), coordinating subordinates' specialization and workload, and by creating a clear chain of command, communication, and authority. In other words, managing the structural elements related to organizational inputs and processes would ultimately allow organizations to attain desired goals of efficiency. Efficiency, however, is but one performance criterion among many others.

Hierarchy, Networks, and Organizational Stability

Unlike much of the private sector, managers in public settings pursue numerous additional goals that are not straightforward nor solely dependent on institutional structure. While the administration of government for public goods and service delivery are expected to be efficient and economical, values of social equity, ethics, and effectiveness are also important organizational goals (Frederickson 1996; 2010; Norman-Major 2011). Given the publicness of these goals, and the agencies that pursue them within complex institutional contexts, public management requires more than an internal focus (Kettl 1993; Milward, Provan, and Else 1993). According to Frederickson (1999), these complex environments conflict with stability that is sought through hierarchical arrangements, such as overcoming information asymmetries and the maintenance of networked relationships and goals. Simon (1976) expands on inward management's limitations but acknowledges that managing institutional structure is useful when organizational goals are singular, and the environmental circumstance are clear. In such cases, a "substantively rational" solution to management is achievable (Simon 1976, 66).[1] However, managers' cognitive capacity notwithstanding, an important feature of

[1]As Simon (1976) contends, economic approaches to management are reflective of singular organizational goals often observed in the private sector.

public organizations is that they operate in complex public environments. Thus, managements' coordination efforts may occur outside of the formal hierarchical vacuum. For instance, public agencies and programs often occupy multiple settings, coordinate and link with other agencies and subcontractors, as well as develop and carry out governmental functions in politicos' omnipresence (Agranoff and McGuire 1998; O'Toole 1997; Provan and Milward 1995). Consequently, managerial needs may appear outside of the institutional context within network settings (Brudney et al. 2001; Milward and Provan 2000; O'Toole and Meier 1999; O'Toole 1986).

Considering diverse organizational settings such as networks, the extent to which management impacts performance is contextually dependent. On one hand, public managers affect, and are affected by, the presence of structural constraints (O'Toole and Meier 1999; Simon 1976). Here, constraints are defined as factors impeding managerial efforts related to organizational performance (Rainey and Steinbauer 1999). On the other hand, because structural contexts vary, public managers must deal with constraints and opportunities within and outside of their organization. Adding network elements to these institutional contexts "increase[s] the range of potentially manipulable variables subject to managerial influence. At the same time, however, networks also increase uncertainty and decrease institutional fixedness for all actors in the setting. Managers have more levers available, but so do others" (Brudney et al. 2001, 20). In the presence of such contextual dependencies, a clear understanding of *how management matters* for organizational performance has begun to materialize but remains underdeveloped across different organizational contexts.

O'Toole and Meier Management Framework and Application

Perhaps the most significant progress to formally model the complexities of public management has been made by Laurence O'Toole and Kenneth Meier, referred to

as the OTM framework. This framework features many of the elements of public management impacting performance (O'Toole and Meier 1999). The following section unpacks this complex relationship by describing how various management terms in the framework correspond to and account for performance. To initiate this endeavor, features of the OTM framework are summarized in the following equation:

$$O_t = \beta_1(S + M_1)O_t - 1 + \beta_2(\frac{X_t}{S})(\frac{M_3}{M_4}) + \epsilon \tag{2.1}$$

where,

O = outcome measure of performance,

S = measure of organizational stability,

M_1 = internal managerial efforts and maintenance of stability,

M_3 = management's efforts to exploit the environment,

M_4 = management's efforts to buffer environmental shocks,[2]

X = a vector of environmental forces, and

ϵ = an error term capturing variance unexplained by the model,

while other subscripts denote time periods, and β_1 and β_2 are estimable model parameters (O'Toole and Meier 1999; S. Nicholson-Crotty and Meier 2004).

Stabilizing Influences of Performance. The first concept examined in the OTM framework accounts for the potential of structural elements to influence performance, denoted as the S term in the model. In the initial conception of the framework, OTM initially define this term as hierarchy which is a structure concept that entails the authority to compel. Similar work in this vein of research refers to this term as a stabilizing or buffering agent of performance, where stabilization is the product of the formal authority to compel. Hierarchy can provide "institutional

[2] M_2 is used to capture two aspects of management's contribution to dealing with the environment by employing buffering or exploiting strategies intended to maintain or enhance performance. Thus, M_2 =M_3/M_4. (S. Nicholson-Crotty and Meier 2004)

support for routines, information systems, values, and further the operational status quo. Sometimes, stability can also hinder performance when flexibility or adaptability is needed" (O'Toole and Meier 1999, 508). Organizations and other public programs located within a single agency are more hierarchical and thus, might be considered more structurally stable. When organizations and programs span multiple agencies they are considered less hierarchical and more networked.

Although these modes of institutionalization are related, O'Toole and Meier (1999) note that it may be less important to distinguish hierarchy and networks, but more-so to differentiate related aspects of structural stability-instability. O'Toole and Meier (2003) describe stability as containing several "related but distinguishable dimensions" (45). The concept of structural stability refers to the extent to which organizations' formal and authority structures endure throughout their existence. In turn, mission stability refers to the consistency of organizational goals. While organizational goals may largely stem from the interests of authorities within the organization's broader operating structure (i.e., state-legislatures), some goals that individual institutions pursue are subject to less permanence. The specific goals of these organizationally embedded units or offices may instead be seen as the means by which broader organizational performance goals are achieved, but they are likely more subject to managerial influence and change; O'Toole and Meier (2003) refer to this concept as procedural stability.

Yet another form of stability is what O'Toole and Meier (2011) refer to as production or technology stability, or the extent to which an agency adapts to, invests in, and subsequently utilizes technology (see also O'Toole Jr. and Meier 2003). Lastly, and perhaps the most straightforward form of stability is personnel stability. Even if "structural and procedural aspects" and goals of an organization change relatively little over time, administrative changes do influence organizational performance (O'Toole and Meier 2011, 136).

A term closely related to stability in Equation 2.1 is the concept of management's contribution to organizational stability. "One crucial task of management

is to maintain the structure: to frame the goals, to set the incentives, and to negotiate the contributions from members from those with whom the system interacts (Barnard 1938; Simon 1976 as cited in O'Toole and Meier 1999, 517). Denoted as M_1, this term captures the impact of managerial efforts under different contexts of system stability. This term appears in the model as S + M_1, and thus means that as organizations become more centralized (hierarchical), the effects of managerial outputs on organizational stability and subsequent performance may be less impactful as opposed to managements' potential influence in more decentralized systems.

O'Toole and Meier (2003) test the effects of stability on organizational performance. Importantly, they widen their earlier notion of hierarchy (see O'Toole and Meier 1999) to include a broader set of personnel-stability factors affecting students' standardized test scores. These two factors measure stability by incorporating the school district superintendents' length of tenure and teacher turnover levels. Relying on prior extensions of the OTM framework, O'Toole and Meier (2003) also incorporate variables capturing management factors such as degrees of professionalization, quality, and recruitment efforts, as well as management and environmental factors such as resources and expenditures, student characteristics. Findings suggest that factors of stability and quality management with an emphasis on networking relationships directly, and interactively, positively affect performance. Additionally, control factors such as managements' effort to pay teachers more and increase the teacher student relationship had positive effects on performance as well. Conversely, increases in instructional spending, the number of Latino or low-income students, and the number of non-certified teachers negatively impacted performance.

Meier and O'Toole (2002) also conduct the first large empirical study testing the effect of managerial quality on organizational performance. Utilizing data from over 1000 Texas school districts ranging over a five-year period, the authors test the impacts of superintendents' salary on a broad inventory of performance

metrics such as students' standardized tests scores. Prior to testing this relationship, Meier and O'Toole (2002) first assess the validity of their proposed measure of managerial quality by regressing district characteristics, personal characteristics, and past performance on managerial salary.[3] As results suggest a sound measure of managerial quality, the authors then test its affect on organizational performance. After controlling for environmental factors (student socio-economic and demographic factors) and as well as superintendent management strategies (i.e., teacher qualifications and instructional expenditures, quality of relationships with parents and the broader community), results suggest that the quality of management matters for performance. Indeed, Managerial quality positively and significantly impacts performance, despite this relationship being somewhat attenuated through network-related support (Meier and O'Toole 2002, 639).

Personnel stability can also enhance organizational performance directly, but also by interacting with other management and environmental factors (Nicholson-Crotty and Meier, 2003; O'Toole and Meier 2003). In more centralized structural contexts, agencies that provide critical societal functions and garner political support may be shielded from budget-cuts during economic recessions. Consequently, these agencies are able to retain personnel resources necessary to carry out administrative functions.

The relationship between performance, stability, and other related internal management factors has also been tested using the OTM framework in other public agency settings. In S. Nicholson-Crotty and O'Toole's (2004) examination of 544 public law enforcement agencies, the authors consider how leaders influence clearance rates through internal managerial outputs (officers educational requirements and training, technological and compensation support, and the presence of

[3]These factors include revenues and tax rates, human capital, past experience and length of tenure, age, race, and standardized test scores from the preceding year (Meier and O'Toole 2002, 634-635).

thorough and clearly defined procedures) and managerial strategies in their organizations' environment (patrols, outreach, and education programs in the community). Other factors suspected to influence performance included a one-year lag of clearance rates and features of the environment (resources, constraints, and demographic controls). After controlling for the large positive effect of prior performance, the authors find that both internal and external management activities can also positively impact performance. In addition to these direct influences, results from subsequent models highlight how interactive components of the OTM framework are also important for understanding performance. Results suggest that the impact of the prior year's performance on current clearance rates attenuated when managers engaged in more activities "designed to improve organizational processes" (Nicholson-Crotty and O'Toole 2004, 13).

In addition to generally supporting theory surrounding the OTM framework, findings from Nicholson-Crotty and O'Toole's (2004) work also indicate that when managers emphasized more externally oriented agency activities, police departments dampened environmental constraints' (crime rates) negative impact on performance (Nicholson-Crotty and O'Toole 2004). However, less clear from results is an understanding of how external management affects performance in light of other internal-stabilizing organizational features.[4] Accordingly, the following section turns attention to the relationship between environmental management and public agency performance.

Management in the Environment. It has been described thus far that organizational maintenance and stability influence organizational performance (O'Toole and Meier 1999). Stability also influences performance through its relationship with other forms of managerial strategies in an agencies operating environment. Indeed, O'Toole and Meier (1999) frame hierarchy as the extent to which managerial action is institutionalized but at the other end of the hierarchy continuum are

[4]Nicholson-Crotty and O'Toole (2004, 6) contend that internal structures vary little across police departments, and thus do not directly test this stabilizing feature of performance.

managers who operate more autonomously from institutional rules and structures. As opposed to more centralized public agencies, managers of more autonomous organizations are likely to more dramatically affect organizational performance (O'Toole and Meier 1999). In turn, the strategy of these managers to focus more on internal organizational management versus more external, networked management has substantial impacts on performance. Greater centralization might buffer agencies from external political and economic influences, but a focus on internal management activities within less hierarchical public agencies can mitigate the impact environmental shocks have on levels of performance.

O'Toole and Meier (1999, 2003) argue that leaders of less centralized agencies can induce greater stability by choosing to manage more internal organizational aspects such as day-to-day operations. In turn, greater stability allows organizations to better buffer against the potentially detrimental effects that environmental shocks can have on performance. Conversely, a greater managerial emphasis on networking may leave organizational performance more vulnerable to shocks and especially for agencies operating in less hierarchical and decentralized structures. O'Toole and Meier (1999) provide a compelling rationale for how management matters for organizational performance. Management's impact on performance is greatly dependent on externally oriented strategies that managers employ, but also contingent on the degree to which the organization's structure and steadying management actions promote stability.

Stemming from Meier and O'Toole's (2003) examination of performance in K-12, it can be argued that greater levels of street-level discretion may occur in less centralized structures. Based on the OTM framework (O'Toole and Meier 1999), the presence of more networking activity is associated with an absence of hierarchy. Although the authors do not directly test structure, they do find that performance is higher for schools in which administrators are more actively managing

networks.[5] Specifically, when managers engaged in more networking activities, their school districts were perceived to have higher levels of support from other important network actors (parents, school board, community). In turn, the authors contend that greater levels of support enabled school districts to attract more qualified teachers by offering higher compensation, among other performance enhancing factors. An implication of this finding is that in certain structural contexts, public managers can exercise discretion to meet policy goals by fostering relationships with networked actors involved in the policy process.

This finding also turns attention to stabilizing features of management that can offset environmental shocks threatening an agency's ability to maintain levels of performance (Meier, O'Toole, and Hicklin 2010; Meier and O'Toole 2003; 2008). Such disturbances to the operational status quo can include a sudden loss of revenue, natural disasters, or other economic and social changes affecting the technical and political demands that an agency may face.

O'Toole and Meier (1999) define factors or shocks in the environment as those forces that may be exogenous in nature but can ultimately create organizational instability. Such events can be a one-time occurrence or a series of discrete events such as budget hearings, while other events are more subtle and are slow to change bureaucratic functions (O'Toole and Meier 1999, 519; Wood and Waterman 1993). Because bureaucrats are responsible to political principals and subject to various levels of control (Wood and Water 1991), a common thread shared across event types is their ability to limit an organization's ability to achieve its goals. Meier, O'Toole and Hicklin (2010) examine the impacts of (literal) environmental shocks on organizational performance and the extent to which management can diminish the negative effects of such disturbances. Utilizing K-12 Texas School district data, the authors test whether two major natural disasters (Hurricanes Katrina and Rita during year 2005) negatively impacted two measures of organizational

[5] In their study, Meier and O'Toole (2003) define performance as the percentage of students passing standardized state tests. Additionally, the term administrators refer to school district superintendents.

performance post-disaster: the rate at which schools resumed normal operations and standardized test scores. Both weather events led to disruptions in school district operations and strained public resources. For instance, displaced residents from neighboring Louisiana were relocated to Texas and resulted in an influx of students enrolled in the state's school districts.

Based on their findings, Meier, O'Toole, and Hicklin (2010) note that there are two different approaches that organizations may take to address environmental shocks; managers can utilize buffering strategies to prevent shocks' impacts from "penetrat[ing] the boundaries of the organization" or organizations can manage the effects of a shock once infiltration occurs (Meier, O'Toole, and Hicklin 2010, 981). Buffering strategies can be conceived as management actions seeking to expand organizational adaptability by making administrative processes less centralized to inhibit shocks affecting core agency functions. If shocks are dealt with after organizational infiltration, then administrators may turn to management tools that are more readily available such as streamlining operations or furloughing personnel. In practice, organization's never fall into just one category as a sole focus on either approach would be detrimental to performance. In other words, public organizations are unable to completely buffer against certain shocks (i.e., natural disasters or budget restrictions), but an absolute buffering strategy would "create an internally close system that would limit organizational learning and change" (Meier, O'Toole, and Hicklin 2010, 981; Lynn 2005).

The authors find that both shocks had overall negative and statistically significant impacts for performance. As found in previous studies (Meier and O'Toole 2003), however, this relationship was not observed across all school districts. In a K-12 context, finds suggest that that increases in structural stability (relative size of central management staff) and internal human resource management (stability in teaching staff) completely eliminate the negative impacts of those shocks

on performance. Interestingly, when just one of these factors are at higher levels,[6] practically significant decreases in performance were not observed. It is not clear from this work which elements of structure are more important drivers of performance stability.

Meier and O'Toole (2008) also examine impacts of the relationship between environmental forces and management strategies on organizational performance. Again utilizing data collected on Texas K-12 education districts ranging from year 1995-2002, the authors develop a measure of buffering based on organizational structure (termed stability as described in O'Toole and Meier 2003) and managerial efforts to pursue possible opportunities and mitigate potential constraints in their environment perceived to impact performance. The authors indirectly capture buffering by measuring the extent to which the effects of environmental shocks linger. For organizations' exhibiting greater buffering, the magnitude of such shocks should diminish over time. Conversely, the level of impact these shocks have on performance will decrease at a lower rate for organizations' that tend to be more decentralized. The environmental factors specified in Meier and O'Toole's (2008) study include measures of school resources (state aid, teacher salary, class size) and student characteristics such as socio-economic factors and race. Results suggest that buffering tends to have a significant positive relationship on overall performance, but to an even greater extent for students from potentially disadvantaged backgrounds.

The importance of the research presented thus far has several theoretical and practical implications as it relates to the use of the OTM to understand management's contribution to performance in HE. Prior to developing these implications further, it is first necessary to review literature in HE describe how elements of OTM framework are conceived in HE scholarship.

[6]As M and H (or S) is an interaction term in Equation 2.1

Literature in Higher Education

A great deal of HE literature relevant to the present study examines social, economic, and political factors affecting state-level policy outputs, such as state budgetary policy (Archibald and Feldman 2006; 2008; Delaney and Doyle 2007; Hovey 1999; McLendon, Hearn, and Mokher 2009; McLendon 2003; Lowry and Fryar 2013; Lucas 2006; and Okunade 2004). Many of these studies have borrowed existing frameworks found in veins of the political science and economic literatures, such as institutional rational choice (King and Dowding 1995; March and Olsen 1984; Ostrom 1991; Shepsle 1979), policy decision frameworks (Baumgartner and Jones 1993; Kingdon and Thurber 1984), and budgetary determinants frameworks (Key 1940; Rubin 2009; Sharkansky 1968; Thompson 1987; Wildavsky 1964). Relatedly, a handful of other studies have narrowed these foci to understand political and structural elements' impacts policy outputs in HE (Archibald and Feldman 2006 ; Dar 2012; Lowry 2001 ; McLendon, Hearn, and Mokher 2009; J. Nicholson-Crotty and Meier 2003; Rizzo 2004; Tandberg 2010). As Tandberg and Griffith (2013) summarize, literature focusing on structural aspects and principal-agent relationships "argue that institutions define the goals, meaning and actions of individuals who are interacting within governments and therefore impact the decisions and outputs of governments" (647). In review, the two presented areas of HE literature are discussed in the following section and will inform the current investigation examining management's impact on performance. Developing an understanding of the nature of this relationship from a HE perspective will also aid in the identification of factors that capture aspects of the OTM framework, as well as the development of the conceptual model and hypotheses tested in the present study.

Higher Education Policy Outputs

Because of the perceived societal importance of public HE, as previously eluded in Chapter 1, a large body of HE literature seeks to address questions related to understanding variation in HE budgetary outcomes. Research suggests that variations in funding to higher education can be linked to state political, demographic, and economic factors (Archibald and Feldman 2008, McLendon, Hearn, and Mokher 2009; Okunade 2004). Thus, a good starting point for this section entails a brief primer on the state of HE finance to understand scholarship's focus on budgetary policy, as well as how available resources might affect the relationship between management and performance at IHEs.

Historically, public higher education received the majority of its public funding from state appropriations. Despite higher education's heavy reliance on state revenues, however, state funding has decreased over the past several decades (Carlson and Laderman 2016). From years 2003 to 2012, funding from state sources fell 9 percent, constituting only 23 percent of institutional revenue on average.[7] Much of the decrease in state appropriations can be explained by increases in enrollment, where state funding has failed to keep pace with the demand for a post-secondary education. National Center for Education Statistics (NCES) data show that total state and local spending per student [after adjusting for inflation] were four percent lower in 2007 than in 1979 (Lowry and Fryar 2013). During the same period, enrollment in public institutions increased approximately 49 percent; from 9.04 million in 1979 to 13.49 million in 2007 (National Center for Education Statistics [NCES] 2015). The enrollment figure climbed even higher to 14.75 million in 2013, possibly as a consequence of the 2008 recession (Kena et al. 2015). Taking into consideration that state funding appropriations can account for approximately half of an institution's revenue, decreases in state funding can have dramatic impacts on

[7]State funding is defined as revenue received through state appropriation laws or through grants, and contracts from state government agencies.

an institution's ability to meet demand (State Higher Education Executive Officers' Association 2014).

To counteract decreased state funding, many public universities and colleges began shifting the economic burden to consumers of education. From 1979 to 2008, tuition and fees increased 129 percent, arguably playing a major role in the record levels of current student debt (Lowry and Fryar 2013). Raising tuition prices also raises several concerns regarding access, academic quality, and social equity (Lucas 2006). Students from low-socioeconomic and minority backgrounds may particularly have trouble in shouldering higher costs (Archibald and Feldman 2006). Moreover, Klor de Alva and Schneider (2011) argue that institutions serving underrepresented populations tend to have the lowest levels of tax-payer support. Given these populations' inability to pay high tuition prices, coupled with decreases in state support, many may never realize the value of HE.

Higher Education Finance

Some of the earliest work exploring budgetary policy determinants in state public HE was conducted by Lindeen and Willis (1975). These authors found that state demographic (e.g., population size and density, age), economic (e.g., urbanization, income, and employment), and political (e.g., voter support, partisanship, centralization, formal powers) factors explain a large proportion of variability on state HE funding patterns. A similar study conducted by Peterson (1976) corroborate these findings. However, other scholarship during 1990's (Layzell and Lyddon 1990) took a more narrow focus on specific determinants. Stemming from the work of earlier budgetary scholars such as Wildavsky and V.O. Key, authors' of more recent scholarship posit that past state appropriations and demand for higher education (i.e., enrollment levels) are the primary factors explaining state policy outputs for higher education.

Recent scholarship from McLendon, Hearn, and Mokher (2009) draw on post-secondary finance, post-secondary organization and governance, and comparative-state politics. Through this process, the authors identified several key environmental, process, and individual preference factors that possibly explain state higher education expenditures: "political-system characteristics, state economic conditions, state demography, higher-education policy conditions, and post-secondary governance arrangements" (McLendon, Hearn, and Mokher 2009, 689). Findings indicate that several political factors had statistically significant effects on state higher education spending. Specifically, factors that tended to significantly decrease higher education spending included states that had increases in republican legislature compositions and republican governors' with greater gubernatorial power. Conversely, factors that significantly increased higher education spending included when states had greater legislative professionalism; imposed legislative term limits; and greater higher-education interest group density.

McLendon, Hearn, and Mokher (2009) also observed that state economic conditions can impact state funding of higher education. Their work indicated that increased state unemployment rates corresponded to decreased state higher education expenditures. Other factors found to be associated with decreased state funding included increases in populations aged 18-24 and over 65 years old, as well as increases private institution enrollment. Conversely, increases in state higher education funding corresponded with increases in two-year public institutional enrollment. Taken together, such findings are important because they highlight the important role that environmental, policy-making processes, and individual actor strategies/preferences have in influencing policy outcomes in higher education.

Environmental and Structural Features

The degree that IHEs interact and may influence decision processes within the public domain depends on the extent to which institutional activities are coordinated and governed. In federal-state settings, contemporary theory and suggests that both internal factors (i.e., institutional rules and personal characteristics that influence budget actor preference) and external factors (i.e., economic, institutional, or economic factors influencing, but external of, the budget process) affect policy outcomes (Key 1940; Rubin 2009; Sharkansky 1968; Thompson 1987; Wildavsky 1964). In a similar vein, frameworks derived from institutional rational choice (King and Dowding 1995; March and Olsen 1984; Ostrom 1991; Shepsle 1979) emphasize the importance of internal and external institutional factors, and individual attributes, which interact to influence individual decisions.

This more recent scholarship in HE has manifested into the broader theoretical development of state politics and institutional structures (Archibald and Feldman 2006 ; Dar 2012; Lowry 2001 ; McLendon, Hearn, and Mokher 2009; J. Nicholson-Crotty and Meier 2003 ; Rizzo 2004 ; Tandberg 2010; Weerts and Ronca 2008). Just as within IHEs' operating environments, environmental constraints and incentives also affect state-level decision-making process as policymakers weigh various costs and benefits in order to maximize self-interests (Tandberg and Griffith 2013).

In decision-making environments at the state-level, Cummins (2012) found that states with term limits tended to have decreased budget balances. Other research finds provide evidence that legislative term-limits were shown to have a positive impact on policy outcomes for state higher education, where McLendon, Hearn, and Mokher (2009) credit these findings to the belief that newly elected legislators are more susceptible to the influences of higher education interest groups, thus are more likely to support increases in funding. The important role of actors in the policy-process has been noted by other scholarship as well. Similar to

findings in finance studies conducted by Rubin (2009) and Tandberg (2010), Ryu et al. (2008) make particular note of the importance surrounding the individual attributes of budgetary actors. They provide evidence that the personal characteristics of state political actors influences their policy preferences and resulting policy outcomes.

A person's characteristics, such as personal convictions and sympathies, may compel legislators' decisions to appropriate more state funds to HE (Tandberg and Griffith 2013; Pascarella and Terenzini 2005). Interestingly, a quite recent study conducted by Chatterji, Kim, and McDevitt (2018) lend support to this notion. Results from their study suggest that states containing more legislators who graduated from an in-state IHE tended to allocate more to those legislators' specific alma-maters. Indeed, for every legislator who attended an in-state public IHE, states' allocated an additional 3.5 million dollars in funding to that school. On similar front, highly professionalized agency actors may also indicate better managerial networking activities in HE policy; where relationships with state-lawmakers allow agency leaders or other advocates of HE to best identify the political levers necessary for enhanced funding (McLendon, Hearn, and Mokher 2009). While the identification of more specific causal mechanisms exploring the relationship between legislative professionalization and state funding warrants further research, data do suggest a substantive influence.

In addition to the role of policy actors, other work related to finance in HE is more closely aligned with elements of the OTM framework and explicitly study policy outputs through the lens of bureaucratic structures (Knott and Payne 2004; McLendon, Heller, and Young 2005; McLendon 2003; J. Nicholson-Crotty and Meier 2003; Tandberg 2013). Specifically, these studies explore the ways in which higher education governance structures policy and administrative features of bureaucracy. Prior to reviewing this work, however, a description of these structural features first deserves attention.

To further specify this variable's adequacy, I turn to structural distinctions in HE forwarded in a report by the National Center for Public Policy and Higher Education (NCPPHE). This conception of HE structure falls into four system criteria:

> [1] Decisions about governance structures establish lines of authority and accountability between state government and providers; [2] Decisions about capacity determine the availability, quality, and location of educational programs and services; [3] Decisions about capacity determine the availability, quality, and location of educational programs and services; [and, 4] Decisions about work processes effect important day-to-day governance and administrative practices, including: (1) collecting and disseminating information about performance; (2) prescribing the framework for budgeting; (3) allocating responsibilities for monitoring program quality and redundancy; and (4) providing arrangements for encouraging higher education institutions to see themselves as a system and to work together on such tasks as school-to-college transitions and student transfer. (Richardson et al. 1998, 7).

McGuinness (1997; 2003; 2016) has expanded on these elements over the past two decades to reflect a changing structural landscape of greater state centralization. Three types of governance structures are identified in this work, and include: 1) consolidated governing boards, 2) coordinating boards, and 3) state planning agencies. McGuinness' research explains that HE in some states is governed by consolidated governing boards and regulatory coordinating boards which make all academic and fiscal decisions for IHEs. Other state HE governance structures are relegated to only reviewing and proposing changes to such areas.[8] Informed by McGuinness' (1997) definitions, a succinct summary of governance structures provided by Knott and Payne (2004) elucidate the relevance of this bureaucratic feature in the present study:

[8]See McGuinness 2003 for typology of state governance in HE.

> Many policymakers see a statewide governing board as one means to regulate and hold universities accountable to statewide priorities. Such a governance structure is viewed as providing greater control over institutional missions, policies, and budgets and an opportunity for review and assessment of performance (McGuinness 1999; as cited in Knott and Payne 2004, 14).

So what does this definition tell us about structure, stability, and hierarchy? To address this question, this section now turns to research in the HE literature finding that state authority structures can affect an agency's administrative functions, managerial discretion, and ultimately impact policy outcomes.

In more centralized governance structures, state priorities are more likely to be reflected in resource allocation decisions. Generally, these priorities often "favor lower tuition and a greater focus on students rather than on research and faculty support" (Knott and Payne 2004, 28). For IHEs operating in more competitive state fiscal climates, however, greater centralization can diminish the level of resources available to them. In more centralized environments, government agencies deemed more critical to political interests and by extension, constituency demands, can receive larger shares of state appropriation funds (Okunade 2004). In turn, decreased revenue streams and the inability to raise additional funds through tuition can hamper an IHE's capacity to achieve policy goals. Indeed, Knott and Payne (2004) found that compared to universities in decentralized environments, IHEs subject to greater regulation and state centralization possessed few resources, produce less research, and received lower levels of funding. Lowry (2001) and Tandberg (2010), and McLendon, Hearn, and Mokher (2009) have similarly observed negative associations between IHE performance, available resources, and state centralization. The latter two pieces of scholarship also suggest that IHEs have greater autonomy and administrators can exercise more discretion; which raises an important implication for studying management's impact on performance in the present study.

J. Nicholson-Crotty and Meier (2003) distinguish between autonomy and centralization in state higher education governance structures. Building on work from Seidman (1975) and Meier (1980), this scholarship argues that political motivations largely drive organizational structures. Here, an agency's level of discretion to make appointments, direct expenditures, and regulate internal operations depends on the extent to which they are free of political control. This is not necessarily surprising, as professionalized agencies may be granted greater levels of autonomy because their political overseers do not perceive discrepant information-asymmetries or may be less concerned about accountability within those agencies (Ingram 1990; McCubbins and Swartz 1984; O'Toole and Meier 2000; Selznick 1948; Wilson 1991).

More importantly for this study, J. Nicholson-Crotty and Meier (2003) find that forms of structural stability in Higher Education can affect factors contributing to organizational performance. Specifically, their study tests the extent to which higher education governance structures permit political forces to influence institutional revenues. While results are largely mixed with no clear patterns of state centralization's impact on these policy outcomes, data do suggest that political factors can affect IHE revenues from tuition and state appropriations. Indeed, factors such as legislative professionalism, citizen and government ideology, as well as partisanship have non-negligible, direct linear impacts on HE policy outcomes.

Conclusion

Based on the review of literature in public administration, public management, and higher education policy, several areas of knowledge need further explication. From a governance perspective, it is clear that structure and networked activities play important roles for HE policy outputs. Less developed is the understanding of strategies IHEs pursue to manage performance, and to what end they enhance

performance, in light of structurally dependent relationships. Paradoxically, teasing out these complex features of bureaucracy has also challenged NPM perspectives because managerial strategies can vary across political, social, and economic contexts. Both NPM and governance and other contextual dependent perspectives found in the public management literature can benefit from further development (Klijn 2004).

An assessment of HE policy literature reveals a merging of many of the ideas found in public management and public administration but has tended to focus on the identification factors influencing state-level policy outputs. More recent HE scholarship has turned attention to policy processes and structural elements, including how agency autonomy and centralization attributed to these relationships can influence administrative activities and agency performance. Nevertheless, much of the work in HE finance is still in need of further development and "under utilizes" theoretical frameworks found in other disciplines (Tandberg and Griffith 2013). A more comprehensive understanding of how institutional structures, political and economic factors, and management strategies interact and directly influence performance is needed; especially in the policy area of higher education.

As discussed previously in this chapter, the research agenda of O'Toole and Meier has sought to address gaps in knowledge pertaining to the interactive aspects of management, environment, structure, and their relationship with performance. While findings suggest that management activities can affect performance, data limitations have often prevented the full inventory of factors in the OTM framework from being tested within a single empirical setting of one study. An explicit application of the full OTM framework within American HE is also lacking, which could prove as a fruitful endeavor to assess the validity of the model. Such an endeavor would also drive the identification of additional factors that have yet to be identified but might aid future research studying influences of HE policy (Tandberg and Griffith 2013).

The application of the OTM framework is the central focus of the present study and will be used to address the following broad research question being addressed; how do different approaches to management, in light of an organization's environmental and structural context, explain variation in graduation rates across universities? In addition to the perceived theoretical contributions of this study, issues of "of real social importance" regarding access, quality, and degree-attainment are also raised (Tandberg and Griffith 2013, 661). Specifically, why do only six out of ten students enrolling in higher education complete their degree (National Center for Education Statistics, 2019)? Thus, it is hoped that findings of this study may enable practitioners to understand how they can improve graduation rates for their students. In conclusion of this chapter, the proposed conceptual model of the OTM framework in the context of HE is visualized in Figure 2.1. The relationships depicted in the conceptual model are further elaborated at the in Chapter 3, prior to the presentation of hypotheses, measures, and the methods of inquiry guiding the current investigation.

[Insert Figure 2.1 about here]

Figure 2.1: O'Toole and Meier Conceptual Model

3

Methods

Introduction

The purpose of this study is to answer the following condensed set of research questions: Why do certain IHEs perform at higher levels than other IHEs? What influence do organizational, managerial, and environmental factors have on IHE performance? How do environmental, managerial, and organizational factors differ and interact across IHEs to influence performance? This chapter begins by explicating the logic underpinning each term of the proposed conceptual model presented in Chapter 2 and related hypotheses; which subsequently are followed by a summary of research questions and hypotheses pertaining to managements expected contribution to organizational performance. The remainder of this chapter culminates with a description of the methods of inquiry used to address research questions of this study, including the operationalization of variables and

data sources, sampling techniques, data collection procedures, and analytical approaches. All variables utilized in this study are contained in Table 3.1, and are further detailed later in the operationalization section of this chapter.

Specifying the Conceptual Framework

Dependent Variable (O_t)

As a measure of performance (the performance outcome, or O as specified in the OTM framework), individual university graduation rates are the dependent variable used in this study.[1] Graduation rates are obtained from the Integrated Postsecondary Education Database System (IPEDS-U.S. Department of Education) and represent the completion rate for full-time, first-time students who complete their degree within 150 percent of the expected time to completion (6-year completion rate). This measure is the most commonly used performance metric in American higher education and is codified into federal law (National Research Council 2012). Importantly, graduation rates capture core features of management associated with the OTM framework because they "also reflect the admission standards, the academic strength of the enrolled students, and the resources institutions devote to instruction, to remediation, and to retention" (National Research Council 2012, 138). While this may lend support to the use of this measure of performance, IPEDS graduation rates (IGRs) are not without limitations.

The first is that IGRs are cohort-based and reflect institutional graduation rates of only first-time, full-time students who began and have remained at that university. IHEs, including those in this sample, also recruit large number of other student types (i.e., part-time students, transfers, etc.). Such student types and their effect on administrative capacity and management may not be adequately

[1]As many evaluation or educational assessment specialists might understand, outcomes are what one hopes to achieve. While this seemingly appears as a straightforward definition, outcomes are often confounded with processes or, the things organizations do to achieve goals. Some may argue that graduation rates are a measure of process rather than other performance outcomes more closely aligned student learning.

captured in this study. Stemming from this, a second limitation is due to the "heterogeneity in student types and institutional missions" (National Research Council 2012, 138). Schools that enroll students of similar backgrounds, such as highly selective institutions (where enrolling similar levels of student types each year are already operating at capacity and are thus unlikely to make administrative changes contributing to performance level variability).

Beyond their theoretical importance, several measures reflecting student characteristics and management strategies are included in this study to control for these limitations, as described in the following sections. Additionally, even though the 166 IHE sample contains numerous highly selective institutions, the majority are more diverse in mission and selectivity. Beyond the potential for more variation in performance between these IHEs, this study does not include IHEs whose characteristics differ so dramatically that direct comparison would be severely limited (i.e., private institutions, community colleges, professional/technical schools, less than 4-year granting institutions).

Lastly, a one-year lag of graduation rates (O_{t-1}) captures the auto-regressive nature specified in the OTM framework and is utilized to control for the effects of past performance on current levels of performance. Although this measure is primarily used as a control variable, observed interactive relationships between past performance and other terms in the models tested are of theoretical importance. The hypothesis associated with past performance is as follows:

> ***Higher levels of past performance are positively associated with current performance.***

Justifying a Measure of Hierarchy/Stability (S)

As briefly discussed in Chapter 2, J. Nicholson-Crotty and Meier (2003) distinguish between autonomy and centralization in state higher education governance

structures, and assert that political motivations largely drive organizational structures. Here, an agency's level of discretion to make appointments, direct expenditures, and regulate internal operations depends on the extent to which they are free of political control. Professionalized agencies may be granted greater levels of autonomy because their political overseers do not perceive discrepant information-asymmetries or may be less concerned about accountability within those agencies (Ingram 1990; McCubbins and Swartz 1984; O'Toole and Meier 2000; Selznick 1948; Wilson 1991). The present study argues that the more autonomous a public agency is, the greater the impact that management has on organizational performance. Conversely, performance is less affected by internal management in organizations subject to greater political forces and control.

A notion mentioned at the beginning of this section, autonomy is related to centralization. As S. Nicholson-Crotty and Meier (2004) contend, more centralized public agencies allow lawmakers to devote more attention to the system as a whole. While this may lower transaction costs and promote information sharing, more fragmented and decentralized institutional arrangements might have the opposite effect. Institutions operating in a system aligned with the latter category also afford IHE administrators more autonomy and discretion when it comes to managing their organization. As conceptualized in Meier and O'Toole's (2003) examination of K-12 structures, higher levels of street-level discretion occur in less centralized structures. In the present study, this can be taken to mean that internal management within IHEs operate more independently from state control.

Importantly, literature reviewed in Chapter 2 suggest that state authority structures in HE impact policy outcomes for higher education. However, while such policy outcomes (state appropriations) likely influence (and are influenced by) organizational management and performance, linking structure to performance at the institutional level, as opposed to broader state policy outcomes, lacks empirical study. Public IHEs structures can be distinguished from one another because of this state-imposed structure. Admittedly, this measure of state authority and

governance structures may not capture all variation in the internal structures of individual IHEs. However, state IHE governance structures may be the best measure of hierarchy/stability that allows one to isolate management's impact on organizational performance in the context of the current study. Indeed, O'Toole and Meier (1999) concede that stability "is in part a function of hierarchy of the system" (513).

The measure of centralization used in this study was adopted from Knott and Payne's (2004) governance structure classification. Accordingly, each of the 166 IHEs were manually coded into three separate levels reflecting the degree to which governance structures are centralized. By extension, this measure captures the extent to which academic and budgetary authority for an institution is centralized and regulated at the state level. The lowest level of authority applies to institutions in governance structures that gives states little to no regulatory authority via coordinating or planning agencies. In governance structures of Moderate Authority, a state-level coordinating board may have either budget or program approval, but not both. Conversely, High Authority structures permit authority over both budget and program approval, and pertain to IHEs operating in states with either consolidated and/or coordinating boards. Because several different structure classifications exists (Hutchens 2009; McGuinness 2003; 2016) this measure was also cross-referenced with the Education Commission of the State's (Hurst et al. 2003; National Center For Higher Education Management Systems 2007) database to ensure coding accurately reflected governance structure types during the time-frame of this study (years 2002-2010). Prior to introducing hypothesized interactive relationships associated with this term, the primary hypothesis associated with the measure of Hierarchy/Stability (S) is presented below:

Higher levels of centralized state authority and governance structures are associated with higher graduation rates.

Justifying a Measure of M_1

In the present study, several proposed factors are intended to capture internal managements' contribution to organizational performance within IHEs. Aligning with O'Toole and Meier's (1999) notion of stability inducing managerial outputs, I propose using president's length of tenure as measured in years elapsed as president for each current-sitting university president. I also propose the incorporation of the president's educational background. While M_1 is generally conceptualized as overall internal management efforts undertaken within individual agencies, President's of less centralized IHEs arguably play a defining role in how universities manage human resources, structure internal operations, and develop strategic plans (i.e. written directives). With each new President (which occurs about every 5-6 years based on data in the present study), often come a reformulation of a institutional goals and a new vision for university operations (Basham 2010; Monks 2012). While many of these changes (i.e., strategic plans, university budget processes, university initiatives and human resource changes) may not be realized or fully implemented during the initial year of tenure, more time is likely associated with a better chance of realizing the new presidents' vision.

Similarly, presidents and other top-level administrators (i.e., chief academic officers or provosts) who have held their administrative position longer are more likely to successfully impact performance as they acclimatize to their new responsibilities, institutional norms and culture, build relationships with subordinates and other key university personnel (i.e., existing administrators and faculty) and affiliates (i.e. institutional governing boards, community and other agency partners). In a similar vein, university leaderships' educational background may also affect performance. For instance, a president with advanced degrees related to administration, governance, and the management of resources (i.e., business, public, non-profit management) may act to quicken the process of acclimatization. The same president may also have increased ability from outset of their appointment

to identify efficient and effective internal processes (e.g., internal staffing and reporting structure, allocation of university resources) that enhance performance and achieve broader policy goals . However, Monks (2012) found that university backgrounds in disciplines such as business change jobs more frequently than presidents with academic degrees in fields such as education. Several rationales unrelated to the present study are offered, however, this finding is important because organizational instability caused by managerial turnover can diminish performance (O'Toole and Meier 2003).

I also include human resource activities as a second set of internal management factors. This measure captures both administrative and instructional capacity, as measured by the number of full-time equivalent executive/administrative staff and faculty per 100 full-time equivalent students, respectively. On one hand, relative increases in the absolute number increase of full-time faculty and administrative staff may enhance organizational efficiency as well as the amount and types of resources available to support students. On the other hand, a bulkier and less experienced organizational structure may lead to greater conflicts of interest and stymie communication flows depending on how the top-level administrators have structured units along lines of authority, responsibilities, and communication (see O'Toole and Meier 2003). For IHEs operating in more centralized and stable state governance structures, increases in administrative staff should lead to increases in administrative efficiency as well as reduce the number of administrative activities that faculty engage in. In turn, this should also allow faculty to focus more on activities targeting organizational objectives that enhance graduation rates such as pedagogy and student development and support (Lovitts 2001; O'Keefe 2013).[2]

[2]Faculty responsibilities also include areas of research and service, of which may be more heavily emphasized at research intensive or more teaching-centered universities, respectively. Although existing empirical evidence found in the student development literature resents a strong case for the positive affect that frequent and quality faculty-student interactions can have student outcomes, the relationship between graduation rates and faculty-time dedicated to activities is less clear. Exploring these relationships may be a potential avenue for future research but are beyond the scope of this study.

To further capture the concept of resource management and student support, and to control for the fact that full-time faculty may have varying teaching, service, and research loads, I also include a third area of internal measures capturing institutional differences related to internal processes and student support. These measures include instructional expenditures per full-time equivalent student, research production (basic Carnegie Classification), land-grant mission, and average full-time equivalent faculty salary expenditures. Differences among these internal management features can influence IHE performance, such as the way students might be served in the "scheduling of classes, student services available, and extracurricular activities"; all of which can impact time to degree and graduation rates (The Carnegie Classification of Institutions of Higher Education 2014). Several of these measures also directly tap internal management strategies aimed to promote stability.

In summary, several hypotheses pertaining to internal management's (M_1) direct and interactive relationship with performance are presented below:

> ***Increased management activities designed to improve internal processes, student support, and organizational stability lead to higher graduation rates.***
>
> ***As internal management activities increase, the impact of past graduation rates on performance decrease.***
>
> ***After controlling for past performance, increases in state centralization decrease the impact of internal management activities on graduation rates.***

Justifying a Measure of M_2

This study proposes that IHE administrators engage in types of external managerial activity that also impact graduation rates. I use the term external to specify

two types of strategies employed by administrators to manage the broader organizational context in order to enhance performance. These factors include the steps managers take to capitalize on perceived opportunities, such capitalizing on an increased consumer demand for education during times of high unemployment. IHE administrators may increase marketing and public relations in order to enroll greater numbers of students. If increases in student enrollment correspond to increased institutional revenues, this would enable IHEs to provide a greater level of resources to students which foster the attainment of their degree. With the resulting increased financial capacity, management could then direct more resources to academic and career help centers or to expand technologies available to students. Providing education to a greater number of citizens may also enable managers to fulfill broader state-level policy goals regarding the role of higher education as a public good.

External management factors also entail the means by which administrators seek to buffer their organizations against environmental shocks threatening performance and stem from the broader social, economic, and political context in which they operate. Returning to the previous example, if unemployment levels remained consistently higher, shrinking state revenues may eventually incite lawmakers to decrease appropriations to public HE. In light of actual (or perceived) decreases in state funding that may strain resources and harm graduation rates, IHE administrators may seek to increase other sources of institutional revenue. Such managerial strategies could include an increased focus on alumni relations and fundraising activities or changes to recruiting and admissions policies in order to enroll more out-of-state students (who generally pay much higher tuition costs than in-state residents). By cushioning their institution from an environmental shock in this simplified example, I maintain that such managerial actions are a form of buffering as described in the OTM framework. However, environmental shocks may not always be directly connected to economic conditions. While an economic rationale may underlie many of these situations, it would be inappropriate

if we fail to consider the importance of political and socio-demographic factors that also likely influence managerial strategies and subsequently have implications on organizational performance.

Keeping in mind IHEs' broader political and social environmental operating context, take for instance a current issue of public salience: gender disparities. The extent to which managerial strategies effectively recruit, enroll, support, and retain female students affect the public's perception of IHEs. If a campus is a perceived by consumers as being primarily composed of males or embattled with sexual assault suits, potential students (especially females) may not desire to attend that institution. Unless management takes appropriate buffering steps, organizational performance may eventually suffer. On one hand, lower levels of enrolled female students likely harm institutional performance. Recent U.S. Department of Education data suggest that females are more likely to graduate than their male counterparts (National Center for Education Statistics 2019). On the other hand, a public institutions' perceived inability to adequately serve all citizens could lead to public outcry and dissatisfaction. Whether based on moral, electoral motivations, or catalyzed by media attention, law-makers may choose to punish an offending institution during budgetary processes. As previously described in Chapter 2, losses of revenue hamper an institution's ability to support and foster a student's development. With less academic and student service support, more students may fail to complete their degree and thus lower an IHE's graduation rates.

As management in the environment has been described above, it is not the intention describe actions taken to buffer against constraints or exploit opportunities always positively affect performance. In response to their operating environment, managers may initially conceive of their directives with the aim to enhance performance. However, the implementation of those management strategies may ultimately have negative consequences for performance. For instance, let us assume again that for any number of reasons, an IHE faces potential revenue losses. Instead of increasing enrollment to boost institutional coffers, administrators may

choose to compensate for the sudden loss in funding sources by lowering the number of adjunct professors or lower-level administrative positions. In turn, personnel cut-backs may strain university resources, lead to decreased levels of student support, as well as increase administrative and teaching work-loads. While this one example is limited because it overlaps with other examples and is argued to have similar outcomes for performance, there are two key-takeaways. First, it allows for a more precise conceptualization of what is meant by management in the environment. While exploiting or buffering strategies may include similar activities, processes, or results, it is the initial rational and actions taken by management (in light of their environmental context) which is important to distinguish and is captured in the factors proposed for this study. Secondly, the complexity of managerial efforts in the environment, as well as their relationship with other internal management factors and institutional contexts further illustrate the interactive and often contingent components of the OTM framework. In order to understand how management matters, these factors and their shared relationships must be unpacked, however daunting the task.

Exploiting Opportunities and Buffering Against Constraints

Environmental management factors (M_2) can be distinguished from internal management (M_1). Generally, external management factors fall into managerial efforts to exploit opportunities (M_3) and buffer against constraints in the environment (M_4) (O'Toole and Meier 1999), and can affect organizational performance.[3] Previous studies utilizing the OTM framework have focused attention only on either buffering or exploiting factors to represent a broad measure of management in the environment (denoted as M_2). By focusing on only buffering factors, for instance, it is assumed that the absence of buffering indicates a management more engaged in exploiting strategies. Rather than rely on such an assumption, this study aims

[3]For work on managerial strategies to exploit or buffer the environment, see Milward and Provan (2000) and Selznick (1949).

to account for the full range of externally oriented management as represented in OTM's full interactive model.

In the present study, a vector of external management strategies represent the various managerial efforts exploiting the environment and managerial buffering strategies. Higher values for this term indicate management activities aimed to exploit opportunities in the environment, as opposed to lower values indicating management's efforts to buffer their agency from direct and perceived environmental constraints affecting performance or other organization goals. It may be difficult to distinguish between these two types of environmental managerial actions, especially in the present context of public HE.[4] However, by interacting management strategies with known environmental factors (as specified in the OTM model), one can determine the extent exploiting or buffering strategies are successful, as well as this relationship's influence on performance. The categorization of the variable selected for this study are based on the known impacts they have on graduation rates as observed in the HE literature.

In terms of exploiting strategies used to enhance performance, what initially comes to mind are selection criteria for incoming students (average family income), all of which have been demonstrated to improve the odds a student has of graduating (The Pell Institute 2009). The argument is that students with higher incomes have likely had more support throughout their development, and likely continue to have higher levels of support during their college years. In turn, greater levels of support enable students to dedicate more time to coursework, access greater levels of academic resources, and ultimately successfully complete the requirements necessary for graduation. Here I intentionally leave "support" broad, as support can take many forms.

[4]For instance, perhaps a university invest more in fundraising and alumni relations activities in order to raise donations. This could be considered management strategies that exploit the environment during positive economic conditions, but could also be considered buffering in poor fiscal conditions that may eventually affect university revenues from state sources.

Additional measures of exploiting strategies can be found in the Carnegie Undergraduate Profile Classification (CUPC), which describes several student characteristics that might dictate how an institution recruits and serves students, and are likely to impact graduation rates. The first characteristic captures the proportion of full-time and part-time students. Students attending part-time tend to have greater work requirements and commitments outside of their pursuit for a degree, and maintain a graduation rate that is about 40 percent lower than full-time students (Shapiro et al. 2017). Thus, IHEs may be more willing to invest resources in areas they perceive to enhance performance, such as recruiting and enrolling students more likely to graduate. A similar rationale applies to another feature selection measure based on student entrance examination performance (i.e., ACT and SAT scores). Indeed, the typical correlation of standardized test scores and graduation rates is around r =0.85 (The Carnegie Classification of Institutions of Higher Education 2014), and IHEs may seek to enroll high-achieving high-school graduates.

Two other exploiting terms included in this study are relate to IHE revenues. Beyond the direct impact increased graduation rates from the previous year may have on subsequent graduation rates (a larger pool of potential future donors), increases in revenues may indicate more active promotion and engagement with external stakeholders to raise money (whether that happens via grants at the academic program/departmental level, or involves greater efforts of managements' fundraising efforts). It also taps the quality of management aspects as managers who can raise more funds may also be more adept at fundraising and convincing stakeholders to enroll in or donate to an institution, or at the very least, managers that provide the resources necessary to front-line administrators (faculty) to obtain external funding. These measures include an institution's net tuition revenue (after accounting for institutional discounts and grants) and institutional revenue from local, state, and federal grants (excluding need-based grants and scholarships). A measure of student enrollment is also incorporated to control for changes

in resource allocation due to levels of enrollment. Changes in enrollment may also, in part, capture managements' ability to recruit and enroll students. I expect that institutions with larger increases in these types of financial resources should also be able to provide greater institutional resources to students; specifically, those resources that may enhance graduation rates.

Conversely, institutional missions and the type of students enrolled at institutions are two related concepts that should influence graduation rates. In terms of institutional missions, I distinguish between universities classified as a land-grant institution (LGI). As described in Chapter 1, the Morrill Acts establishing LGIs mandated institutional missions that promulgated the teaching of applied disciplines (such as agriculture and engineering) to train a workforce that would meet the needs of a post-industrial revolution economy in the states. Over time, it has also become expected of LGIs and other public institutions to promote broader state interests (Ewell and Jones 2006), such as engaging in activities that promote equal institutional access, equity, and community engagement. Indeed, many LGI's (especially HBCUs) serve economically disadvantaged citizens, poor and rural geographic areas, and under-represented minority (URM) populations.

Although LGIs develop economic development programs in these disadvantaged communities fulfilling public policy goals, this study focuses on the related notion of managerial activities that recruit and enroll disadvantaged students. Often, such students may have lower performance during their early educational careers, and tend to lack the resources and support typical of more advantaged populations (The Pell Institute 2016). Offsetting the negative impacts that these populations may have on organizational performance often requires heavy investment of institutional resources (e.g., first-year programs, targeting advising and academic support, access to financial support and scholarships). While institutions may recruit and enroll these students, this study conceives that such managerial actions are pursued as a form of accountability to state policy goals, and

are thus a form of buffering against environmental constraints. A similar logic underlies several other variables intended to capture IHE buffering strategies, which include the percentage of URM students, students receiving Pell grants, and first generation students enrolled.

Similarly, management in the environment may observed in other student characteristics. Indeed, the salience of contemporary issues such as equal-access and equity are captured in an institutions strategy to recruit and enroll students based on gender and state residency. Females tend to graduate at higher rates compared to their male counterparts (National Center for Education Statistics 2019). Interestingly, institutions have also increased their efforts to recruit and enroll out-of-state students (Jaquette 2017). While this strategy neglects the LGI mission to serve the citizens of a state in which it is located (Jaquette 2017), recruiting out of state students has indirect and direct impacts on performance. Indirectly, out-of-state students typically pay much higher levels of tuition compared to state residents. Thus, institutions may be able to dedicate higher levels of academic resources and support to all students, which should improve their chances of graduating. A more direct impact on performance relates to the previously described exploiting strategy explaining that wealthier students tend to have higher levels of support and are more likely to graduate. Thus, the same logic can be applied to out-of-state students because they can afford to pay higher tuition rates. Ultimately, the present study contends that institutions with higher levels of female and out-of-state students tend to have higher graduation rates, compared to institutions with lower levels of each.

The last measure of management in the environment includes the percentage of graduate students enrolled at an institution. The tangible contributions of graduate education, coupled with its less visible applications of civic engagement, drive home the point that lawmakers and citizens perceive graduate education as crucial to ensuring our country's future economic prosperity, social growth, and leadership

role throughout the world (Wendler et al. 2010). Nevertheless, graduate education tends to be an intensive investment of institutional resources.[5] Institutions supporting greater levels of graduate students may dedicate fewer resources to the usually larger undergraduate student population. Distressingly, evidence suggests the doctoral student dropout rate hovers between 50 to 56 percent (Cassuto 2013; Sowell, Zhang, Redd, and King 2008). Whether graduate students finish their degree or not is not reflected in the dependent variable of this study, but the drain of graduate education on university resources, as well as the disruption graduate drop-outs may have undergraduate course instruction might indirectly lead to lower university performance. Thus, if graduation rates are viewed as the metric of performance to which IHEs are accountable, the enrollment of graduate students may be perceived as a buffering strategy that can diminish performance.

In summary, the hypotheses associated with the direct impact of management in the environment (M2) on performance are as follows:

Increased efforts to exploit the environment increase performance.

Increased efforts to buffer the environment decrease performance.

Justifying a Measure of Environmental Factors (X_t)

Beyond variables capturing institutional stability, managerial quality, and managements' strategy in the environment, there are several additional factors affecting graduation rates. Their inclusion in this study is two-fold. First, these variables might constrain or enhance resources available to IHEs. Secondly, more recent scholarship has taken a closer inspection of state political variables influencing impacting higher education policy outputs (Archibald and Feldman 2006 ; Dar 2012; Lowry 2001 ; McLendon, Hearn, and Mokher 2009; J. Nicholson-Crotty and Meier 2003 ; Rizzo 2004 ; Tandberg 2010; Weerts and Ronca 2008). Just as

[5]I refer to intensive investment as a relative term, because the conception provided here does not consider the value that graduate student employees and instructors provide to a university, nor the potential costs saved by not having to hire full-time staff to carry out such university functions.

within IHEs' operating environments, environmental constraints and incentives can affect state-level decision-making process as policymakers weigh various costs and benefits in order to maximize self-interests (Tandberg and Griffith 2013). Such decisions are likely to influence IHE management strategies. In turn, IHE management strategies may then subsequently impact state-level policy decisions.

Based on McLendon, Hearn, and Mokher's (2009) study of higher education finance, political factors that tended to significantly decrease higher education spending included states with an increased republic presence in the legislature and governor's office. Conversely, state factors that significantly increased higher education spending included greater legislative professionalism; the presence of legislative term limits; and greater higher-education interest group density. State economic factors, such as increases in state unemployment rates were also shown to decrease state higher education expenditures. Lastly, several demographic and higher education policy conditions shared statistically significant relationships with state higher education funding; in populations aged 18-24 and 65 and over; and increases in those enrolled in private institutions. Conversely, increases in state higher education funding corresponded with increases in two-year public institutional enrollment.

Evidence from these studies suggest the important role that environmental, policy-making processes, and individual actor strategies/preferences have in influencing policy outcomes in higher education. Tandberg and Griffith (2013) find that many of the relationships observed in McLendon, Hearn, and Mokher's (2009) investigation are often in observed in other study related to state level policy outputs. Accordingly, it is reasonable to suggest that state financial support for higher education directly impacts IHE performance. As described earlier in this chapter, institutions able to dedicate more resources and support (as captured by expenditures per student, tuition costs, student demographics, etc.) to students are expected to have higher graduation rates than IHEs unable to do the same.

State level economic, political, and demographic variables include state appropriations to public higher education, state citizen ideology, state legislator ideology, governor's party, formal gubernatorial powers, state unemployment rate, degree of urbanization, legislative professionalism and composition, and the proportion of state residents enrolled in either private or two-year community colleges. While all of these factors are intended to be used as controls that allow for the isolation of management's impact on organizational performance, several variables warrant further explication for theoretical and practical reasons. It is reasonable to suspect that states with higher populations have a greater capacity to fund public higher education (Archibald and Feldman 2006; McLendon, Hearn, and Mokher 2009). Additionally, state economic conditions have been demonstrated to significantly constrain state funding of higher education (Lowry and Fryar 2013; McLendon, Hearn, and Mokher 2009; Okunade 2004; Hovey 1999). The present study will also test the importance of state economic conditions by including a state unemployment variable.

I will also test the relevance of HE policy process and actor preference factors in HE policy outcomes by including state citizen ideology and legislative term limits. State citizen ideology measures the mean position of a state's electorate on the conservative-liberal political spectrum which is measured on a X-Y scale with X indicating a more conservative citizenry (Berry et al. 1998). In research examining state spending from years 1961-2001, Archibald and Feldman (2006) found that more liberal states tended to fund state higher education at increased levels. Though similar work conducted by McLendon, Hearn, and Mokher (2009) did not yield statistically significant results, it did support the positive relationship between liberal ideology and state higher education funding. Legislative term limits, or the length of time that legislators are allowed to serve, may also impact state higher education appropriations. Several states enacted term limits under the belief that they would reduce frivolous government spending and improve state fiscal conditions. However, literature does not generally support this notion.

Research conducted by Cummins (2012) found that states with term limits tended to have decreased budget balances. Nevertheless, previously described research provides evidence that legislative term-limits were shown to have a positive impact on policy outcomes for state higher education. Additionally, research conducted by Freeman (1984) and Canfield-Davis et al. (2010) suggests that the individual values that legislators hold influences policy areas such as budgetary outcomes. Given the potential impact of this factor, this study also attempts to capture the value that state legislators place on public higher education.

I now turn to the influence that legislative professionalism may have on organizational performance. Recent scholarship suggest that legislative professionalism significantly impacts state HE policy decisions. Indeed, states with more highly professionalized legislatures tend to fund higher education at higher levels. Several studies rely on Squire's Index (i.e., an index normalized from 0-1 representing legislatures' resemblance to the U.S. Congress, the most professionalized governing body across the world). Another approach more commonly used in political science utilizes legislative pay and specific budget capacity (Barrilleaux and Berkman 2003; Fiorina 1994). While Hick's (2015) demonstrates that both measures are highly correlated, the key mechanisms linking professionalization and state budgetary decisions is that more professionalized legislatures are more educated, have better resources, and lessless information asymmetries. The measure used in this study stems directly from Hick's (2015) conception of legislative professionalism.

On one hand, more educated legislators may also place greater value on education. In turn, personal convictions and sympathies may compel legislators' decisions to appropriate more state funds to HE (Chatterji, Kim, and McDevitt 2017; Tandberg and Griffith 2013; Pascarella and Terenzini 2005). Greater professionalization may also indicate better managerial networking; where relationships with state-lawmakers allow advocates of HE to best identify the political levers necessary for enhanced funding (McLendon, Hearn, and Mokher 2009).

Ultimately, much of a states' role for Higher Education surrounds budgetary policy outputs. IHEs with greater levels of revenue from state sources, likely impact management strategies to network and raise revenue. Stemming from HE literature reviewed in Chapter 2, this study holds that institutions with greater levels of resources are able to provide greater support to individual students, invest in staff, and have more capacity to manage disruptions to their operating environment; all of these facets are expected to enhance graduation rates. Though the direct impacts of environmental factors on performance are not the primary emphasis of this study, the interactive relationship these factors share with management features are of central focus and culminate in the following set of hypotheses:

Increased state centralization decreases the impact of environmental forces and increases the impact of external management activities on graduation rates.

Increased efforts to exploit the environment in more centralized organizations increase performance.

Increased efforts to buffer the environment in less centralized organizations increase performance.

In addition to these economic, political, and demographic factors impacting policy decisions that trickle down to institutions, state higher education structures and legislative professionalism warrant further examination and explication. Based on the model of management and performance suggested by O'Toole and Meier (1999), I aim to directly test the interactive and structurally contingent components of the OTM framework. No known study to date utilizes the

model to test such a relationship.[6] Building on previous work that provides a compelling theoretical justification for this ambition, it is argued that the HE data set constructed for this study allows for this endeavor. Whereas the incorporation of higher education governance structure was described previously as a measure of stability, the OTM framework accounts for the impact that environmental factors have on performance relative to this measure of stability (as seen in the X divided by S term). Indeed, organizations operating in more centralized structures tend to have more consistently stable levels of performance and are largely shielded or buffered from fluctuations or sudden changes in the broader state political, economic, and demographic environment. Conversely, performance at IHEs with greater levels of autonomy from state control may change drastically under dynamic state environmental conditions and management's impact on organizational performance is much more likely to shape IHE graduation rates. To further understand how the present study extends the OTM framework to the context of higher education, the conceptual map in Figure 2.1 illustrates how management may impact graduation rates, as well as how environmental and structural elements may interact with management to influence performance.

Summary of Hypotheses

Generally, broad questions guiding the present investigation involve understanding why certain IHEs perform at higher levels than others, and understanding how factors associated with graduation rates may be specified in the OTM framework to account for this. Hypotheses associated with these relationships, and as illustrated in Figure 2.1, are presented again below and prefaced by a summary of corresponding research question(s).

The first primary research question involves understanding how OTM framework can be used as a lens to examine the impacts institutional past performance,

[6]It should be noted that O'Toole and Meier (2003) test stability, but not aspects related to centralization and structural components conceptualized as Hierarchy in O'Toole and Meier (1999).

governance structures, internal and external management, and environmental factors may have graduation rates. The hypotheses associated with this question are as follows:

H1: *Higher levels of past performance are positively associated with current performance.*

H2: *Higher levels of centralized state authority and governance structures are associated with higher graduation rates.*

H3: *Increased management activities designed to improve internal processes, student support, and organizational stability lead to higher graduation rates.*

H4: *Increased efforts to exploit the environment increase performance.*

H5: *Increased efforts to buffer the environment decrease performance.*

The second and third questions move to test interactive components of the models. The second question asks how stability inducing elements (past performance, governance structure, and internal management) interact and directly impact graduation rates? Hypotheses related to this question are as follows:

H6.1: *As internal management activities increase, the impact of past graduation rates on performance decrease.*

H6.2: *After controlling for past performance, increases in state centralization decrease the impact of internal management activities on graduation rates.*

The third question asks how factors related to environmental management (external management, state-level influences, and governance structure) interact and directly influence graduation rates? This question culminates in the following set of hypotheses:

H7.1: *Increased state centralization decreases the impact of environmental forces and increases the impact of external management activities on*

graduation rates.

H7.2: *Increased efforts to exploit the environment in more centralized organizations increase performance.*

H7.3: *Increased efforts to buffer the environment in less centralized organizations increase performance.*

The hypotheses listed above test how internal and external management, environmental forces, and hierarchy/stability influence performance. Because each of these terms are factor analyzed and are composed of multiple independent variables, individual hypotheses for each independent variable are precluded but available upon request.

Quantitative Design

Design, Unit of Analysis, Variables and Sources

The quantitative portion of this study involves testing a theory of public management's impact on organizational performance through statistical analysis. Results from these analyses will allow the researcher to gauge the generalizability and practical importance of the OTM framework. The units of analysis for this study are individual public universities, within the United States during a given year (i.e., university/year). The units of observation are the observed measures of collected data for each university. The dependent variable is university graduation rates. Graduation rates are operationalized as the cohort completion rate for full-time, first time, bachelor-degree seeking students who complete their degree within 150 percent of expected time to completion. For instance, an institutional graduation rate for year 2010 represents the percentage of completing students from the Fall 2004 (or 2004-05 academic year) cohort. These data were obtained from the U.S. Department of Education, National Center for Education Statistics (NCES) (2017) and are available at the following website: https://collegescorecard.ed.gov/data/.

There are 21 other university-level variables in this study representing the proposed measures of state centralization and governance, as well as internal and external management factors. Eighteen of those variables, as well as the dependent variable (graduation rates) in this study were obtained from NCES College Scorecard (https://collegescorecard.ed.gov/data/) and IPEDS Analytics Delta Cost Project Database (https://nces.ed.gov/ipeds/deltacostproject/). The remaining three university-level variables, IHE president length of tenure and education background, as well as IHE governance structures, were obtained from the Institutional Data Archive via the Inter-university Consortium for Political and Social Research (ICPSR): (https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/34874) and the Education Commission of the States website: (https://www.ecs.org/postsecondary-governance-structures/), respectively. State-level data were obtained from the following electronic sources: the National Conference of State Legislature's (http://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx), the Book of the States (http://knowledgecenter.csg.org/kc/category/content-type/content-type/book-states), the National Association of State Budget Officers (https://www.nasbo.org/mainsite/reports-data), Richard C. Fording (https://rcfording.wordpress.com/state-ideology-data/), the U.S. Census (https://census.gov/), the US Bureau of Labor Statistics (https://www.bls.gov/), Klarner's (2016) Dataverse (https://doi.org/10.7910/DVN/3WZFK9), the U.S. Bureau of Economic Analysis (https://www.bea.gov/tools/), the State Higher Education Officers Association (https://sheeo.org/project/state-higher-education-finance/), the Boris Shor (2018) Dataverse (https://doi.org/10.7910/DVN/BSLEFD). Descriptions, operationalizations, and data sources of all variables are provided in Table 3.1 below:

[Insert Table 3.1 about here]

Population and Sample

Public universities included in this study were drawn from a stratified random sample of 1390 four-year colleges and universities, and consist of 384 baccalaureate granting institutions, across all fifty states, between the years of 2002 to 2010. This sample includes 72 highly selective and leading research universities, and more than 100 IHEs from each of the following 1994 Carnegie Classification tiers: Other selective colleges and research universities (tier 2); Master's I (tier 3); and non-selective baccalaureate-granting institutions including Master's II (tier 4). The sub-sample used in this study excludes specialized, for-profit, or two-year institutions, reducing the sample used for analyses to 166 public four-year colleges and universities. Because graduation rates are repeatedly measured across 9 time points (waves or repeated measures) for the individual 166 IHEs (number of level-two clusters) nested within 43 states (number of level-three clusters), the total number of cases is equal to 1,494 (level-one sample size).

Data Collection

Quantitative data used in this study have been assembled from the provided government and publicly available sources. Variables capturing IHEs president length of tenure and educational background were retrieved from the Institutional Data Archive (IDA) on American Higher Education database. Public data available on institutional websites were also used by the author to manually input missing presidential data and to compute additional related variables in this study. The IDA has been supervised by Dr. Steven Brint at the University of California-Riverside, and was last managed and updated by Kerry Mulligan in 2010. Data from the IDA, as well as IHE and state-level data obtained from publicly available sources listed in Table 3.1, have been collected, collated, and managed by the author of this dissertation over the prior two-years. The collection and management of these data have produced a novel longitudinal dataset spanning years 1996 to

years 2016. However, data used in this study are limited to years 2002 to 2010 primarily because data sources in this period capture all variables of interest related to this study. Although these secondary data do not constitute federal definitions of human subject's research, formal Auburn University IRB approval of their use in this study was obtained Fall 2018.

Data Analysis

As a first step, descriptive statistics (means, standard deviations, frequencies) will be generated for all variables in this study. Pairwise correlations between predictors and the dependent variable will also be computed. Subsequently, all variables representing the concept of each term specified in the formal OTM model (internal management, external management, and environmental forces) will be factor analyzed using principle components analysis (PCA).

Principal Components Analyses (PCA) were conducted using the FACTOR command in IBM SPSS Statistics 24. PCAs are a variable reduction technique and enabled composite scores to be computed for each management factor hypothesized to impact performance in this study. Because variables representing each management factor are high correlated, PCA and other types of Factor Analysis can address concerns of multi-collinearity that otherwise may result in less reliable estimates for predictors in eventual regression models (Crocker and Algina 2006; Yu 2011). Following a similar approach to that of other scholars testing the OTM framework (S. Nicholson-Crotty and O'Toole 2004), steps taken in this study are described in detail below.

The data were initially screened for univariate outliers and missing data. No extreme outliers were observed for any predictor, and the use of listwise deletion resulted in a sample size (n=1163) satisfying the minimum amount of data to appropriately conduct a PCA (Tabachnick and Fidell 2007). As a first step, I first examined the suitability of independent variables believed to capture each concept/domain of the OTM framework (Equation 2.1). Based on the proposed theory

and conceptual framework described in Chapter 3, the process of variable selection subsequently involved choosing correlated predictors that independently shared statistically significant relationships with graduation rates. Variables selected for measures of Internal Management (M_1), External Management (M_2), and Environmental (X_t) domains are described in the following sections and displayed in Figure 3.1.

Because PCA analyzes total variance, selected predictors were then standardized so that no term's impact on the dependent variable would be more heavily weighted than other measures (Nicholson-Crotty and O'Toole 2004; Shlens 2003). Specifically, Little's (2013) "POMS" or "POMP" approach was followed, transforming the scale of each variable to a metric between zero to one, one being the highest. This approach also enables absolute distances in variables to be retained, as described in the following equation:

$$POMS = [(\textit{observed - minimum)/(maximum - minimum)}] \tag{3.1}$$

In addition to scaling to unit variance, predictors were also grand mean centered (CGM) to further ensure that differences in scales across measures do not unduly weight results (UCLA-IDRE 2019). It is also important to note that a one-factor solution was specified *a-priori* for empirical and theoretical reasons. Empirically, the interest was to reduce a large set of variables to represent a management domain and the first principle component is a linear index of the variables capturing the largest amount of common variance for each management term (Brown 2009; Lindeman, Merenda, and Gold 1980); as opposed to identifying latent sources of variability in psychological constructs. From a theoretical standpoint, other scholars testing aspects of the OTM framework have (S. Nicholson-Crotty and O'Toole 2004) have similarly chosen a one-factor solution. Replicating the methodological approach of similar scholarship lends greater credibility to the interpretation of results and comparative validity of the OTM framework.

Subsequently, a three level mixed effect model was specified to determine internal management's, external management's, and environmental force's impact on performance.[7] Should further explication of estimated relationships be warranted, relationships between variables representing model terms are provided for examining specific relationships of theoretical or practical interest.

Relying on the PROC MIXED procedure in SAS 9.4, the fully operationalized model of management will be estimated using a mixed effect model with restricted maximum likelihood estimation. Due to the nested structure of data used in this study, hierarchical multi-level modeling (MLM) was used because traditional regression methods' (ANOVA and ANCOVA) independence assumption is violated by the nesting of time in institutions within states (Pastor 2017). Multilevel Modeling (MLM), Multilevel Growth Modeling (MLGM) or Hierarchical Linear Modeling (HLM) is a form of regression used when data violate the independence of observation assumption. Violating this assumption can lead to underestimated standard errors, and subsequently inflated Type I errors (incorrectly rejecting a null hypothesis and incorrectly suggesting a significant effect). MLM accounts for the nested structure of data and allows for the unbiased estimation of university-level management strategies (level 2) that account for the variability in graduation rates between institutions and within institutions. In terms of this study's dependent variable, consider that graduation rates are collected from twenty different IHEs across 20 different states. It would be expected that IHEs from the same state would be more alike because they may be subject to similar environmental and institutional factors and may interact with one another, whereas these shared attributes may not be observed between two IHEs located in different states. Thus, one cannot make the assumption that all observations are independent because some IHEs are more related than others. If the state effect, or the dependency

[7]Because PCA factor loadings are standardized (in standard deviation units), comparisons to the relative importance of all terms using PCA scores are appropriate (S. Nicholson-Crotty and Meier 2004).

due to observations being nested within states, is not taken into account, then the assumption of independence is violated.

The same violation of independence can occur when using longitudinal data, where data are collected at several time points. In other words, different measurement occasions are nested within IHEs. Similar to the two-level model, it is inappropriate to assume that one measurement of an individual during one time period is independent from other measurements of the same individual at time periods two and three. Thus, MLM can take into account management's influence on performance due to measurement occasions (level 1) being nested within IHEs (level 2) nested within states (level 3) using a three-level model. To determine nesting specifications and the utility of incorporating factors at various levels, the amount of variability within and between institutions will be calculated using the Intraclass Correlation Coefficient and fit indices across various models will be compared.

Given the interactive and autoregressive model of management proposed in the OTM framework, it is important to note that MLM/ HLM also offers several advantages when modeling non-linear dynamics (McNeish and Matta 2017). Compared to other advanced methods (i.e., SEM), mixed effect multi-level models do not require a balanced data-set, permit one to inspect cross-level interactions, allow one to examine average and time varying change (slopes and intercepts) as well as time-varying covariates, and can also can be used with power polynomials to model non-linear dynamics (McNeish and Matta 2017; Singer and Willet 2003). As McNeish and Matta (2017) explain, "for specific forms of nonlinear growth, the ME [mixed effect] approach should be preferred, because it can estimate the model directly and does not need to linearize the model prior to estimation" (4). Importantly, estimates of change parameters tend to have greater precision by reducing standard errors in the causal links associated with changes in the dependent variable over time.

Lastly, the mixed effect MLM approach also allows the researcher to fit a true covariance structure (e.g., unstructured, compound-symmetry, auto-regressive, etc.) and thus reduce error variance (Hoffman 2015; Samonte 2012). This last point is particularly salient for the auto-regressive nature of the OTM framework, where current performance is dependent on past performance and are expected to have correlated errors. Ultimately, an Alternative Covariance Structure model was chosen to test hypotheses in this study. Although analytical decisions are primarily driven by theory, combining this modeling strategy with a data-driven approach will ultimately strengthen the confidence placed in this study's reported findings.

In this study, eleven measurement occasions (level 1) are nested within 166 IHEs (level 2) across 43 states (level 3). These data consist of 9 repeated measures collected on 9 consecutive years (2002-2010) for all institutions and states included in this study. Here, because data across years are equally and identically spaced (i.e., year 2006 is one year apart from year 2007), time can be coded with integers to reflect equal spacing distances of one year. Singer and Willet (2003) demonstrate there are numerous ways to code time to ease interpretation of the intercept in an example using data points spanning 5-years (i.e. 0 to 4 for expected growth from initial measurement; -2 to 2 at the middle time point; or -4 to 0 to reflect last measurement occasion intercept). This study similarly opts to grand mean center (CGM) time around the middle time point for two reasons. First, centering at the midpoint of time allows us to interpret the intercept as the estimate of average graduation rates (expected graduation rate when year = 2006), as well as the slope of the average linear trend (Enders 2013; Hoffman and Stawski 2009). Perhaps more importantly, the extent to which graduation rates have varied over time may not be fully realized in years 2002 to 2010 as they are but a snap shot in time. Thus, constructing a meaningful comparison time point (year 2006) is useful. In addition to time, all level-two and level-three covariates used in this study are also grand mean centered to facilitate overall estimates' interpretations and reduce multicollinearity issues (Brincks et al. 2017; Enders and Tofighi 2007)

Weaknesses and Limitations

Although a combined theory and empirically driven analytic strategy alleviate concerns of incorrectly or under-specifying the proposed model of management, several limitations are noted. The first limitation involves this study's use of data ranging from years 2002-2010. Observed relationships based on the current range of years may not be representative of other periods of time. A second limitation is directly attributable to the ambitious aims of this study. By attempting to fully operationalize the formal OTM model of management in a previously unexplored program area, only hypothesized relationships identified as substantive theoretical or practical importance will be explored. Unfortunately, space constraints may preclude a more comprehensive unpacking of all quantitatively observed relationships that may be relevant in other contexts.

However, the limitation perceived to be of most importance is one often noted by O'Toole and Meier (2003; 1999); data availability and measurement. The availability of data allowing for the model's full operationalization has often eluded scholars seeking to use the OTM framework in order to understand the relationship between public management and organizational performance. Indeed, studies using OTM only test components or parts of the model. The current study's attempt to utilize the full model should not be perceived as disregard of O'Toole and Meier's advice, but more of this author's intent to advance the field of public management theory through the HE contextual lens. While this study provides a theoretical justification of measures used for OTM model terms, their reliability and validity as measures of the intended concepts are only partially addressed in this study.

Future work may seek to gather further empirical evidence to assess these measures' adequacy. A related weakness perceived in this study is the sole quantitative focus. A lack of qualitative data may limit the ability to refine observed quantitative relationships and/or explain statistical results in more detail (Creswell

and Plano-Clark 2007). Future work could use qualitative data (interview data from key informants such as University Presidents and other top-level university administrators) to identify other important features of managing performance in HE.

Table 3.1: *Variables*

Variable	Measurement*	Definition†	Source‡
Graduation Rate (O_t)	Continuous	The proportion of full-time, first-time, degree/certificate-seeking undergraduates used by the institution to calculate completion rate within 150 percent of normal time, included in the IPEDS Graduation Rates component	IPEDS College Scorecard (2018)
Prior Year Graduation Rate (O_{t-1})	Continuous	One year lag of 6-year graduation rate	IPEDS College Scorecard (2018)
State HE Governance Structure (S)	Ordinal	Measure of extent to which academic and budgetary authority for an institution is centralized and regulated at the state level (0.99=High Authority ; 0.66=Moderate Authority; 0.33=Low Authority)	Knott & Payne (2004) and cross-referenced with ECS database (2007;2013)
		Variables for Internal Management (M_1)	
University President Tenure	Continuous	Years current sitting president/chancellor has served in this role at the institution (observation year-appointment year)	Brint (2011); Institutional Websites

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
University President Age	Continuous	Age of current president (observation year-birth year)	Brint (2011); Institutional Websites
University President Gender	Nominal	President Gender (1=Male; 0=Female)	Institutional Websites
President Degree Field	Ordinal	President/chancellor's field of study for highest degree attained (1=Business, Education, Law; 0=Arts, Humanities, Social Sciences, Natural Sciences, Health Studies)	Brint (2011); Institutional Websites
Administrative Capacity	Continuous	The number of full-time executive/administrative staff per 100 FTE students.	IPEDS Analytics: Delta Cost Project Database (2018)
Instructional Expenditures	Continuous	Instructional expenditures per FTE student	IPEDS College Scorecard (2018)
Instructional Capacity	Continuous	The number of full-time faculty members per 100 FTE students.	IPEDS Analytics: Delta Cost Project Database (2018)
Land-Grant Mission	Nominal	Land Grant status of Institution (1=Land Grant; 0=Not a Land Grant)	IPEDS Analytics: Delta Cost Project Database (2018)

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
HBCU Status	Nominal	HBCU status of Institution (1=HBCU; 0=Not a HBCU)	IPEDS Analytics: Delta Cost Project Database (2018)
Research Productivity	Ordinal	Basic Carnegie Classification of comparable categories for Carnegie Years 2000, 2005, 2010. (0.99= Research/Doctoral Institutions; 0.66=Master's Institutions; 0.33=Bachelor's Institutions)	IPEDS Analytics: Delta Cost Project Database (2018)
Faculty Salary Expenditures	Continuous	Average salary for full-time faculty	IPEDS Analytics: Delta Cost Project Database (2018)
		Variables for External Management (M_2)	
Enrollment of High Performance Students	Continuous	Equivalentized SAT/ACT Scores (75th percentile verbal and math score average) for entering freshman	IPEDS Analytics: Delta Cost Project Database (2018)
Enrollment of Female Students	Continuous	% share of enrolled undergraduate degree-seeking students who are women	IPEDS College Scorecard (2018)

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
Enrollment of High Income Students	Continuous	Average family income of dependent students	IPEDS College Scorecard (2018)
Government Reliance	Continuous	% share of operating revenues from government sources (includes basic revenue streams but excludes Pell Grants)	IPEDS Analytics: Delta Cost Project Database (2018)
Tuition Revenues	Continuous	Net Tuition Revenue per FTE student	IPEDS Analytics: Delta Cost Project Database (2018)
Enrollment of Out-of-State Students	Continuous	% share of full-time, first-time degree/certificate-seeking undergraduates (fall cohort) who are out-of-state residents	IPEDS Analytics: Delta Cost Project Database (2018)
Total Enrollment	Continuous	Total annual enrollment of all student types	IPEDS Analytics: Delta Cost Project Database (2018)
URM Enrollment	Continuous	% share of total enrollment that does not identify as white race	IPEDS Analytics: Delta Cost Project Database (2018)

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
Low-Income Students	Continuous	% share of full-time first-time degree/certificate-seeking undergraduates receiving federal grants or educational assistance funds (includes Pell Grants)	IPEDS Analytics: Delta Cost Project Database (2018)
First Generation Students	Continuous	% share of total enrollment that are first-generation students	IPEDS College Scorecard (2018)
Undergraduate Students	Continuous	% share of total enrollment that are undergraduate students	IPEDS Analytics: Delta Cost Project Database (2018)
Graduate Students	Continuous	% share of total enrollment that are graduate students	IPEDS Analytics: Delta Cost Project Database (2018)
Part-time students	Continuous	% share of total enrollment that are part-time students	IPEDS Analytics: Delta Cost Project Database (2018)
		Environmental Variables (X_t)	
Democratic Composition of Legislature	Continuous	% share of total state legislators (upper and lower chamber) that are Democrat	Klarner (2016)

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
Democratic Governor	Nominal	Governor Party Affiliation (1=Democrat; 0=Republican)	Klarner (2016)
Legislative Professionalism	Continuous	Total state legislative operating budget per legislator	US Census and NASBO (based on Hicks (2015))
State Government Ideology	Continuous	Index representing average political ideology of state government on a liberal-conservative continuum (0-100=higher values indicate more liberal)	Fording et al. (2014)
Citizen Ideology	Continuous	Index representing average political ideology of state citizens on a liberal-conservative continuum (0-100=higher values indicate more liberal)	Fording et al. (2014)
State Party Competition Upper Chamber	Continuous	Distance between state upper chamber party ideology-point estimate medians, based on individual-level	Shor, Boris and Nolan McCarty (2018)
State Party Competition Lower Chamber	Continuous	Distance between lower chamber party ideology-point estimate medians, based on individual-level	Shor, Boris and Nolan McCarty (2018)
State Population	Continuous	Total state population	US Bureau of Economic Analysis (2018-SAINC1)

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Table 3.1: *Continued from previous page*

Variable	Measurement*	Definition†	Source‡
State Unemployment Rate	Continuous	% share of total eligible state workforce that is unemployed	US Bureau of Economic Analysis (2018-SAINC1)
State Support of Higher Education	Continuous	Total state appropriations to higher education per 1k of total state personal income	State Higher Education Executive Officers Association (2019)
Private Institution Enrollment	Continuous	% share of state population enrolled in public two-year or similar institutions	US Department of Education, NCES, IPEDS (2017)
Two-Year Institution Enrollment	Continuous	% share of state population enrolled in private institutions (for and non-for profit)	US Department of Education, NCES, IPEDS (2017)
Traditional College-Age Population	Continuous	% share of state population age 65 or older	U.S. Census Bureau
Older Population	Continuous	% share of state population age 18-25	U.S. Census Bureau

* Percentage, Ratio, and Ordinal levels of measurement are not necessarily continuous data, but are treated as such in this study.

† All variables are grand mean centered (CGM) for analysis

‡ Primary data collected from publicly available sources

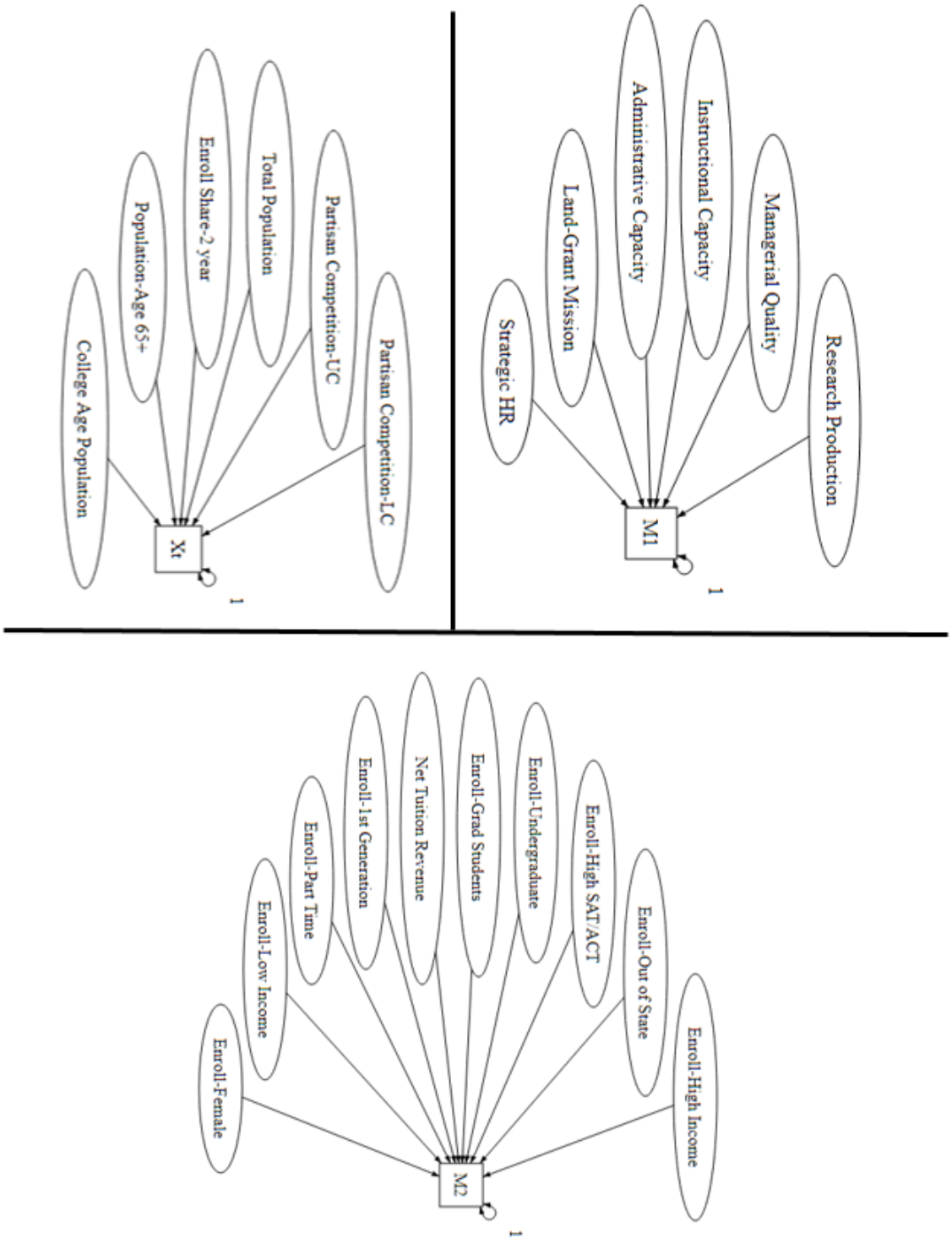

Figure 3.1: Principle Components Analysis Diagrams

4

Initial Analyses

Introduction

Developing a parsimonious causal theory of managements' contribution to performance has proven an enduring challenge. Historical literature on management (as cited in O'Toole and Meier 1999, see Poveda 1990; Selznick 1949) have often noted the theoretical importance these aspects share with organizational performance, although much of this past work relies on case study investigations. While this case study mode of inquiry yields rich details and a better understanding of factors affecting organizational performance, drawn conclusions are contextually dependent (much like the relationship of management and performance) and less generalizable. Indeed, a lack of "systematic empirical investigation" involving larger samples and quantitative inquiry have stymied the development of a generalizable theory modeling the managerial impact on organizational performance (S. Nicholson-Crotty and O'Toole 2004; O'Toole and Meier 1999).

Overview of Analyses

To begin to understand "How Management Matters" for performance in the context of Higher Education, this chapter contains two stages. The first stage begins by examining univariate and bivariate statistics to describe the analytic sample and to explore relationships between graduation rates and predictor variables. Subsequently, the process of creating a single component score based on variables representing each term of the OTM framework (as conceptualized in Chapter 3) is described. The second stage of this chapter introduces the initial model building process used to specify how graduations rates vary over time (level-1), across institutions (level-2) nested within states (level-3). While identifying the best fitting multi-level mixed effects model (MLMM) is critical to understanding how graduation rates vary over time, dynamic auto-regressive components of the OTM framework present several limitations to using a purely hierarchical linear modeling approach. Thus, a simpler Alternative Covariance Structure (ACS) model with comparable fit is also specified to overcome these limitations and to facilitate a more parsimonious understanding of management's impact on performance within the context of the present study. Approaches in phase 1 and phase 2 then culminate in the specification of an additive autoregressive model including all components of the OTM framework and serves as the basis for testing interactive relationships and contextual specifications of the OTM framework in Chapters 5 and 6, respectively.

Guiding Questions

Guiding the first stage of analysis involves identifying relationships between IHE and state-level measures share with universities' graduation rates, and distinguishing how these terms may combine to represent each domain of management in the OTM framework as specified in chapter 3. The combined theoretical and empirical approach in stage one address broader questions of the study asking why

certain IHEs perform at higher levels than others, and how the OTM framework can account for this variation.

After identifying factors sharing significant associations with graduation rates and combining related predictors to obtain a PCA score for each OTM management term. Because each of these terms are composed of multiple independent variables, overall relationships are described but formal hypotheses for each independent variable are precluded in this section. Initial testing of formal hypotheses occurs in stage two.

Describing the Sample

Means and standard deviations for all variables used in this study are shown in Table 4.1. Over the nine year period (2002-2010), mean graduation rates (M=50.2, SD=17.6) across the 166 institution sample suggest that about half of the undergraduate students at each institution completed their degree within six years. Distribution frequencies of time invariant predictors presented in Table 3 indicate that across the 166 IHEs (n = 1494), about half (47.0 percent) are Research/Doctoral Institutions, 33 (19.9 percent) are Land Grant institutions, and seven institutions (4.2 percent) are designated as a Historically Black College or University (HBCU).

[Insert Table 4.1 about here]

[Insert Table 4.2 about here]

Turning to the measure of stability (S), the majority of institutions (62.0 percent) operate within the most centralized form of governance structure and are subject to greater levels of state control and oversight. Because testing the stability/hierarchy term in the OTM framework is a primary interest of this study, univariate distributions of graduation rates across sample and state governance structures are provided in Figure 4.1 and Figure 4.2 below, respectively. While

both figures indicate a normally distributed dependent variable, Figure 4.2 suggests demonstrates that graduation rates do vary across levels of HE governance structures. Graduation rates for institutions (Median=65.0 percent) operating in states with the least centralized HE government structures tend to cluster above the sample mean, and include IHEs located in states such as California and Pennsylvania. Conversely, the graduation rates of institutions (Median=43.6 percent) located in states possessing the most regulatory authority tend to cluster about below the sample mean.

[Insert Figure 4.1 about here]

[Insert Figure 4.2 about here]

Correlates of Graduation Rates

Pairwise correlations in Table 4.1 summarize the 40 independent variables thought to impact graduation rates in this study. Here, the previously observed negative relationship between HE government structures and performance (r = -.351) is similarly evident. Strong associations were also observed among other factors representing stabilizing influences proposed in the conceptual framework. Prior year's performance (O_{t-1}) shared the strongest positive association with graduation rates (r =-.980), while the magnitude of the relationship between internal management (M_1) factors and current performance varied to some degree.

Internal management factors related to human resource management and student support were more strongly related to performance than those factors designed to tap aspects of quality and stability. Higher levels of performance was associated with higher faculty salaries, student instructional expenditures, and research productivity, as well as greater levels of administrative and instructional capacity. Interestingly, only two factors reflecting the quality and stability of internal management shared significant relationships with performance. President's

age shared a weak positive association with performance (r = .100), whereas contrary to expectations, lower graduation rates were associated with IHE's led by a Presidents' with an educational background in education, business, and legal fields (r = -.262). No significant relationships were observed between performance and a president's gender or length of tenure.

Almost all variables measuring aspects of management in the environment (M_2) shared significant relationships with graduation rates in the expected direction. Unexpected was the observed non-significant relationship performance shared with URM enrollment, and that lower graduation rates were negatively associated with female enrollment (r = -.398). Lastly, most state-level measures of the political, economic, and social environment (X_t) were shared significant small to moderate correlated with performance. Lower graduation rates were observed among those IHE's located in states' appropriating more to public higher education and with larger proportions of citizen's 65 years and older. It is also interesting to note that overall, environmental variables tended to share weaker correlations with performance compared to internal and external management factors.

Returning to the broader questions guiding initial analyses, it is clear that many of variables conceptualized in this study are associated with graduation rates. The next step involves combining different sets of these variables to represent the various management domains conceptualized in the OTM framework (Equation 2.1); resulting factor scores will be used to test hypotheses of substantive interest.

Principal Components Analysis

After conducting PCAs for each management term, only variables with loadings above the acceptable threshold (0.32) were retained (S. Nicholson-Crotty and O'Toole 2004; Tabachnick and Fidell 2007). Kaiser Meyer Olkin measures of sampling adequacy were above acceptable thresholds ($KMO > 0.6$) and Bartlett's Test of Sphericity indicated that terms were suitable for factorability ($p < 0.001$) (Kaiser

1974). PCA results are presented in Table 4.3, and include component loadings, communalities, and variance explained for each of the management domains tested in this study (M_1, M_2, X_t). It is noted that some measures have missing data. While listwise deletion was used to perform each PCA, analyses were also replicated using mean substitution but produced similar variance explained and loadings for variables included for each term in the model. Scree plots are also presented in Figure 4.3 to further aid in understanding the magnitude and relevance of a single factor solution for each term.

[Insert Table 4.3 about here]

[Insert Figure 4.3 about here]

In column two in Table 4.3, one factor of seven components (variables) is shown to explain 42.8 percent of the variance in Internal Management (M_1). Composite scores created from loading suggest that higher Internal Management scores are associated with Institutions who: are led by a president with academic training in the arts, humanities, social and/or natural sciences; pursue a land-grant mission, and have greater levels of research productivity, administrative and instructional capacity, faculty salary and instructional expenditures, and pursue a land-grant mission.

Loadings in column four of Table 4.3 indicate that External Management (M_2) composite scores are higher for Institutions that have higher levels of total enrollment, collect more net tuition revenue, and enroll students with higher family incomes and ACT/SAT scores. Greater levels of graduate student and out-of-state enrollment are also associated with higher External Management scores. Higher External Management scores are also associated with IHEs that enroll fewer female, first generation, undergraduate, part-time, or low-income students.

Lastly, column six of Table 4.3 loadings captures the state environment in which each IHE operates. These results indicate that Environment scores are higher for IHEs operating in more states with higher populations, levels of political

party competition, as well as unemployment levels. Higher environment scores are also associated with IHEs in states with greater proportions of the population that are less than 65 years old, college-aged, or enrolled in a two-year college.

Having reduced the sets of variables representing each managerial domain (M_1, M_2, X_t) into three single composite scores, the next task involves specifying a model to test the research questions of this study. While this process can be arduous (Snijders and Bosker 2000), proper model specification is necessary to ensure that the fixed effects of management factors and other predictors of interest are correctly interpreted.

Multi-Level Model Specification

Data for the initial model-building process originated from the Brint Dataset, IPEDS, NCHEMS, and personally computed/obtained public data described in Chapter 3. For these data, time is considered to be balanced across IHEs, where final models include 166 institutions measured at assumed equal 1-year time intervals, over 9 possible years (2002-2010). Estimates produced by these models were examined to change over time in 6-year graduation rates (measure of performance), as well the extent to which institutions differ from one another in intercepts in change over time. As also discussed in Chapter 3, these data were stacked (long format) such that one row contains the data for one year for one institution. Uniquely identifying variables (IDs: unitid and stateid) index which institution and which state measured values belong. The model building processs follows that of Snidjers and Bosker (2000), Hoffman (2015), and Raudenbush and Burke (2003).[12]

Results from the model building process are presented in Table 4.4 Attention is first turned toward specification of a two-level unconditional means model (Model

[1]The SAS MIXED procedure (PROC MIXED) was used for multi-level and alternative covariance structure models

[2]MACRO programs used for computing Likelihood Ratio Tests are available from Dr. Lesa Hoffman, http://www.lesahoffman.com.

1a). Level one captures each IHEs average graduation rate and the variability from this average within each IHE over time. Level two captures the average graduation rate of the sample and the variability between IHEs from this average. The system equations representing separate levels and the combined model are written as:

$$\begin{aligned} Combined : y_{ti} &= \beta_{00} + u_{0i} + e_{ti} \\ Level-1 : y_{ti} &= \pi_{0i} + e_{ti} \\ Level-2 : \pi_{0i} &= \beta_{00} + e_{ti} \end{aligned} \tag{4.1}$$

Model 1a can be referred to as the fully unconditional model and has two variance components: level-1 residual (e_{ti}) and level-2 random intercept. It assumes that all institutions are independent, or in other words, does not yet account for an institution's membership in a particular state. Results from model 1 are listed in column two of Table 4.4. Equation 4.1 specified that graduation rates (y) at time (t) for institution (i) in state (j) is modeled as a linear combination of the grand mean graduation rate (β_{00}) averaged across all years for all institutions within all states (institutions and states are combined), plus a random effect estimate at level 2 that quantifies the variation in school i's mean graduation rate as it deviates from the overall sample mean graduation rate ($\tau_{\pi 00}$), plus a level 1 residual ($e_{ti}; VAR[e_{ti}] = \sigma^2$) quantifying the variation in graduation rates collected across T=9 time points as they deviate around each institutions average graduation rate. Subsequent multi-level models build on Equation 4.1; with the exception of the final model, additional equations are not presented in order to focus on results of the model building process.

Results

Model 1a indicates that the average graduation rate of the sample is approximately 50 percent. Relatively little within IHE variability is observed ($\sigma^2 = 12.99$),

suggesting that the majority of graduation rate variance is between institutions ($\tau_{\pi 00} = 306.33$). The intraclass correlation similarly indicates that (ICC) 95.9 percent of graduation rate variance was between institutions. The addition of a level-3 random intercept for state in Model **1b** significantly improved model fit ($-2\Delta LL(1) = 10.927, p < 0.001$), indicating that of the 95.9 percent of the variance between schools, 18.9 percent was due to shared variance at the state-level (i.e., institutions in the same state). The total variance explained at each level was 4.1 percent at level 1 (within schools over time), 77.7 percent at level 2 (between schools), and 18.2 percent at level 3 (between states). The majority of variability in graduation rates appears to be between schools, thus the addition of level two predictors may help explain between IHE variability in performance.

Based on the pattern of model-estimated means, fixed linear and quadratic effects of time were then added in Model **2a** and accounted for 22 percent of the level-1 residual variance. Adding variance in Model **2b** to account for the level-2 school random linear time slope (and its covariance with the level-2 school intercept) significantly improved model fit, $-2\Delta LL(2) = 274.62, p < 0.001$. However, the addition of variance in Model **2c** for a level-3 (state) random linear time slope (and its covariance with the level-3 state intercept) did not significantly improve model fit, $-2\Delta LL(2) < 0.00, p = NS$, and suggest that less than 0.4 percent of time-slope variance contributed by level 3 (state) was not significantly different from 0. Finally, random quadratic slopes for level 2 (schools) were added to Model 2b, as indicated in Model **2d**. Results indicated significant improvement in model fit with all quadratic covariance parameters (intercept ($\tau_{\pi 020}$), slope ($\tau_{\pi 022}$), covariance ($\tau_{\pi 120}$) for quadratic time being statistically significant. Describing how graduation rates change over time are now described using the best fitting model.

As described in Chapter 3, it is important to recall that time was centered at the midpoint prior to interpreting the fixed effects in Model 2d. Using year 2006 does not change the observed relationships in the model but it does change the interpretation of the intercept, slope, and growth coefficient. The coefficient for

linear time ($C\_Time = 0.61$) suggest that on average, graduation rates increase by about 0.61 percent each year. However, the presence of the quadratic term indicates that the rate of increase slows down over time ($C\_Time^2 = -0.07$). This deceleration is visualized in Figure 4.4.

[Insert Table 4.4 about here]

[Insert Figure 4.4 about here]

[Insert Table 4.5 about here]

As discussed in Chapter 3, MLM and variants of Hierarchical Linear Modeling enable researchers to understand how subjects in a study change both overall and individually (Hoffman 2015; Samonte 2013). Results in this study do suggest that overall graduation rates tend to increase for each year in this study but that the rate of this change slows over time. Significant random effects presented in Table 4.4 further suggest that average graduation rates vary across IHEs nested within states, but also that that the rate of change varies across levels of performance for individual schools. These relationships are visualized in Figure 4.5, which plots graduation rates over time for high, average, and low performing IHEs (IHEs above, within, and below one standard deviation of the mean, respectively).

[Insert Figure 4.5 about here]

Trajectories in Figure 4.5 indicate the differences between IHEs across the three levels of performance. At first glance, it is observed that despite difference in initial performance, the rate at which graduation rates increase for high and average performers is about the same. The same rate of change was not observed for low performing IHEs whose rate of change for and actually decreases close to year 2007. Two important points can be derived from these findings; one point having implications for theory and the other point necessary to guide empirical decisions for analyses in Chapter 5. Points one and two are further elaborated on below.

First, the near steady and eventual decline in graduation rates for low performing IHEs may be explained by features of the public management surrounding bureaucratic inertia and the stability inducing elements associated with hierarchies. Once hierarchies and the organizations within that system are set on a path, they will tend to sustain that trajectory "with little deviation barring a major shock to the system" (O'Toole and Meier 1999, 513). Evidence from this study offer validity evidence supporting the conceptualization of performance continuity within the OTM framework; a notion that would be important to understanding managements relationship to performance in Higher Education. Testing factors that influence this relationship is the crux of Chapter 5, and relevant to the second point on implications of these results.

As eluded to in the introduction of this Chapter 4, appropriate multi-level model specification is a difficult but important task. The MLM approach, though helpful to understanding individual change, is less suited to testing the dynamic and interactive components of the OTM framework conceptualized in this study. Scholars often argue that the inclusion of lagged dependent variables and interactions (dynamic models with serial correlation) in MLM may not be appropriate (Achen 2000; Allison et al. 2015). In the context of the present study, these scholars' argument refers to the (O_{t-1}) term in the context of the present study that if included, can positively bias the lagged coefficient and underestimate other predictors.

Moreover, the specification of random effects and a lagged dependent variable in the same model violates the independence assumption; and discovered in the model building process, leads to unwieldy results of zero estimates for variance components, which results indicate is not the case. While this limitation cannot be completely overcome in the present study, the specification of an Alternative Covariance Structure (ACS) model for residuals can account for estimation errors arising from the issues described. This simpler model may also aid in a more

parsimonious and interpretable understanding of management's relationship to performance.

ACS Model Specification

In light of limitations described previously, the current MLM model is simplified to account for residual error auto-correlation across repeated measures which as described by Singer and Willet (2003), is a feature "not possible under the standard model of change" (253). By removing the random components of the former multi-level model, all level 2 and 3 variance and covariance between institutions nested in states, and all level 1 variance and covariance within schools nested in states resides in the R correlation matrix (Hoffman 2015; Peugh and Heck 2017; Samonte 2013). The removal of random state effects may also be appropriate from an inferential statistics standpoint; political scientists and policy scholars often debate whether 50 geographic states can be sampled randomly (Gelman et al. 2005; Heck, Thomas, Tabata 2013). Though other limitations with the specified model persist, an AR(1) first order auto-regressive residual error (covariance and variance) across each year in graduation rates is accounted for through the parameters p (auto-correlations between time points) σ^2 (homogeneous variances) (Hoffman 2015; Peugh and Heck 2017). As a result, all deviations from the average rate of linear and quadratic change in graduation rates can be determined by the heteroscedasticity and auto-correlations of level-1 (repeated measures of graduation rates of IHEs nested within states) residuals.

The choice of an AR(1) error covariance structure was largely based on the OTM model of management; a model that is inherently auto-regressive (O'Toole and Meier 1999; S. Nicholson-Crotty and O'Toole 2004). Even though other covariance structures (compound symmetry, Toeplitz, heterogenous auto-regressive) can be tested to obtain the best fitting model, that is beyond the scope of this study. For reasons of transparency and replication, however, comparison models are provided in Table 4.5 but are not described in detail. The primary take-away from Table 4.5

indicates that the AR(1) structure is a slightly better fit than other ACS models, at least with the objective of seeking a simpler model with the fewest estimated parameters.

Since the focus of this study is focusing on modeling of the mean graduation rate, and because the systematic effects of time are not necessary to estimate in the model when using the R matrix alone (Hoffman 2015), the final chosen AR(1) model can be further simplified by removing time as a predictor. The removal of the fixed time effects will also help simplify the interpretation of results for the already quite complex interactive models that will be used to test hypotheses in Chapter 5. This decision is also supported by previously discussed results indicating that the amount of graduation rate variance explained by time is quite small (less than 5 percent).

Summary

The depth and breadth of Chapter 4 is quite substantial and can benefit from a brief summary. As eluded to in the introduction of this Chapter 4, appropriate multi-level model specification is a difficult but important task. In the present study, it appears that graduation rates tend to increase over time, and many of the stability-inducing elements, management factors, and environmental variables thought to explain these changes are correlated with performance. PCAs were then conducted as a variable reduction technique and enabled the computation of a single score for each management term in the OTM framework. Subsequently, a multi-level model with mixed effects incorporating computed terms was initially specified to test hypotheses in this study. This process was able to shed light on graduation rate variability over time but was deemed to be less suitable than an Alternative Covariance Structure model given that understanding individual change was not a primary focus of this study. Great effort was undertaken to detail this process, but were important steps ultimately resulting in the selection of a simpler model to test how management may impact performance in HE.

For the sake of brevity in the summarizing model building already described in this chapter, an appropriate culmination of this chapter's purpose is summarized by Snidjers and Bosker (2000, 91) below:

> Model specification is one of the most difficult parts of statistical inference, because there are two steering wheels: substantive (subject-matter related) and statistical considerations. These steering wheels must be handled jointly. The purpose of model specification is to arrive at a model that describes the observed data to a satisfactory extent but without unnecessary complications. A parallel purpose is to obtain a model that is substantively interesting without wringing from the data drops that are really based on chance but interpreted as substance. (as cited in Pastor 2017)

Under the auspices of these empirical and theoretical underpinnings, Chapter 5 proceeds to test the fully operationalized OTM model conceived in this study.

Table 4.1: *Descriptive Statistics and Bivariate Correlations for Dependent Variable*

Variables[a.]	*N*	*missing*	*M(SD)*	*Corr(x,DV)*[b.]
Graduation Rate	1488	6	50.2(17.8)	-
Prior Year Graduation Rate	1481	13	49.5 (17.6)	.980*
State HE Governance Structure (0-1)	1494	0	0.8 (0.2)	-.351**
University President Tenure	1494	0	5.7 (5.4)	0.004
University President Age	1494	0	60.1 (5.9)	.100**
University President Gender (0-1)	1494	0	0.8 (0.4)	0.004
President Degree Field (0-1)	1494	0	0.3 (0.5)	-.262**
Administrative Capacity	1166	328	1.2 (0.8)	.259**
Instructional expenditures per student	1493	1	7067.2 (4327.8)	.529**
Instructional Capacity	1164	330	5.6 (2.6)	.383**
Land-Grant Mission (0-1)	1494	0	0.2 (0.4)	.346**
HBCU Status (0-1)	1494	0	0(0.2)	-.210**
Research Productivity (0-1)	1494	0	0.8 (0.2)	.519**
Faculty Salary Expenditures	1377	117	65820 (14581.8)	.724**
Enrollment of High Performance Students	1263	231	24.8 (3.1)	.798**

Continued on next page

Table 4.1: *Continued from previous page*

Variables[a.]	*N*	*missing*	*M (SD)*	*Corr (x,DV)*[b.]
Enrollment of Female Students	1485	9	0.5 (0.1)	-.398**
Enrollment of High Income Students	1493	1	60000.3 (15177.3)	.679**
Government Reliance	1377	117	0.6 (0.1)	.094**
Tuition Revenues	1377	117	5896.8 (2595.3)	.560**
Enrollment of Out-of-State Students	1376	118	0.2 (0.1)	.172**
Total Enrollment	1377	117	18081.2 (19697.5)	.487**
URM Enrollment	1377	117	0.3 (0.2)	-0.024
Low-Income Students	1352	142	0.3 (0.1)	-.579**
First Generation Students	1490	4	0.4 (0.1)	-.765**
Undergraduate Students	1377	117	0.8 (0.1)	-.413**
Graduate Students	1312	182	0.2 (0.1)	.335**
Part-time students	1371	123	0.2 (0.1)	-.689**
Democratic Composition of Legislature	1458	36	0.5 (0.1)	0.034
Democratic Governor	1494	0	0.5 (0.5)	0.038
Legislative Professionalism	1458	36	0.2 (0.2)	.299**

Continued on next page

Table 4.1: *Continued from previous page*

Variables[a.]	*N*	*missing*	*M (SD)*	*Corr (x,DV)*[b.]
State Government Ideology	1494	0	0.5 (0.1)	.153**
Citizen Ideology	1494	0	0.5 (0.1)	.222**
State Party Competition Upper Chamber	1401	93	1.6(0.6)	.326**
State Party Competition Lower Chamber	1368	126	1.6 (0.6)	.293**
State Population	1494	0	10469516.9 (9869291.9)	.280**
State Unemployment Rate	1494	0	0.1 (0)	.059*
State Support of Higher Education	1494	0	6516.9 (2095.6)	-.233**
Private Institution Enrollment	1494	0	0 (0)	.134**
Two-Year Institution Enrollment	1494	0	0 (0)	.272**
Traditional College-Age Population	1494	0	0.1 (0)	-.056*
Older Population	1494	0	0.2 (0)	-.097**

Note: Years=2002-2010. IHEs=166. States=43. Two-tailed Tests.

[a.] Range denoted for categorical variables.[b.] Correlations with Graduation Rate.

* (p <0.1), * (p <0.05), * (p <0.01)

Table 4.2: *Frequencies of Time Invariant Predictors*

Variable	Frequency	% of Sample
Governance Structure		
High	103	62.0%
Moderate	39	23.5%
Low	24	14.5%
Land- Grant Institution		
Yes	33	19.9%
No	133	80.1%
HBCU		
Yes	7	4.2%
No	159	95.8%

Note: Years=2002-2010. IHEs=166. States=43. Total N=1494.

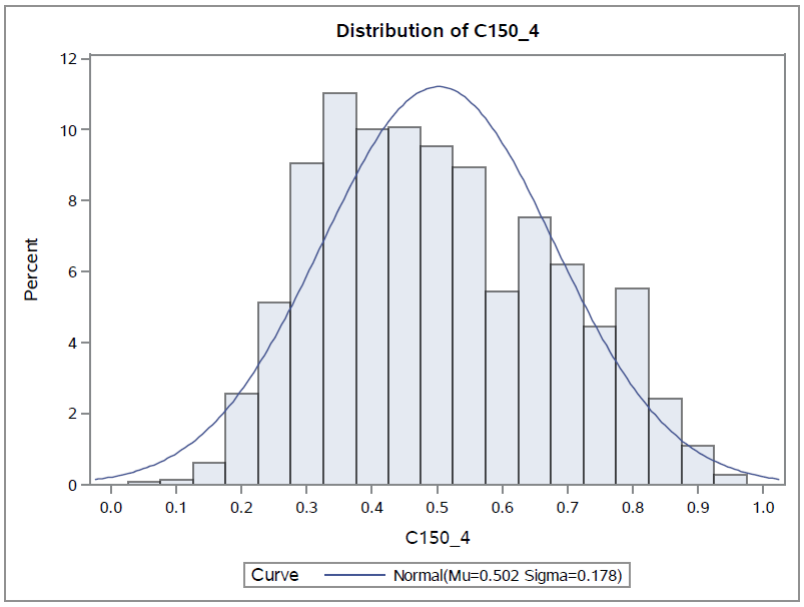

Figure 4.1: Univariate Distribution of Graduation Rates

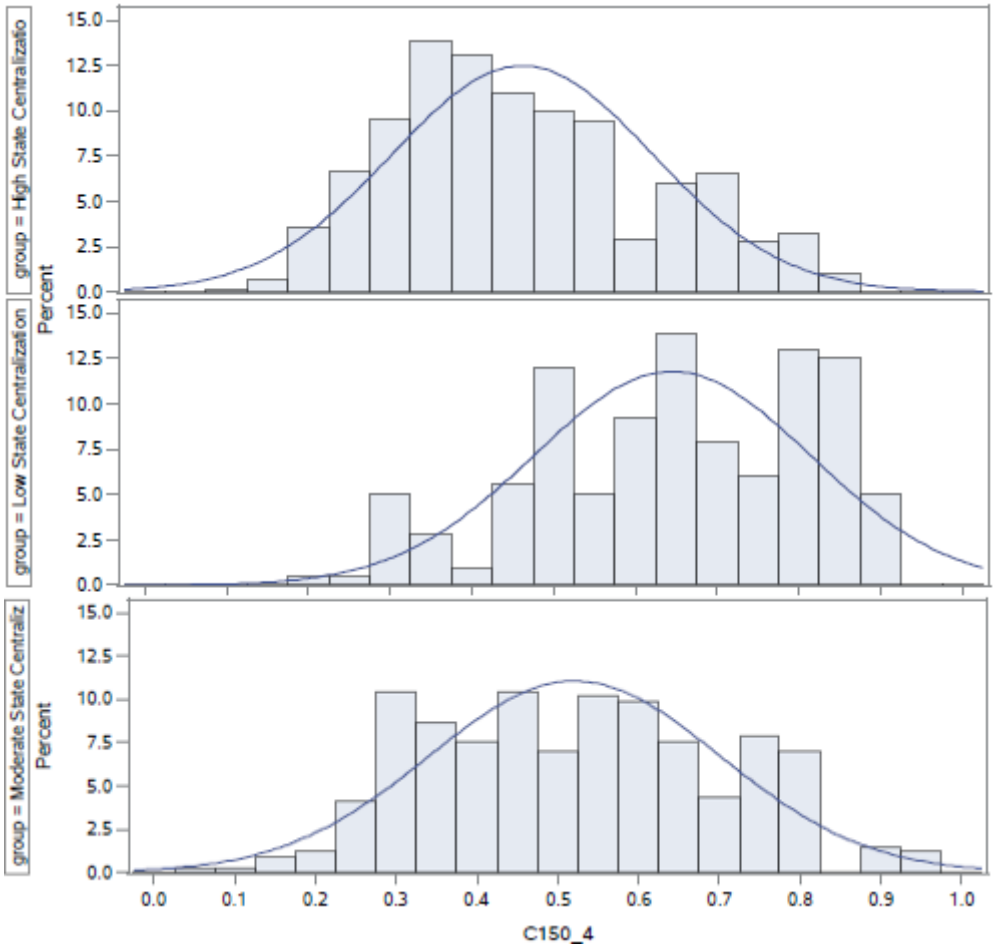

Figure 4.2: Distributions of Graduation Rates by Governance Structure

Table 4.3: *Principal Components Analyses*

Variables	M_1-Factor 1		M_2-Factor 1		X_t-Factor 1	
	Loadings	Communalities	Loadings	Communalities	Loadings	Communalities
Internal Management (M_1)						
Carnegie Classification	0.706	0.499				
Landgrant−Mission	0.493	0.244				
Managerial Quality	-0.404	0.163				
Administrative Capacity	0.412	0.170				
Instructional Capacity	0.883	0.780				
Faculty Salary	0.696	0.484				
Instructional Expenditures	0.809	0.654				
External Management (M_2)						
Student Family Income			0.816	0.665		
Out of State Enrollment			0.430	0.185		
Total Enrollment			0.503	0.253		
SAT/ACT Score			0.837	0.701		
Net Tuition Revenue			0.688	0.473		
Graduate Enrollment			0.472	0.222		
Female Enrollment			-0.621	0.385		
First Gen. Enrollment			-0.896	0.802		
Undergraduate Enrollment			-0.528	0.279		
Part-Time Enrollment			-0.548	0.301		
Pell Enrollment			-0.675	0.456		

Continued on following page.

Table 3.1: *Continued from previous page*

Variables	M_1-Factor 1		M_2-Factor 1		X_t-Factor 1	
	Loadings	Communalities	Loadings	Communalities	Loadings	Communalities
State Environment (X_t)						
Party Competition(LC)					0.921	0.849
Party Competition(UC)					0.905	0.820
Total Population					0.790	0.624
Unemployment					0.365	0.133
2yr College Enrollment					0.849	0.721
Population (65+)					-0.692	0.479
State Population (18−24)					0.434	0.189
No. of Variables	7		11		7	
Eigenvalue	2.993		4.723		3.814	
% Variance Explained	42.762%		42.932%		54.486%	

Note: Level 2 Institutions = 1494 (166 $*$ 9 years). Level 3 States = 43.

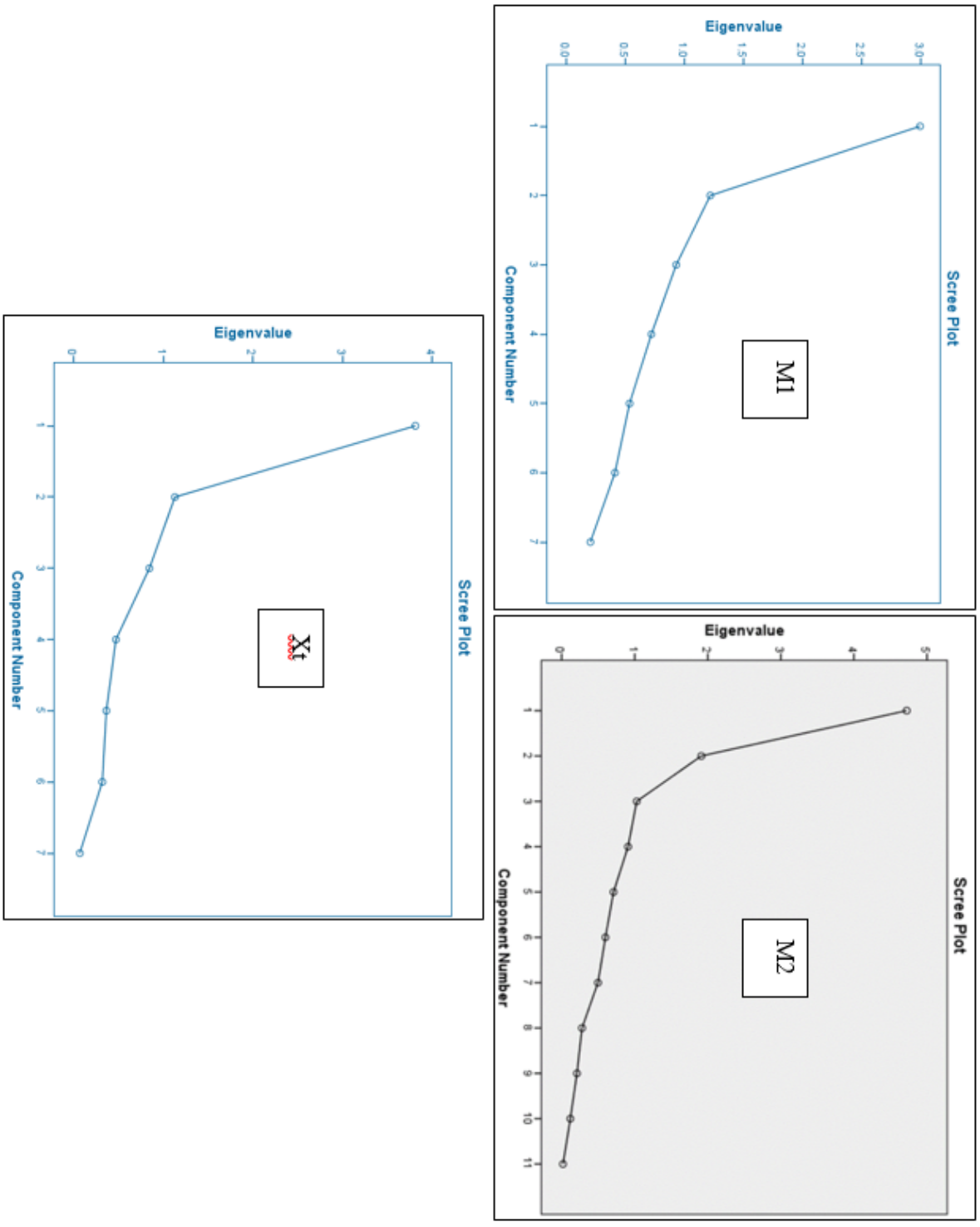

Figure 4.3: Scree Plots for Principle Components Analyses

Table 4.4: *Modeling Graduation Rates Over Time (years 2002-2010)*

	DV = 6-year Graduation Rate					
	(Model 1a) L2 RI	(Model 1b) L3 RI	(Model 2a) Time: FE	(Model 2b) Time: L2 ME	(Model 2c) Time:L3 ME	(Model 2d) Time^2: L2 ME
Fixed Effects						
Intercept(γ_{000})	50.23***	49.46***	49.90***	50.07***	49.82***	50.06***
	(1.36)	(1.76)	(1.76)	(1.71)	(1.75)	(1.69)
C_Time(γ_{100})			0.61***	0.61***	0.60***	0.61***
			(0.03)	(0.06)	(0.06)	(0.06)
C_Time^2(γ_{200})			-0.07***	-0.07***	-0.07***	-0.07***
			(0.01)	(0.01)	(0.01)	(0.02)
Random Effects						
Level 1: Residual(σ^2)	12.99***	12.99***	10.12***	6.77***	6.77***	5.99***
	(0.51)	(0.51)	(0.40)	(0.28)	(0.28)	(0.27)
Level 2: Intercept($\tau_{\pi 000}$)	306.33***	245.96***	246.07***	249.97***	246.84***	246.35***
	(33.88)	(30.73)	(30.71)	(31.36)	(30.84)	(30.94)
Level 2: Covariance($\tau_{\pi 010}$)				2.79***	2.26*	2.69***
				(1.01)	(1.06)	(0.99)
Level 2: Linear Slope($\tau_{\pi 110}$)				0.45***	0.44*	0.47***
				(0.06)	(0.07)	(0.06)
Level 2: Covariance ($\tau_{\pi 120}$)						0.38
						(0.26)
Level 2: Quadratic Slope($\tau_{\pi 220}$)						0.018***
						(0.00)
Level 2: Covariance($\tau_{\pi 020}$)						0.00
						(0.01)

Continued on following page

Table 4.4: *Continued from previous page*

DV = 6-year Graduation Rate						
	(Model 1a) L2 RI	(Model 1b) L3 RI	(Model 2a) Time: FE	(Model 2b) Time: L2 ME	(Model 2c) Time:L3 ME	(Model 2d) Time^2: L2 ME
Level 3: Intercept($\tau_{\beta_{000}}$)		57.46**	57.43**	50.76**	56.44**	48.17**
		(25.56)	(27.45)	(25.56)	(27.32)	(24.39)
Level 3: Covariance($\tau_{\beta_{011}}$)					0.91	
					(0.67)	
Level 3: Slope($\tau_{\beta_{010}}$)					0.00	
					(0.03)	
-2L*L*	8924.7	8913.7	8592.6	8317.9	8315.9	8280.3
BIC	8934.9	8919.7	0.8603.8	8336.8	8342.2	8310.4
χ^2	3865.62***	3876.55***	4189.41***	4464.03***	4446.12***	4501.63***

Note: Level 2 Institutions = 1494 (166 *x* 9 years). Level 3 States = 43. Standard errors in parentheses. Two-tailed tests.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

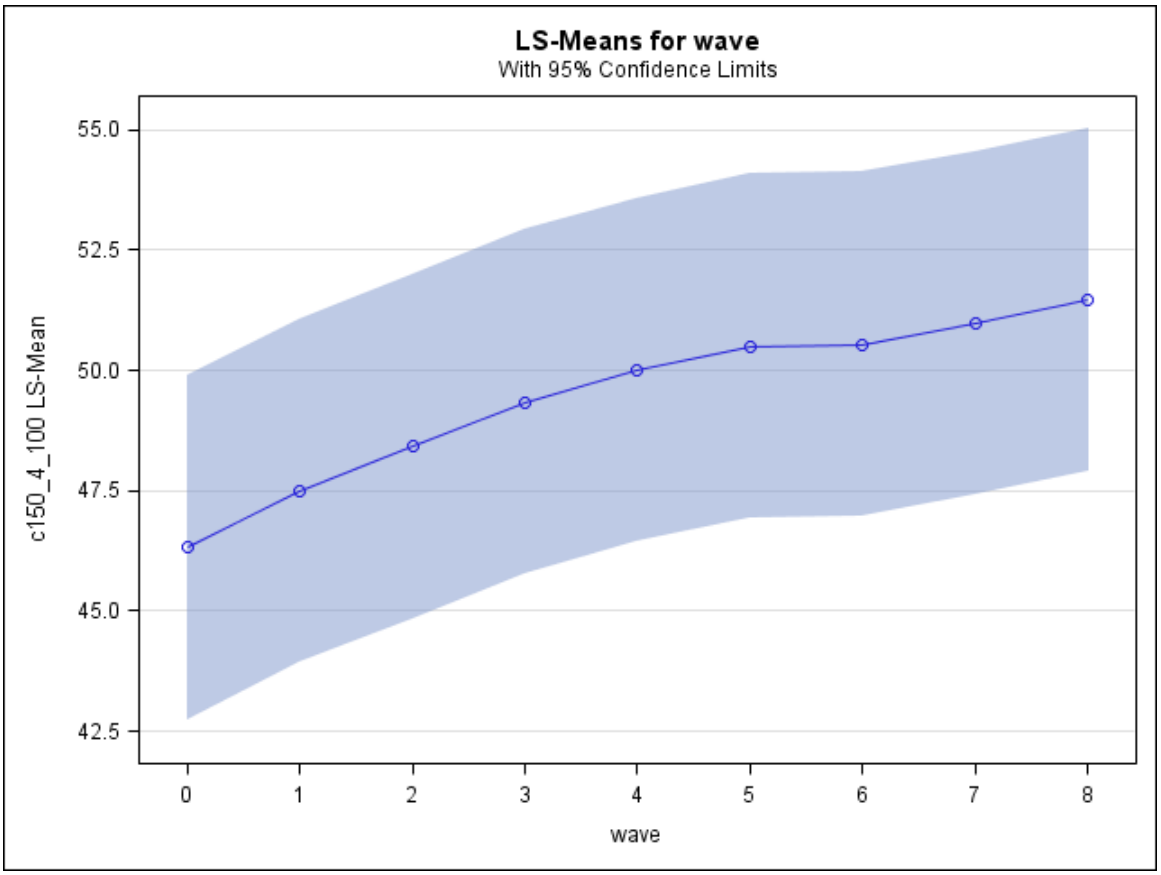

Figure 4.4: Graduation Rates Over Time

Table 4.5: *Comparing Multilevel and ACS Models*

Models	# of Parameters	-2L*L*	*AIC*	*BIC*
ACS Models				
CS	3	8592.6	8598.6	8603.8
AR(1)	**2**	**8499.0**	**8503.0**	**8509.3**
ARH(1)	11	8480.9	8500.9	8532.0
UN	45	8200.3	8290.3	8430.3
Multilevel Models				
Model 2a:	3	8592.6	8598.6	8603.8
Model 2d:	8	8280.3	8296.3	8310.4

Note: n = 1494.

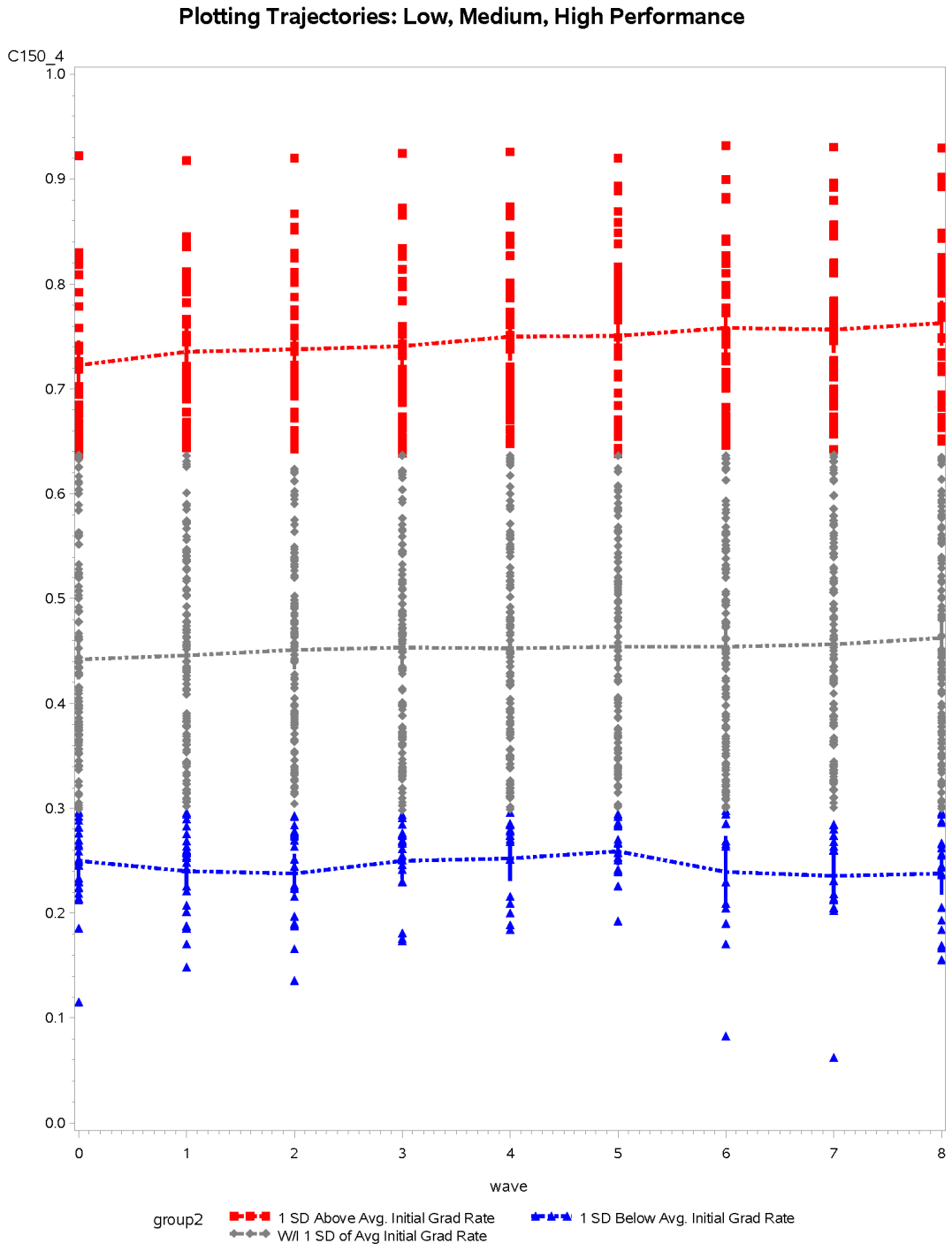

Figure 4.5: Graduation Rates Over Time by Initial Performance Levels

5

Primary Analyses

This chapter sets out to test the primary relationships of interest of the conceptual model presented in Chapter 3. It is important to note that the addition of remaining terms this model (HE governance structures and past performance) has decreased the total number of observations in the sample from 1,494 to 1, 242 institution/years; representing a decrease of 16.8 percent. The smaller sample size is due in part to the fact that past performance is a one-year lag of the dependent variable. MLM and ACS models were able to accommodate missing dependent variables in Chapter 3, but both forms of modeling in the presence of missing predictors can enhance estimate biases and limit confidence when interpreting results.[1]

Rather than impose unrealistic assumptions regarding the nature of these missing data, listwise deletion was used to best reflect reality and to compare

[1]Several schools were also missing data for PCA scores on management terms, but as described in Chapter 3, results using mean substitution or listwise deletion were virtually similar.

equivalent models. There is also less concern surrounding biased parameter estimates since models use Restricted Maximum Likelihood Estimation (Schafer and Graham 2002). While the loss of information may limit the generalizability of findings to only schools included in the study (as opposed to the random sample), 138 of the 166 IHEs were still retained and located within the original 43 states of the sample. Indeed, this study focuses on between institution variability in performance as explained by internal and external management factors; variables used in this analysis still permit the testing of related hypotheses and are presented in this section.

Results

Additive Model

Results for the final models are provided in Table 5.1. Because predictors in the models are grand mean centered, coefficient estimates are interpreted as the average overall effect on graduation rates. It is also important to remember that predictors in these models are on the same metric (standard deviation units) and are thus directly comparable. Model **3a** presents results for the full additive model including each term of the OTM framework; past performance, governance structure, internal management, external management, and state environmental factors.

[Insert Table 5.1 about here]

Upon initial inspections of the results, the large positive impact of past performance (O_{t-1}) on current performance is noticeable ($\beta = 0.95, SE = 0.01, p < 0.01$). This speaks to the autoregressive nature of graduation rates in higher education, a facet of performance similarly observed in other policy environments (S. Nicholson-Crotty and O'Toole 2004). For every one percent performance increase in a prior year, current year graduations rates are expected to increase by almost one percent. The large effect of this term indicates the importance of controlling for past

performance, or the modus operandi of public organizations, in models of current performance. Other stability influences were observed in the salient impact of bureaucratic structures on performance, which is a stability term capturing levels of state centralization and authority. Results suggest that increases in levels of state centralization and authority (S) are negatively associated with graduation rates ($\beta = -1.38, SE = 0.09, p < 0.01$). After controlling for the effects of past performance and other predictors in the model, every one unit increase in state centralization and authority indicates a 1.38 percent decrease in graduation rates. The directionality of this result was not expected but may speak to the unique bureaucratic context of public HE; a notion that is returned to and expanded upon in the following sections.

Surprisingly, other performance stabilizing elements related to aspects of internal management (M_1) were not significantly associated with performance. This finding of non-significance was unexpected, and it is plausible that variables used in this study do not adequately capture the broad range of internal managerial activities taking place at public universities. However, a different rationale may be inferred from results; although internal improvement activities *internal processes, student support, and organizational stability* could be important, it may be more likely that internal management's impact on performance is quite small when simultaneously considering the large positive effects of external management activities (M_2), ($\beta = 0.86, SE = 0.18, p < 0.01$). Results suggest that every one-unit increase in external management graduation rates increase by 0.86 percent, on average and after controlling for all other terms in the model. Similar results were observed when comparing semi-partial correlations in an additional multiple regression model, indicating that even after accounting for shared variance between the two terms the large impact of M_2 and the relatively small impact of M_1 on performance remained.

Turning to the last term in Model 3a, features of an institutions operating environment (X_t) shared a negative relationship with performance as hypothesized.

However, the impact of this term was not significant after controlling for other terms in the model. To further unpack findings presented thus far, attention now turns to results examining the interactive features of the model.

Interactive Models

Results for model **3b** are presented in Table 5.1. It should be noted that in addition to estimates for the specified interaction terms, models also include higher order interactions to isolate each terms direct impact on graduation rates and account for cross-level interactions.[2] In testing hypotheses related to stability inducing elements of performance,[3] the importance of controlling for past performance is again observed ($\beta = 0.94, SE = 0.01, p < 0.01$). Even after controlling for this large positive affect, the effect of external management has a large positive association with graduation rates ($\beta = 0.87, SE = 0.18, p < 0.01$). After controlling for other terms in the model, every one-unit increase in external management is associated with a 0.87 percent increase in graduation rates. It is noted that after accounting for the interactive aspects of internal management, the impact of external management is slightly less than in Model 3a.

Only one interaction in Model 3b was significant (past performance, internal management, and stability). These results may provide additional credibility to the impact of external management on performance in HE, but variables measuring M_1 may not be capturing all important elements of internal management. Despite this limitation, result can still shed light on hypotheses related to internal management, though results are somewhat mixed.[4] In model **3b**, the main effect of internal management suggest that for each one unit increase, graduation rates

[2]Grand Mean Centering (CGM) has been used, thus cross-level interactions is a relative term in this case because any variance between IHEs across state level factors has been removed, thus, the effect of state-level factors or the associated X_t term reflect within institution and between institution variability that is explained in graduation rates (Enders and Tofighi 2013).

[3]Environmental features are not tested in Model 3b, as specified in the conceptual model of the OTM framework.

[4]Other scholarship testing the OTM framework often note the complexity of the model, and similarly report non-significant findings given the complexity of the model and likelihood that the full range of managerial aspects may never be captured (S. Nicholson-Crotty and O'Toole 2004; Meier and O'Toole 2002; Meier et al. 2015).

increase by 0.05 after accounting for other terms in the model. One of those important "other" terms accounted for, however, is the interaction of M_1 with past performance. It was hypothesized that increases in M_1 would decrease the impact of the past performance. While the direct impact of past performance decreased slightly, the indirect effect captured by the positive interaction between (O_{t-1}) and (M_1) suggest that the impact of internal management activities increases as graduation rates increase. In other words, internal management still has a negligible impact on performance when considering all terms in the model, but the small impact that it does have may be important for maintaining levels of performance in higher performing IHEs.

Results in the model 3b also offers more clear support of Hypothesis 6.2. After controlling for past performance and other terms in the model, increases in state centralization do indeed appear to decrease the small impact internal management may have on graduation rates. The interaction term ($M_1 * S$) suggest that for a one unit increase in governance structure, the direct impact of internal management decreases by almost a half-percent (-0.42 percent). As previously eluded to, the only significant three-way interaction ($O_{t-1} * M_1 * S$) further suggest that IHEs with higher levels of past performance can mitigate the negative impacts that centralized governance structures has on performance. Here, every one percent increase in the prior year's graduation rate, the negative impact that the relationship between governance structure and internal management has on performance (-0.42 percent) decreases by 0.04 percent.

Results for the final interactive model **3c** are presented in the last column of Table 5.1 and address remaining hypotheses pertaining to management in the environment. Again, after controlling for the large positive effects of the prior year's graduation rate, results suggest that external management shares a strong positive association with current performance($\beta = 1.04, SE = 0.20, p < 0.01$). Increased levels of state centralization and authority remain negatively associated with performance, as indicated by the main effects for governance structure ($\beta =$

$-1.70, SE = 0.45, p < 0.01$). Compared to Model 3b, the inclusion of external interaction variables indicates that observed estimates for the environmental term are also now significant ($\beta = -0.36, SE = 0.15, p < 0.05$). After accounting for the interaction between externally oriented management activities (M_2) and environmental features (X_t), a one unit increase in these state-level influences is associated with a 0.36 percent decrease in graduation rates. The fact that (X_t) is significant only in Model 3c suggest that in the absence external management (and its interaction with X_t), performance can be negatively impacted unless environmental shocks or other influences are attenuated. Similar relationships have been observed in other public management scholarship (S. Nicholson-Crotty and O'Toole 2004; Meier and O'Toole 2002; 2007; 2009; 2010; O'Toole and Meier 1999; 2003) and suggest that managing performance in a HE context requires attention to external political, demographic, and economic forces.

Lastly, Model 3c offers mixed support for remaining hypotheses. Estimates for the interaction term ($M_2 * S$) are in the expected direction, where increases in state centralization tend to enhance the positive impact of external management activities on graduation rates by 0.38 percent. To aid interpretation of this result, it is important to recall how the measure M_2 was constructed in Chapter 4. Based on the PCA loadings in Chapter 4, higher values for M_2 indicate IHEs with higher levels of total, graduate and out-of-state enrollment, as well as greater proportions of high income, high performing students. Higher scores are also associated with IHEs that enroll lower proportions of first-generation, low-SES, and part-time students, and whose student population is primarily composed of undergraduate students. Thus, IHEs with higher graduation rates tended to reflect IHEs that sought to capitalize on opportunities in their environment and focus less on buffering strategies. If the direction of the interaction estimate ($M_2 * S$) is flipped, it may be inferred that decreases in state centralization can dampen the positive effects of exploiting strategies (1.04 percent) by 0.38 percent. Stemming from this logic, it can be inferred that compared to exploiting strategies, , buffering

strategies can offset factors negatively impacting performance in less centralized bureaucratic environments.

Summary and Implications

Results presented in Chapter 4 suggest that features of internal management related to human resource management and aspects of managerial quality are associated with graduation rates, at least in part. Other stabilizing influences such as governance structures and environmental management strategies were also observed to have substantial impacts on graduation rates. These variables were then factor analyzed to create individual structural, managerial, and environmental terms for each IHE and to test their hypothesized relationship with performance. Collectively, many features of the OTM framework as conceptualized in this study were shown to impact graduation rates. As observed in other policy domains (law enforcement, K-12 education), modeling past performance was shown to be an important stabilizing influence of current IHE performance. As expected, higher levels of past performance were positively associated with current performance (**H1**).

Using a novel data set, this study represents the first known attempt to model all components of the OTM framework in the context of HE. Attention will first be given to the structural element (S), which has been distinguished from other stabilizing features of performance (mission, procedural, and organizational stability) conceptualized by the M_1 term. While these types of stability are related to structure, the S term operationalized in this study is intended to gauge the extent to which state's possess the formal authority to compel (O'Toole and Meier 1999). Thus, IHE's that operate in more centralized governance structures are subject to more state control and oversight, both of which are features that inform routines and operation, information systems, and the goals IHE's pursue.

Although much of the research studying governance structures focuses on the impact of centralization on state policy outcomes (state HE appropriations), no known study has modeled the relationship these features share with managerial

strategies and outputs at the institutional level in Higher Education. Results from this study shed light on this relationship, but findings are contrary to expectations (**H2**). Because the goals and accountability metrics of IHEs have shifted to align more with state-level priorities in recent years (Ewell and Jones 2006; McGuinness 2016), it was believed that greater centralization would enable IHEs to work more closely with lawmakers in policy processes, both in the identification of policy initiatives and the resources needed to attain public goals (such as performance-based funding models). However, greater levels of centralization were found to be negatively associated with performance; a finding that may be attributed to unique features of the HE policy environment. As J. Nicholson-Crotty and Meier (2003) surmise, greater centralization enables lawmakers to devote more attention to IHEs and overcome information asymmetries, but it also permits politics to penetrate organizations both directly and indirectly. During times of fiscal stress and high unemployment, lawmakers may choose to divert more state funds to other areas of government. Similarly, elected state officials may also become more attentive to issues salient to voters. For instance, if a state faces a revenue shortfall and a large block of a state's electorate is beyond 65 years old or older, lawmakers may choose to divert funds away from areas such as education to other government programs such as Medicaid. Indeed, competing "demands of budget competitors like K-12 education, Medicaid, and highway infrastructure" (Archibald and Feldman 2006, 640).

In the scenario described above, greater centralization may also indirectly harm IHEs performance by limiting manager's ability to pursue alternative revenue generating strategies such as tuition increases. Another indirect way in which losses of revenue may harm performance is by hindering IHE's ability to recruit high-performing students. Because 10 percent of a university's national ranking can be based on financial resources available per student (Morse and Brooks 2019), high-performing students may choose to enroll at more highly ranked

IHEs perceived as more prestigious and are better positioned to support their educational pursuits. Results from testing hypotheses **H4** and **H5** offer additional support for this rationale. Findings related to external environment strategies were as expected and suggest that institutions tended to have higher graduation rates when they engaged in activities seeking to exploit the environment. Conversely, lower levels of performance was observed among IHE's that tended to engage in buffering type strategies, particularly for IHEs in more centralized governance structures.

Substantively, in contrast to relationships observed in law enforcement agencies (S. Nicholson-Crotty and O'Toole 2004), results in this study suggest that external management activities has a far greater impact on overall performance compared to management activities that are internally focused. It also indicates the ability of certain IHEs to identify and engage in effective management strategies that enhance performance. Structural features may also help explain why compared to other factors, internal management (M_1) was observed to have a small positive relationship with graduation rates (**H3**). It was hypothesized that a greater focus on internal management activities, such as ensuring efficient day-to-day operations and increasing human resource support, can induce greater organizational stability (O'Toole and Meier 1999; 2003). By building on a foundation of high performance, managers can leverage internal activities that foster stability and establish operational routines which ensure that levels of performance are maintained and will carry forward into the future (S. Nicholson Crotty and O'Toole 2004). However, support for **H6.1** and **H6.2** was more mixed and contingent based on results testing interactive elements of stabilizing influences. First, it was observed that by increasing internal management efforts, IHEs can be less constrained by prior performance; however, this effect was rather small and was not statistically significant. A more concrete finding based on results was that internal management activities are less important for performance in more centralized structures. Unlike lower performing IHEs, however, universities with higher

graduation rates might leverage internal management efforts to maintain performance, even in more centralized governance settings. This finding can be further unpacked by returning attention to M_2.

Despite the dearth of existing evidence testing external management (M2) and hierarchy/stability within the same model of the OTM framework, findings in J. Nicholson-Crotty and Meier's (2003) study suggest that political and economic features of the environment affect state HE appropriations and other policy outcomes, but also permeate levels of bureaucracy down to the institutional level and affect organizational factors directly related to performance. It was also hypothesized that greater levels of centralization would decrease the impact of environmental forces (**H7.1**). The estimate for the interaction of these two terms (= 0.82, SE = 0.39, p ¡ 0.05), however, indicates that there may be more nuances to this relationship in the context of Higher Education; increases in state centralization may actually enhance the negative impacts of environmental forces, but with a caveat for external management. Focusing on the three-way interaction (M_2SX_t) presented in column four of Table 5.1, an alternative explanation is that IHEs in more centralized state structures tend to focus on external strategies buffering the environment. This would be indicated by lower scores on M2. Thus, if we flip the sign of the coefficient for the three way interaction it could also be interpreted as decreases in M_2, particularly for IHEs operating in states that have more regulatory and budgetary authority, may contribute to decreased graduation rates. These findings do not contrast expectations that, 1) higher levels of performance would be observed among IHEs in more centralized environments and who engage in exploiting strategies (**H7.2**), and 2) buffering strategies would increase performance in less centralized structures(**H7.3**). Despite this congruency, the logic underpinning contextual dependencies may need refinement in HE policy settings and is explored further in Chapter 6.

Summary

In summary, the evidence presented in this chapter provides evidence generally supportive of the validity of the OTM framework, and its ability to isolate management factors contributing to performance in HE (as measured by graduation rates). Because the focus of this study is on overall between differences in performance, future work may seek to use alternative methodological techniques to understand non-linear contextual effects influencing performance.[5] Examining the influences and effect of management on performance across different empirical settings is also an important part of future public management research (Meier et al. 2015). Aligning with these contemporary theoretical orientations, the following chapter further explores contextual nuances observed in the present investigation. Specifically, Chapter 6 presents a deconstructed model testing individual variables representing each PCA term in order to acknowledge institutional differences and examine how different types of IHEs across the spectrum of graduation rates tend to manage performance. It is hoped that this alternative presentation of results, though brief, will shed light on the political economy of HE and be of practical use to stakeholders seeking to enhance performance.

[5]These contextual effects appear to limited to low performing institutions, a relatively smaller subset of the sample used in this study.

Table 5.1: *Final ACS-Fixed Effects Models (years 2002-2010)*

	(Model 3a) Full Model	(Model 3b) Stabilizing Influences	(Model 3c) Environmental Management
Intercept	50.29***	50.21***	50.19***
	(0.09)	(0.11)	(0.10)
Prior Performance (O_{t-1})	0.95***	0.94***	0.94***
	(0.01)	(0.01)	(0.01)
Governance Structure (S)	-1.38***	-1.50***	-1.70***
	(0.42)	(0.48)	(0.45)
Internal Management (M_1)	0.03	0.05	0.00
	(0.13)	(0.17)	(0.13)
External Management (M_2)	0.86***	0.87***	1.04***
	(0.18)	(0.18)	(0.20)
State Environment (X_t)	-0.11		-0.36**
	(0.11)		(0.15)
Internal Interactions:			
O_{t-1}*S		-0.03	
		(0.04)	
O_{t-1}*M_1		0.005	
		(0.006)	
M_1*S		-0.42	
		(0.84)	
O_{t-1}*M_1*S		0.04*	
		(0.02)	
External Interactions:			
M_2*S			0.38
			(0.40)
M_2*X_t			0.23
			(0.14)
S*X_t			-0.82**
			(0.39)
M_2*S*X_t			0.20
			(0.40)
-2LL	4650.9	4663.2	4645.9
BIC	4660.8	4673.1	4655.7
χ^2	77.63***	75.40***	73.12***

Note: n=908. Standard errors in parentheses. Two-tailed tests.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6

Probing Context

Introduction

Because an understanding of the average impact that management factors may have on overall graduation rates may not fully capture the full range of "managerial points/offices of leverage" nor "multiple managers" contrasting foci on external and internal management practices (O'Toole and Meier 1999, 524), examining these relationships among subsets of the sample may shed light on such idiosyncrasies. Specifically, testing these relationships for different types of institution may aid in further evaluation the OTM framework, and may promote a clearer and more generalizable understanding of management's contribution to performance in Higher Education. In addition to examining internal and external management strategies across policy contexts, more recent scholarship has sought to unpack the role that political and structural factors may also have in shaping outcomes (George, Van de Walle, and Hammerschmid 2019; Meier et al. 2015),

where findings suggest that the extent to which management matters for performance varies across policy contexts. Given the exploratory nature of the following analyses, Chapter 6 proceeds in the following order. In lieu of presenting guiding questions and hypotheses, as all have already been addressed, Chapter 6 begins with directly describing the method for selecting variables that composed the previously tested PCA terms. While it is clear that management, past performance, and structure may matter for graduation rates, results from a deconstructed model presents relationships between performance and the individual variables used in this study (presented in Table 6.1). Table 6.1 also includes the average values for each independent variable used in the model for three different institution types; land-grant institutions, state flagships, and Historically Black Colleges and Universities (HBCUs). Taken together, these results may help corroborate findings previously presented, but may aid administrators and other HE stakeholders seeking actionable management strategies to enhance performance.

Variables representing each term in the conceptual model were chosen under two considerations. The first consideration involved identifying variables with relatively high loadings on PCA terms presented in Chapter 4.[1] Secondly, sets of these high loading variables were further winnowed by choosing only those sharing a large effect size association ($r \geq 0.50$) with graduation rates (see pairwise correlations in Table 4.1).

Following the process described above, the selected measures for internal management included instructional expenditures and faculty salary. External management included those variables capturing aspects of exploiting the environment, specifically the enrollment of high performing, high income students as well as the amount of net tuition revenue IHEs generated. Facets of buffering the environment as part of external management strategies included variables capturing

[1]Comrey and Lee (1992) suggest that variables loading onto a factor at 0.71 or higher are potentially excellent indicators of the given factor.

enrollment of first generation and part-time students. Past performance and governance structures are not included in these models, primarily because of the exploratory nature of this chapter, but also because their large effect on performance and resulting implications has already been addressed.

Discussion of Contextual Results

Results for contextual comparisons of land-grant institutions, state flagships, and Historically Black Colleges and Universities (HBCUs) are as follows. Column two of Table 6.1 presents results of the ACS regression model utilizing individual variables. With the exception of student family income, coefficient estimates for all variables were observed to share statistically significant relationships with graduation rates.

[Insert Table 6.1 about here]

Turning first variables of internal management (M_1), both instructional expenditures ($\beta = 0.27, SE = 0.09, p < 0.01$), and faculty salary ($\beta = 0.13, SE = 0.04, p < 0.01$), were significant positive predictors of graduation rates after accounting for other variables in the model. Results suggest that for every additional one-thousand dollars that IHEs spent on instructional activities, graduation rates increased by about a quarter percent. Graduation rates similarly increased by about 0.13 percent for every one thousand dollar increase in faculty salaries. It was of little surprise that variables capturing aspects of external management were also observed to share strong relationships with performance. For each one point increase in an enrolled student cohort's average SAT/ACT equated score, graduation rates tended to increase by a full percent ($\beta = 1.02, SE = 0.14, p < 0.01$), holding other factors constant. A similar significant positive relationship was not observed in the enrollment of high income students, but significance was observed for the amount of net tuition revenue ($\beta = 0.35, SE = 0.02, p < 0.10$). It is quite possible that these two variables are explaining similar aspects of variability in

graduation rate. While grand mean centering helps alleviate concerns of multicollinearity (smaller standard errors), it does change not the relationship between predictors and the dependent variable; because the effect size of student family income is quite small, net tuition revenue may indeed be masking effects of student family income. Nevertheless, institutions seeking to generate additional revenue by raising tuition costs must also enroll students that possess the means to shoulder a greater financial burden. Assuming that state oversight authorities permit tuition price hikes, this strategy is unlikely to generate additional revenue for IHE's that serve less affluent and disenfranchised student populations.

These results may be not be surprising to many practitioners, but underscore points of leverage predictive analytics companies often seek to exploit in the political economy of higher education and why IHEs invest in such services (Daniel 2015). This point is further highlighted by coefficient estimates for the buffering strategies universities employ. Higher enrollment levels of both first generation ($\beta = -0.48, SE = 0.08, p < 0.01$) and part-time students ($\beta = -0.39, SE = 0.05, p < 0.01$), appear to have rather large negative associations with graduation rates. The software solicited by predictive analytics companies often identifies these students possessing these characteristics are at greater risk of attrition; a circumstance that many IHEs closely monitor to and seek to invest resources in. A downside to this approach, however, is that institutions may become more selective in their enrollment strategies in order to meet state policy goals (Ewell and Jones 2006). These results may also reflect the important role managerial activity plays in maintaining networks and relationships and highlight how networked relationships indirectly influence IHE's management strategies and subsequent performance (O'Toole and Meier 1999). Future research may seek to refine how these networked relationships manifest across levels of centralization in state governance structures and can indirectly influence performance.

While numerous implications can be derived from these results, there are several findings that merit further discussion in the context of the present study.

The first is that while internal management may influence performance less than external management activities for IHEs in general , this broad brush approach does not paint a complete picture of management's ability to impact performance. For IHEs in certain contexts, internal management activities may actually prove critical to improving graduation rates. Compared to Land Grant and state-flag ship institutions, results in this study suggest that HBCU's allocate around half as much to student instructional expenditures and spend 30 percent less on faculty salaries. Thus, the inability to dedicate resources to these internal areas of management (student academic and financial support) may help partially explain low performance levels among institutions such as HBCU's; a rationale similarly supported in recent HE data (The Carnegie Classification of Institutions of Higher Education 2014). Results from the present study may also be important because given the vast amount of internal activities in which IHEs engage to fulfill multiple institutional and state-level goals, findings help identify and evidence some of the feasible and truly important managerial inputs for graduation rates across contexts. Presented findings may be especially salient to less autonomous IHEs and/or managers that have fewer external managerial tools available to enhance performance, and may seek alternative managerial strategies that are more effective and take into account for their institutions unique contextual circumstances. Two of these alternative strategies are discussed below.

The first suggested strategy is more prospective in nature and involves IHE stakeholders leveraging networked relationships and policy channels at the state-level to incite change. Similar to efforts that reformed environmental policy in the U.S. during the 1970s, symbolic and expert policy pathways may be useful avenues of legislative reform in HE today (Conlan, Posner, and Beam 2014). Based on theory guiding this study and empirical results, IHEs may be able to take advantage of the mounting political pressure facing lawmakers from public demands to improve student access, success, and equity in public HE (Jones 2017). In light of the high public saliency of this issue, budgetary decision-makers may be more

likely to support legislative reform that strategically directs state resources to low-performing IHEs in support areas more likely enhance graduation rates (e.g., student support and expenditures, faculty compensation, etc.). To complement these efforts, HE advocates may gain additional traction with decision-makers during policy formulation by supporting their arguments with evidence (Bolling 2019). Future scholarship, similar to that of the present study, can provide evidence suggesting why current resource allocation strategies are unlikely to work for certain types of IHEs, and where resources might be more effective to help institutions fulfill their mission while simultaneously enabling government to achieve broader public policy goals. As Ewell and Jones (2006) suggest, some states such as West Virginia and Kentucky have passed legislation recognizing that institutional capacities vary across contexts. Indeed, "context matters a lot in determining a state's ability to conceive of – and sustain – the kind of public agenda" necessary to fully realize HE's contribution to the greater public good (Ewell and Jones 2006, 15).

The second related strategy involves bridging the divide between research and practice. Results of this study support many of the well-known predictors of graduation rates; levels of wealthy high-performing students retain a large positive effect on graduation rates even after accounting for complex structural and environmental features. When low-performing IHEs are unable to enroll students with these characteristics or serve less-affluent student populations (HBCUs), results suggest that more resources should be invested in student support and retention. Interestingly, the conclusions stemming from results in this study have been independently corroborated by recent efforts at Georgia State University. In addition to increasing diversity enrollment to record levels and investing heavily in technology and predictive analytics, The Panther Retention Grants initiative have made it twice as likely that at-risk students (students at risk of dropping out) will graduate (Georgia State University 2018)[2]. Beyond substantially improving graduation

[2]compared to at-risk students that dropped because of financial distress

rates, the return on investment is also quite impressive. Based on Academic Year 2016 data, increased retention and graduation rates resulted in a net return that was two to four times the amount it cost to administer the program (1̃.5 million dollars, Georgia State University 2018).[3]. Because the program is self-sufficient, Georgia State has continually scaled up the number of grants awarded over the past several years. The outcomes of this program support several results in the present study and demonstrate that situational factors and contextual constraints can be offset by innovative internal management strategies designed to enhance performance. Taken together, these findings hold great promise for IHEs seeking to improve the graduation rates of their own students; regardless of their students' backgrounds and resource constraints.

[3]Because retained students attend more semesters, additional revenue reflect pell grants and tuition costs, but exclude emergency aid programs

Table 6.1: *Deconstructed Model and Contextual Comparisons*

	Model 4a[a.] Deconstructed *(n=980)*	Mean		
		Land Grant *(n=200)*	State Flagship *(n=163)*	HBCU *(n=36)*
Intercept[b.]	50.52***	63.11	70.90	34.85
	(0.80)			
Internal Management (M_1)				
Instructional Expenditures (1k)	0.27***	9148.33	11333.93	5980.97
	(0.087)			
Faculty Salary (1k)	0.13***	74011.04	80699.1	53789.97
	(0.04)			
External Management (M_2)				
SAT/ACT Score	1.02***	26.20	28.11	19.44
	(0.14)			
Net Tuition Revenue	0.35*	7377.50	8701.97	4982.11
	(0.02)			
Student Family Income (1k)	0.03	65677.07	73719.45	37796.57
	(0.04)			
First Gen. Enrollment	-0.48***	0.31	0.26	0.43
	(0.08)			
Part−Time Enrollment	-0.39***	0.17	0.17	0.18
	(0.05)			

Note: n=908. Standard errors in parentheses. Two-tailed tests.

[a.] -2LL = 5123.4.[b.] Average Graduate Rate for Mean Comparisons. [c.] Not applicable for Mean Comparisons

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7

Conclusions

Questions Addressed

Evidence provided in the study addressed several overarching questions. The first question sought to understand how contemporary theories of public management could be extended to understand management's relationship to graduation rates at public universities. The conclusion of this study is that management matters for performance in higher education, just as scholarship in other policy domains (cross-national, K-12 education, and law enforcement) have reached similar conclusion. The more recent direction of literature in this vein of public management scholarship, however, seeks to understand how interactive aspects of managements relationship to performance, as well as how these relationships vary across context. Results in this study sought to unpack these nuanced relationships within HE and explored related contextual variations. The final section of this dissertation proceeds to summarize these findings and presents several theoretical and practical implications.

Public Management and Performance

Evidence presented in this study suggest the OTM framework is a useful theoretical lens to understand managements relationship to performance, and there a several takeaways. This is the first study known to operationalize each term in the OTM framework and subsequently test those terms within the same empirical setting and across different intra-study contexts. Evidence generated in this study support many features of the model, and particularly highlight the salient impact that stability and hierarchy can play within public organizations such as institutions of higher education. Very few studies have explicitly tested how stability and structure impact performance and policy outputs, while literature that has explored this relationship has produced mixed findings (J. Nicholson-Crotty and Meier 2004, 94-95). Findings in this study may help clarify the role of structure and stability, suggesting that governance structures do interact with management terms and environmental influences to impact performance. Despite contextual dependencies that make describing this relationship complex, a meaningful understanding can be gleaned by knowing that in general, IHEs operating in more centralized and hierarchical environments tend to have lower levels of performance. Instead of buffering external influences and shocks from infiltrating IHEs, governance structures may actually enhance the negative impact of those forces unless managers are able to capitalize on opportunities in their operating environment. These strategies can be more feasible for large IHEs with plentiful resources, but in certain IHE contexts these external management levers are not available.

In earlier chapters, it was suggested that greater levels of stability and centralization would enable IHEs to focus on external managerial and networking efforts, and thus better capitalize on opportunities in the environment to enhance performance. Data generally support this reasoning, but this relationship was not uniform across IHE contexts. Based on data in this study, low-performing

IHEs might engage in buffering strategies because situational factors render external management levers that enhance graduation rates unavailable. For instance, IHEs primarily serving economically depressed regions or disenfranchised populations are more likely to enroll students that have historically faced more difficulty in completing their degree and can benefit from a greater investment of institutional resources (Day and Newburger 2002). This circumstance means in certain contexts, such as IHEs serving less privileged populations, a full-range of performance-enhancing management tools are unavailable.[1]. Greater state centralization and authority might further compound these challenges, as findings in this study and related scholarship (J. Nicholson-Crotty and Meier 2003) suggest that IHEs within more hierarchical bureaucratic structures do not operate more freely from the state political environment. In turn, political controls and accountability mechanisms can limit managerial discretion and prevent low-performing IHEs from pursuing alternative strategies which enhance performance but are not perceived by lawmakers to align with state priorities (e.g., bolster internal management efforts to support students by pursuing alternative revenue streams and external partnerships). In other policy settings such as K-12 education, Meier and O'Toole (2003) show that managers exercising discretion were able to obtain greater levels of resources, attract more qualified teachers, and ultimately enhance performance (standardized test scores). Important theoretical and practical contributions may be realized by further integrating such contextual dependencies into the study of performance management, and future research involving higher education policy settings may benefit from exploring how relationships observed in this study can influence other performance metrics in HE (e.g., student learning outcomes, employment, post-graduation outcomes).

[1]Management tools in HE such as recruiting students who have likely had more financial and educational support throughout their lives.

Future work may also seek to examine the personal characteristics of managers and managerial quality. Presidents were chosen for this study and are recognized to be important components of managing universities by lawmakers (Bolling 2019), but appear to have minimal impact on graduation rates, at least from an aggregated perspective of public higher education. When the focus is shifted to the institutional level, however, other findings suggest that the characteristics and internal management strategies of presidents, chancellors, and other institutional leaders might play a much larger role in shaping performance. Contingencies of the OTM framework were quite apparent in the context of HE, which may also prove as a fruitful empirical setting for future research in public management and higher education. Indeed, this dissertation is an important step in developing a more parsimonious and generalizable theory of performance management; one that moves beyond asking the question of *how* management matters for performance, but specifies *when* and under *what* conditions and contextual circumstances.

Performance Management in Higher Education

Various management activities can shape performance in HE. External management strategies can substantially influence graduation rates, but internal management strategies may be more critical for performance at some institutions. Depending on situational factors such as resource availability and the type of student an institution serves, IHEs with lower levels of performance and limited autonomy may be unable to enroll high-income high-performing students. In these contexts, more feasible management strategies call for an internal focus to enhance performance, such as increasing instructional expenditures, student support, and greater investment in human resource management. Paradoxically, because these strategies require the investment of additional resources they may be difficult to implement for IHEs with limited financial capacity. Thus, improving graduation

rates for IHEs that are more constrained by situational factors will require extensive managerial innovation.

Possible innovative approaches to increase graduation rates might focus on the retention of at-risk and disenfranchised students. Indeed, programs that strategically direct limited resources to specific areas of student support (scholarships, grants, and data analytics) can not only retain more students at risk of dropping out, but may become self-sustaining and enable IHEs to overcome constraints they face when seeking to improve performance. Investing resources in these activities simultaneously promulgate state and institutional perspectives by enhancing both equity and performance in HE.

Other practical takeaways can be derived from this dissertation. As most knowledgeable evaluation or educational assessment specialists understand, outcomes are what one hopes to achieve. While graduation rates are somewhat straightforward, outcomes are often confounded with processes or, the things organizations do to achieve goals. Some may argue that graduation rates are a measure of process rather than a broader performance outcome more closely aligned to the purpose of higher education (i.e., improving student learning). Unfortunately, this is a moot point until a more unified understanding of higher education's purpose and/or goal is realized, but that too is unlikely given recent public trends in the HE landscape. More certain is that the goals of IHEs over the past several decades have become more aligned with state policy agendas; and graduation rates will continue to be an important metric of accountability used by IHEs to demonstrate their public value. While it is not the intent of this study to drift into normative acquiescence of reported results and implications, it is hoped that findings from this study and related research may help spark a broader conversation in HE to improve student retention, identify other meaningful measures of performance, and facilitate a better understanding of how public HE can help students of all backgrounds learn, grow, and aspire to be productive citizens through the attainment of a college degree.

Concluding Remarks

In reference to his mid-nineteenth century journey to the United States, Alexis de Tocqueville once quipped, "The effort made in the country to spread instruction is truly prodigious. The universal and sincere faith that they profess here in the efficaciousness of education seems to me one of the most remarkable features in America" (as cited in Pierson 1998, 452). This general sentiment is perhaps one of the few features of the HE landscape that has remained unchanged over time. What has changed, however, is the way that HE's "efficaciousness" might be defined and used as a mechanism of accountability to ensure that public IHEs continue to promote the public good. Understanding how IHEs manage performance such as graduation rates, particularly across demographic, political, and socio-economic contexts, are thus critical to ensure that "A good higher education system [with] two basic attributes: high quality and full access for qualified students..." is maintained (Archibald and Feldman 2006, 638).

Management matters for performance in Higher Education. Many of these strategies tend to be externally oriented (as conceptualized in the present study), suggesting that high-performing IHE administrators are sensitive to their unique operating environment and the performance constraints they face. Whether this entails capitalizing on opportunities that are known to enhance performance or investing resources internally to support students, ensuring that students are retained and graduate enables institutions to demonstrate their responsiveness to the state policy goals increasingly emphasized by lawmakers and citizens alike. Indeed, Ewell and Jones (2006) assert that public institutions have become more accountable to broader state interests over the past several decades. Findings in this study also support other public management scholarship, where managers more actively engaged in external strategies can enable their organization's performance to be less constrained by features of the operating environment. However, stabilizing features of performance related to institutional autonomy and

state centralization can attenuate the extent to which IHEs effectively manage performance and achieve public goals. Indeed, greater centralization and hierarchy can hinder performance when adaptability and flexibility are needed (O'Toole and Meier 1999) and will continue to be needed to achieve the goals of HE in years to come (Grawe 2018). When IHEs are limited in their ability to engage in certain external management strategies, such as constraints imposed by environmental features or state mandates limiting enrollment and tuition strategies, enhancing performance may become more difficult; particularly for low-performing IHEs. To overcome these challenges, findings suggest that IHE should turn attention to internal management strategies that strategically support students who need it most; and this will likely require a great deal of innovation to feasibly be effective and sustainable. These conclusions are actively being corroborated in practice by institutions like Georgia State, and demonstrate that the academic-practice gap can be narrowed (Rynes, Colbert, O'Boyle 2018). A transformation is well underway in American public Higher Education, again, and the important role of management in helping institutions achieve performance is only likely to be magnified in the coming decade.

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